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November 30, 2009

382914

Mr. Craig Hoffman
Project Manager
California Energy Commission
1516 Ninth Street, MS 15
Sacramento, CA 95814-5512

Subject: Mariposa Energy Project (09-AFC-03)
Data Response Sets 1A and 1B, Responses to CEC Staff
Data Requests 1 through 68

Dear Mr. Hoffman:

Attached please find 13 hard copies and 13 electronic copies on CD-ROM of the Mariposa Energy Project's Data Response Sets 1A and 1B. This Data Response Set was prepared in response to California Energy Commission Staff Data Requests 1 through 57 for the Application for Certification for the Mariposa Energy Project (09-AFC-03) dated October 23, 2009. Responses to California Energy Commission Staff Data Requests 58 through 68 (Set 1B) for the Application for Certification for the Mariposa Energy Project (09-AFC-03) dated October 28, 2009 are also being provided.

If you have any questions about this matter, please contact me at (916) 286-0348.

Sincerely,

CH2M HILL

Doug Urry
AFC Project Manager

Attachment

cc: J. Salamy, CH2M HILL
B. Buchynsky, Mariposa Energy, LLC.

APPLICATION FOR CERTIFICATION

DATA RESPONSES, SETS 1A AND 1B

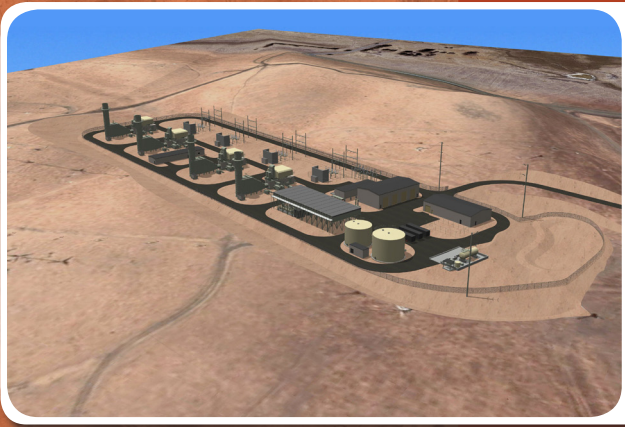
RESPONSE TO DATA REQUESTS 1 TO 68

SUBMITTED TO THE

California Energy Commission

FOR THE

Mariposa Energy Project



SUBMITTED BY

Mariposa Energy, LLC

TECHNICAL ASSISTANCE BY

CH2MHILL

NOVEMBER 2009

EY012009005SAC

APPLICATION FOR CERTIFICATION

DATA RESPONSES, SETS 1A AND 1B

RESPONSE TO DATA REQUESTS 1 TO 68

SUBMITTED TO THE

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FOR THE

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Mariposa Energy Project

(09-AFC-02)

Data Responses, Sets 1A and 1B

(Response to Data Requests 1 to 68)

Submitted to

California Energy Commission

Submitted by

Mariposa Energy, LLC

With Assistance from

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

November 2009

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Introduction

Attached are Mariposa Energy's responses to the California Energy Commission (CEC) Data Request Set 1A (numbers 1 through 57) and Set 1B (numbers 58 through 68) regarding the Mariposa Energy Project (MEP) (09-AFC-03) Application for Certification (AFC).

The responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as the CEC presented them and are keyed to the Data Request numbers (1 through 68). New or revised graphics or tables are numbered in reference to the Data Request number. For example, the first table used in response to Data Request 36 would be numbered Table DR36-1. The first figure used in response to Data Request 42 would be Figure DR42-1, and so on.

Additional tables, figures, or documents submitted in response to a data request (supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of each discipline-specific section and are not sequentially page-numbered consistently with the remainder of the document, though they may have their own internal page numbering system.

Air Quality (1-14)

Background: Air Quality Permit Application

The proposed project will require a Determination of Compliance (DOC) analysis from the Bay Area Air Quality Management District (BAAQMD or "District"), which will be integrated into the staff analysis. Therefore, staff will need copies of relevant correspondence between the applicant and the District in a timely manner in order to stay up to date on any issues that arise prior to completion of the Preliminary or Final Staff Assessment.

Data Request

1. Please provide copies of all substantive District correspondence regarding the Mariposa Energy Project permit application, including e-mails, within one week of submittal or receipt. This request is in effect until the final Commission Decision has been recorded.

Response:

Copies of all substantive District correspondence regarding the Mariposa Energy Project's air permit application will be transmitted to the CEC within one week of receipt or submittal.

Background: BACT Analysis

In AFC Section 5.1.6.2.2 BACT Analysis, the AFC states, "A summary of the Best Alternative Control Technology analysis is presented in Appendix 5.1E". However, Appendix 5.1E is the permit application sent to BAAQMD. Of special concern is the proposal for BACT of carbon monoxide (CO), which is at an emission rate (6.0 parts per million) that is higher than other proposals Energy Commission staff is currently reviewing (namely 4.0 ppm CO proposed by Turlock Irrigation District for the Almond 2 Power Plant).

Data Requests

2. Please provide the summary of the BACT analysis.

Response:

The BACT analysis included a review of the following databases and information:

- BAAQMD BACT clearinghouse (http://hank.baaqmd.gov/pmt/bactworkbook/default.htm)
- EPA BACT/LAER database (http://cfpub.epa.gov/RBLC/htm/bl02.cfm)
- SCAQMD BACT database (http://www.aqmd.gov/bact/)

- CEC Orange Grove, Chula Vista, SFPUC, Turlock Irrigation District Almond 2, and Canyon Power Plant license proceedings (http://www.energy.ca.gov/)

Based on this analysis, it was determined the current CO BACT level routinely achieved in practice was 6.0 ppm and that a lower CO limit of 4 ppm is currently being used in recent permitting actions (see the response to Data Request # 3).

3. Please describe whether the proposed LM6000 combustion turbines would be able to achieve 4.0 ppm CO.

Response:

Based on discussions with the turbine vendor and a review of available source test data for LM6000 units in operation, Mariposa Energy, LLC believes the LM6000 turbine would be able to achieve a 4 ppm CO emission level while maintaining a 2.5 ppm NOx emission level. Therefore, Mariposa Energy, LLC will coordinate with the BAAQMD to revise the CO emission level to reflect the most recent BAAQMD BACT requirement for CO.

Background: Initial Commissioning

The initial commissioning values according to AFC Table 5.1-11 (per turbine) seem to exceed the maximum low-load and startup emissions expected for the LM6000s. For nitrogen oxides (NOx), the hourly emission rate expected during commissioning (51 lb/hr) exceeds even the uncontrolled NOx emissions shown (44 lb/hr) on the vendor sheet (AFC Appendix 5-1B, Table 5.1B.2). Additionally, the initial commissioning steps described in the AFC do not contain information regarding how emissions would be monitored during the phase. The AFC (p. 5.1-24 and Table 5.1-25) describes how up to three turbines may simultaneously undergo commissioning and that the fire pump engine was not included in the commissioning impact analysis.

4. Please provide a discussion for any proposed mitigation during the commissioning period. For example, describe whether additional mitigation would be provided beyond that proposed for routine operations?

Response:

The commissioning schedule and emission estimate presented in Appendix 5-1B Table 5.1B.1 represents a maximum expected case. The durations and emission levels presented in this estimate, as noted by Staff, are overly conservative. The Applicant expects the BAAQMD to require the preparation and submittal of a commissioning plan prior to the start of the commission period, consistent with other recently permitted power plants.[1] The purpose of this plan is to minimize the operation of the turbines without the benefits of the emission control systems to reduce air emissions to the extent feasible. Therefore, additional mitigation is not warranted.

5. Please provide an explanation of how the hourly NOx, carbon monoxide (CO), and volatile organic compound (VOC) commissioning emission rates for the LM6000s were derived.

[1] PG&E's Gateway Generating Station (00-AFC-01), Condition of Certification AQ-5.

Response:

The hourly NOx, CO, and VOC commissioning emission rates, and associated schedule in AFC Appendix Table 5.1B.1, are based on correspondence with the turbine vendor. As discussed in the response to Data Request #4, the schedule and emissions represent an overly conservative estimate in order to determine potential ambient air quality impacts.

6. Please include the criteria pollutant emissions monitoring techniques, to be used during the initial commissioning monitoring. For example, describe which commissioning tests would occur with continuous emissions monitoring (CEM) systems installed and operational.

Response:

The continuous emissions monitoring (CEM) system will be installed prior to the first fire of the LM6000 turbines. Therefore, the CEM units will be operational during the turbine commissioning activities. However, the CEM system will not be certified prior to turbine commissioning.

7. Please describe whether MEP would accept a prohibition on simultaneous commissioning of more than three combustion turbines and a prohibition on commissioning with fire pump engine testing.

Response:

Mariposa would be willing to accept a Condition of Certification limiting the simultaneous commissioning of no more than three turbines prior to the final tuning of the units.

Background: Emission Offsets

The applicant's proposed offset package is uncertain. Information (including confidential information) submitted by MEP to Energy Commission staff do not provide detail regarding the specific emission reduction credits (ERCs) that are going to be used for the project. Staff eventually needs to know the exact location, the amount, and the offset ratios, including interpollutant offset ratios, applicable to each ERC that MEP proposes to use. This information may be submitted under confidential cover to staff, but staff expects to make this information available to the public with the staff assessment. Staff requires a finalized offset package to complete our analysis.

Data Request

8. Please provide a tabulated list showing expected emissions and emission offset accounting indicating the proposed quantity of offsets, including the location of emission reductions, in a quantity sufficient to fully offset the project's emissions. Please show the current updated ERC certificate number and former certificate number for all certificates that have been recently split and/or re-issued in the name of the project.

Response:

The emission reduction credits (ERCs) secured by Mariposa Energy, LLC, are BAAQMD Banking Certificates 1163 for NOx and 1165 for Precursor Organic Compounds (POC), currently held by Element Markets, LLC. ERC certificate 1163 is for 196.420 tons per year of NOx ERCs and certificate 1165 is for 64.000 tons per year of POC ERCs. Copies of the ERC certificates are provided in Attachment DR8-1. Table DR8-1 presents the expected MEP emissions, emissions offset accounting, proposed offsets, and quantity of offsets represented by the ERC certificates. Figure DR8-1 shows the location of the ERCs relative to MEP.

TABLE DR8-1
MEP Emission Reduction Credit Proposal

Pollutant	MEP Expected Emissions	Proposed ERCs Required	NOx ERC Certificate 1163	POC ERC Certificate 1165
NOx	48.6	55.9	196.420	—
POC	11.1	11.1	—	64.000

In reviewing emission reductions for qualification to be used as ERCs, the BAAQMD determines if the emission reductions satisfy the requirements of Real, Quantifiable, Permanent, Enforceable and Surplus. The surplus discount is done by subtracting any emission reductions that would have otherwise occurred through District rules, federal New Source Performance Standards (NSPS), and federal Maximum Achievable Control Technology (MACT) Standards. No further surplus adjustment or reduction of the ERCs is made at the time that the ERCs are actually used, which would reflect local and federal rules and requirements adopted after the ERCs were originally issued. This was confirmed through contact with Kenneth Lim and David Brunelle, the BAAQMD staff involved with the ERC program. Mr. Lim indicates that the BAAQMD has no plans to change its rules to require further ERC adjustment at the time that credits are used. Because the BAAQMD does not reevaluate the surplus discount at time of use for major sources, the USEPA guidelines allow an alternative demonstration of equivalency. Mr. Lim, who works on the annual equivalency demonstration, indicates that there are sufficient excess ERCs and other reductions each year. The District has had no difficulty in the past in making the annual equivalency demonstration.

The NOx ERCs originated from the Owens Corning Insulating Systems facility, located at 960 Central Expressway, Santa Clara, CA 95050. Banking Certificate 1163 indicates that the deposit of NOx emission reductions was made on December 29, 2003. David Brunelle of the BAAQMD indicated that the emission reductions were the result of modification of equipment and/or permit conditions.

The POC ERCs were originated from the Quebecor World San Jose operation, which was located at 696 E. Trimble Road, San Jose, CA 95131. Banking Certificate 1165 indicates that the deposit of POC emission reductions was made on March 27, 2000. The Quebecor emission reductions were the result of equipment shutdown.

Background

The applicant proposes to offset NOx and VOCs to comply with BAAQMD local requirements by securing emission reduction credits. Because the project is likely to also affect air quality in the San Joaquin Valley Air Basin, Energy Commission staff may require additional specific mitigation for particulate matter (PM10) and sulfur oxides (SOx) to ensure localized benefits to the area impacted directly by the Mariposa Energy Project. A complete mitigation strategy would provide one-to-one emission reductions for proposed PM10 and SOx emission increases.

Data Request

9. Please identify and quantify a complete package of proposed mitigation, especially for PM10. For example, if proposed by MEP, strategies to reduce emissions in the San Joaquin Valley and the effectiveness of such strategies would need to be explicitly identified by MEP and preferably developed in consultation with Energy Commission staff before staff makes the information available in the staff assessment.

Response:

Mariposa Energy has reached an agreement in principle and is currently working to finalize a binding agreement with the District staff to reduce the potential MEP ozone and particulate matter impacts to the San Joaquin Valley Air Basin. This agreement incorporates similar mitigation strategies employed in previous CEC licensing projects. This plan should be available by the end of December and will be submitted to the CEC once finalized.

Data Request

10. Please identify and quantify a mitigation strategy for proposed SOx emissions to ensure that MEP avoids contributing to additional PM10 violations of ambient air quality standards.

Response:

As noted in response to Data Request #9, Mariposa Energy is working to finalize an agreement with the District to reduce particulate matter impacts in the San Joaquin Valley Air Basin. This agreement incorporates similar mitigation strategies employed in previous CEC licensing projects. This plan should be available by the end of December and will be submitted to the CEC once finalized.

Background: Cumulative Modeling Analysis

Applicant states in the AFC they are working with San Joaquin Valley Air Pollution District (SJVAPCD) along with BAAQMD to complete all the background information for the cumulative air impact analysis, and are currently trying to identify other applicable sources from SJVAPCD to get a complete cumulative air impact analysis.

Data Requests

11. Please provide a copy of the Districts' correspondence regarding existing and planned cumulative projects located within six miles of the MEP site.

Response:

A copy of the SJVAPCD and BAAQMD correspondence is included in Attachment DR11-1.

12. Please provide the progress for the cumulative air quality impact analysis following the protocol proposed in the AFC.

Response:

The cumulative air quality impact analysis has been completed (See response to Data Request 13).

13. Please provide the cumulative air quality impact analysis.

Response:

The Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD) were contacted to identify potential cumulative air quality impact sources which have received construction permits but are not yet operational, or are in the permitting process (such as, the NSR or CEQA permitting process), and have a potential to emit 5 tons or more per year of NOx, CO, PM_{10}, $PM_{2.5}$, or SOx.

The BAAQMD identified three facilities within 6 miles that meet the above criteria; the East Altamont Energy Center (EAEC), the Tesla Power Project (TPP), and Waste Management of Alameda County. The SJVAPCD confirmed that there are no facilities that have requested or have received authority to construct permits within 6 miles of the MEP site in the previous two years. Table DR13-1 presents the list of BAAQMD facilities included in the cumulative impact modeling assessment.

TABLE DR13-1
MEP Cumulative Impact Sources

Facility ID	Facility Name	Permit Date	Permit Type	Status	Description
2066	Waste Management of Alameda County	Flare: Issued 2/11/09 IC Engines: Rec'd 01/28/08	ATC	FINAL	Addition of a flare and four IC engines.
13050	East Altamont Energy Center	Issued 07/24/02	CEC	FDOC	Gas Turbine Power Generation (three combustion turbines, one steam turbine, one auxiliary boiler, one emergency generator, one fire pump, and a 19-cell cooling tower)
13424	Tesla Power Project	Issued 02/07/03	CEC	FDOC	Gas Turbine Power Generation (four combustion turbines, one steam turbine, one emergency generator, one fire pump, and a 22-cell cooling tower)

Cumulative Air Quality Impact Analysis

The cumulative air quality impact analysis was performed using the model settings and the coarse and refined receptor grid modeling approach outlined in Section 5.1 (Air Quality) of the AFC. The short term 1-hour NO_2 modeling was further refined for EAEC and TPP by using the AERMOD ozone limiting method group function for the identical turbines at each facility (AERMOD, version 09292). The facility fence lines for the cumulative sources were not included in the modeling analysis with the exception of the fence line for Waste Management of Alameda County. This fence line was based on the outline of the current and future land fill areas identified by the BAAQMD.

Modeling Parameters

The emission and exhaust parameters used to estimate the cumulative impacts are presented in Table DR13-2. Because emission rates for $PM_{2.5}$ were not available for the cumulative sources, it was conservatively assumed that $PM_{2.5}$ emission rates were equal to those of PM_{10}, with the exception of the cooling tower emission rates for EAEC and TPP. Based on the California Emission Inventory Development and Reporting System (CEIDARS), the fraction of PM_{10} emitted from cooling towers which is less than or equal to 2.5 micron is 60 percent. Therefore, the EAEC and TPP cooling tower $PM_{2.5}$ emission rates were assumed to be 60 percent of the PM_{10} emission rates.

With the exception of the short term emission profiles noted for EAEC below, all sources at each facility were conservatively included in the cumulative impacts analysis. The source parameters were based on the following data sources:

- **Mariposa Energy Project:** source parameters and emission rates were based on the operating scenario, which includes start-up and shutdown emissions, resulting in the maximum predicted impacts presented in Table 5.1-26 of the AFC, with the exception of the 1-hour and 8-hour CO emission rates. The CO emission rates were calculated assuming a 4.0 ppm CO emission limit compared to a 6.0 ppm CO emission limit modeled for the AFC.

- **Tesla Power Project**: source parameters and emission rates were based on permitted source data received from the BAAQMD on April 16, 2009, the CEC Final Decision dated June 2004, and the Tesla Power Plant AFC application materials available on the CEC website: http://www.energy.ca.gov/sitingcases/tesla/index.html.

- **East Altamont Energy Center**: source parameters and emission rates were based on permitted source data received from the BAAQMD on April 16, 2009, the CEC Final Decision dated August 2003, and the East Altamont Energy Center AFC application materials available on the CEC website: http://www.energy.ca.gov/sitingcases/eastaltamont/index.html

  As shown in Table DR13-2, the short term modeled emission rates for EAEC represent the higher of the two emission rates for the emergency generator and fire pump. This is consistent with the modeling approach outlined in the EAEC AFC application materials. The short term turbine emission rates in Table DR13-2 are based on the maximum permissible emission rates for normal operations, which are identified in the CEC Condition of Certification (COC) AQ-25 (CEC Final Decision, August 2003). The annual emission rates are based on permit application materials provided by the BAAQMD, which include start-up and shutdown emissions.

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TABLE DR13-2
Summary of Modeled Emission Rates and Source Parameters (Point Sources)

Source Description	Easting (m)	Northing (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Emission Rates (g/s)									
								1-hr NOx	1-hr CO	1-hr SO_2	3-hr SO_2	8-hr CO	24-hr $PM_{10}/PM_{2.5}$	24-hr SO_2	Annual NOx	Annual $PM_{10}/PM_{2.5}$	Annual SO_2
Waste Management of Alameda County																	
Flare	618,237	4,179,174	290	16.8	1,172	2.76	3.64	0.998	3.308	1.108	1.108	3.308	0.284	1.108	0.998	0.284	1.108
IC Engine P-206	618,543	4,179,402	335	3.20	809	107	0.0635	0.108	0.034	6.34E-03	6.34E-03	0.034	7.35E-04	6.34E-03	0.037	2.52E-04	2.17E-03
IC Engine P-207	618,963	4,179,402	293	2.82	757	96.9	0.0635	0.108	0.034	6.34E-03	6.34E-03	0.034	7.35E-04	6.34E-03	0.037	2.52E-04	2.17E-03
IC Engine P-208	618,543	4,178,915	276	3.20	809	107	0.0635	0.108	0.034	6.34E-03	6.34E-03	0.034	7.35E-04	6.34E-03	0.037	2.52E-04	2.17E-03
IC Engine P-209	618,963	4,178,915	246	3.20	757	96.9	0.0635	0.108	0.034	6.34E-03	6.34E-03	0.034	7.35E-04	6.34E-03	0.037	2.52E-04	2.17E-03
East Altamont Energy Center																	
West Turbine	625,585	4,184,801	12.0	53.3	334	16.9	5.64	2.394	2.917	0.232	0.232	2.917	1.449	0.232	2.500	1.320	0.204
Middle Turbine	625,627	4,184,802	11.6	53.3	334	16.9	5.64	2.394	2.917	0.232	0.232	2.917	1.449	0.232	2.500	1.320	0.204
East Turbine	625,670	4,184,803	11.2	53.3	334	16.9	5.64	2.394	2.917	0.232	0.232	2.917	1.449	0.232	2.500	1.320	0.204
Auxiliary Boiler	625,548	4,184,775	12.0	30.5	436	21.5	1.07	0.189	0.630	0.011	0.011	0.630	0.334	0.011	0.063	0.115	0.004
Emergency Genset	625,600	4,184,684	12.4	3.05	747	35.0	0.23	0.814	0.854	-	-	0.107	2.72E-03	-	0.019	1.49E-03	2.58E-05
Fire Water Pump	625,425	4,184,745	12.2	3.05	812	63.4	0.15	-	-	0.016	5.29E-03	-	-	6.61E-04	6.27E-03	2.66E-04	1.81E-04
Cooling Tower Cells 1 - 19	See Note	See Note	12.2	17.4	294	10.0	10.3	-	-	-	-	-	0.016/0.0096	-	-	0.016/0.0096	-
Tesla Power Project																	
Turbine/DB 1	625,969	4,176,031	118.3	61.0	359	16.8	5.79	1.974	2.404	0.252	0.252	2.404	1.606	0.252	1.797	1.366	0.253
Turbine/DB 2	626,011	4,176,031	117.1	61.0	359	16.8	5.79	1.974	2.404	0.252	0.252	2.404	1.606	0.252	1.797	1.366	0.253
Turbine/DB 3	626,096	4,176,031	116.2	61.0	359	16.8	5.79	1.974	2.404	0.252	0.252	2.404	1.606	0.252	1.797	1.366	0.253
Turbine/DB 4	626,138	4,176,031	116.1	61.0	359	16.8	5.79	1.974	2.404	0.252	0.252	2.404	1.606	0.252	1.797	1.366	0.253
Cooling Tower Cells 1 – 22	See note.	See note.	118.0	16.9	307	6.51	9.14	-	-	-	-	-	0.026/0.016	-	-	0.026/0.016	-
Emergency Genset	626,067	4,175,976	118.9	1.94	787	95.4	0.20	0.810	0.155	0.050	0.017	0.019	0.055	2.10E-03	2.77E-03	9.35E-05	5.42E-04
Fire Water Pump	626,217	4,175,917	116.1	3.00	622	75.0	0.13	0.467	0.110	0.047	0.016	0.014	8.19E-03	1.97E-03	4.81E-03	6.26E-04	5.73E-04

Notes: The coordinates for each of the identical cooling tower cells are included in the modeling input files available on CD.

- **Waste Management of Alameda County**: source parameters and emission rates were based on permitted source data received from the BAAQMD on April 16, 2009 and additional correspondence with the BAAQMD on April 30, 2009.

Cumulative Impact Assessment Results

The results of the cumulative impact assessment are presented in Table DR13-3. Because the EAEC application is subject to the provisions included in the CEC's *Extension of the Deadline for Commencement of Construction*, August 13, 2008, which require the Applicant to modify the air quality analysis to reflect the new emission standards that have taken effect since the project received certification, and the Tesla Power Plant certification was recently terminated (October 16, 2009), the results in Table DR13-3 represent a conservative assessment of the reasonably foreseeable projects within six miles of MEP.

TABLE DR13-3
Cumulative Impacts Analysis—Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Predicted Cumulative Impact ($\mu g/m^3$)	Background[a] ($\mu g/m^3$)	Total Cumulative Impact[b] ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2	1-hour	218	105	323	338	-
	annual	1.2	18.8	20	-	100
SO_2	1-hour	129	47.1	176	655	—
	3-hour	68	34.0	102	—	1,300
	24-hour	20	18.3	39	105	365
	annual	1.0	5.5	6.5	—	80
CO	1-hour	504	5,039	5,543	23,000	40,000
	8-hour	133	2,645	2,778	10,000	10,000
PM_{10}	24-hour	8.7	126	135	50	150
	annual	2.4	27	29	20	-
$PM_{2.5}$	24-hour	7.8	85.3	93.1	-	35
	annual	1.5	13.1	14.6	12	15

[a] Background concentrations as reported in Table 5.1-26 of the AFC.
[b] Total cumulative impact includes the predicted cumulative impact plus the background concentration.

Despite the conservative nature of the analysis, the total hourly and annual NO_2 cumulative impacts would remain below the respective ambient air quality standards. Therefore the cumulative NO_2 impacts would be less than significant. The modeled cumulative impacts of SO_2 and CO are far below the state and federal standards. Therefore, the SO_2 and CO cumulative impacts would be less than significant.

Because the background ambient concentrations of PM_{10} and $PM_{2.5}$ are above the respective standards, any increase in PM_{10} or $PM_{2.5}$ concentrations would result in a significant impact without mitigation. MEP's contribution at the location of the maximum predicted PM_{10} and $PM_{2.5}$ cumulative impacts is less than four percent (4%) of the predicted impact and MEP is providing $PM_{2.5}$ and PM_{10} mitigation consistent with the BAAQMD's New Source Review Rule. Therefore, significant cumulative PM_{10} or $PM_{2.5}$ impacts are not expected as a result of MEP.

Five compact diskettes containing the air dispersion modeling files will be provided to CEC staff. Compact diskettes of the air dispersion modeling files will also be provided to others upon request.

Background: Diesel Fire Pump Engine

The proposed diesel fire pump engine would meet stringent Tier 3 emission standards, but in the MEP emission inventory and impact analysis, a 20-minute testing duration is assumed (AFC Appendix 5.1B, Table 5.1B.7) instead of the typical one-hour emission rate. It is not clear if MEP is proposing to limit NOx and Nitrogen Dioxide (NO2) impacts from this source by limiting its testing to 20 minutes per test.

Data Request

14. Please describe whether MEP would accept a prohibition on using the fire pump engine for durations of more than 20 minutes per test, and if not, please provide a revised air modeling analysis using the one-hour test duration.

Response:

Mariposa Energy is willing to accept a condition of certification limiting the fire pump operating duration to no more than 20 minutes per hour for testing and maintenance purposes.

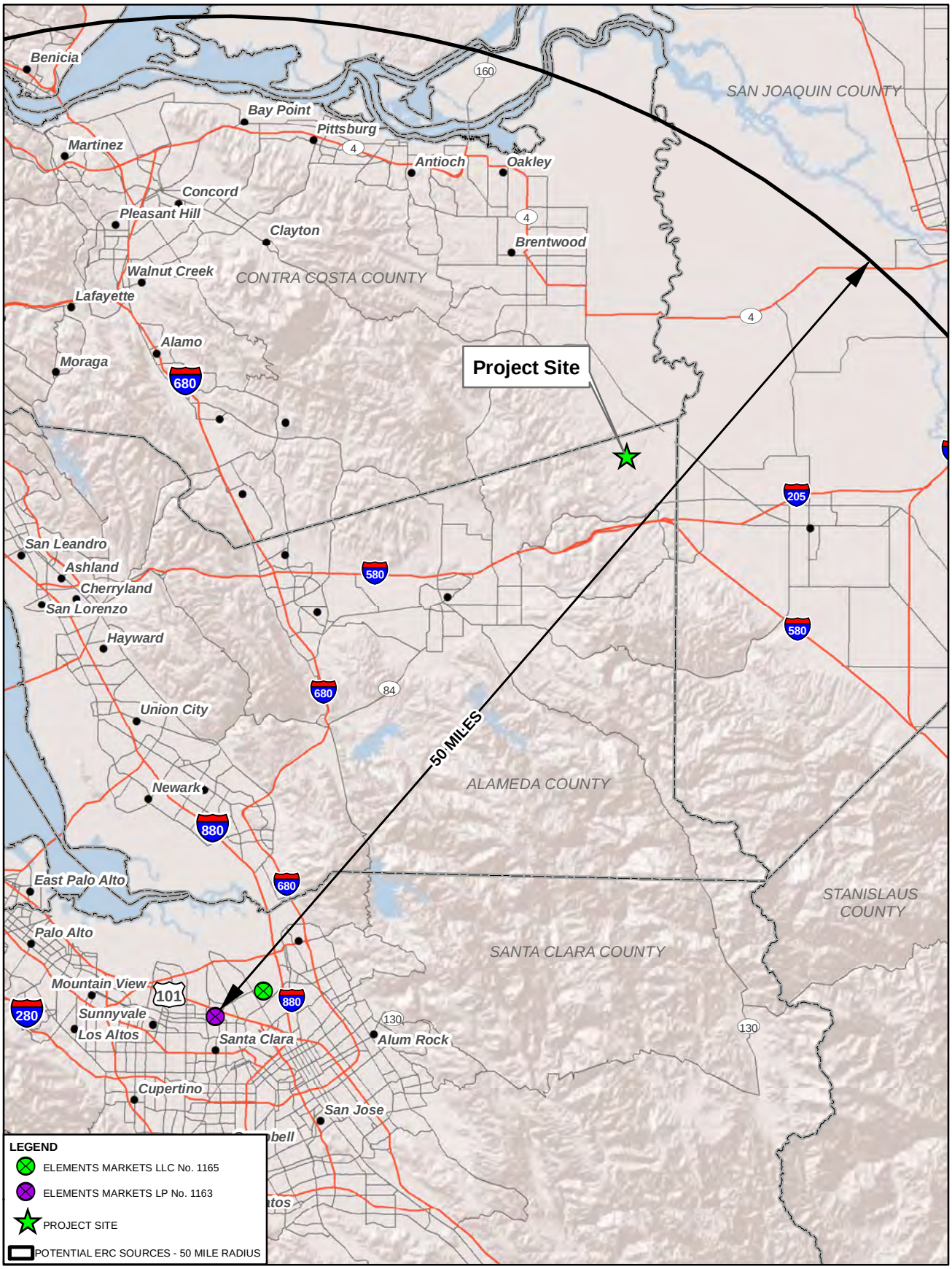

FIGURE DR8-1
LOCATION OF ERCS RELATIVE TO PROJECT SITE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

SAC\\ZION\SACGIS\PROJ\DIAMOND_376670\MAPFILES\AFC_MAPS\ERCS_SOURCES.MXD MHASKELL 11/24/2009 12:15:18

Attachment DR8-1
BAAQMD ERC Certificates 1163 and 1165

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

EMISSION REDUCTION BANK

Certificate of Deposit 1163

Element Markets, LLC

is hereby certified as the holder of the following emission reduction credits, approved pursuant to application number 20998:

Nitrogen Oxides	**196.420**	**tons/year**

These credits are for emission reductions occurring at:

Owens Corning Insulating Systems, LLC
Santa Clara, CA

Jack P. Broadbent
Executive Officer/APCO

August 17, 2009

By _____

Engineering Division

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

EMISSION REDUCTION BANK

Certificate of Deposit 1165

Element Markets, LLC

is hereby certified as the holder of the following emission reduction credits, approved pursuant to application number 20998:

Precursor Organic Compounds	**64.000**	**tons/year**

These credits are for emission reductions occurring at:

Quebecor World San Jose Inc
San Jose, CA

Jack P. Broadbent
Executive Officer/APCO

August 26, 2009 **By** _____

Engineering Division

Attachment DR11-1
SJVAPCD and BAAQMD Correspondence

From: Harold Lips [HLips@baaqmd.gov]
Sent: Thursday, July 30, 2009 9:55 AM
To: M cGregor, Keith/SAC
Subject: RE: Data Request for Cumulative Impact Modeling

Keith,

For permit application 17305, the four portable diesel engines will be permitted as sources but they will not reside at a single location within the site. The engines power the hydraulic lifts of the waste tippers, which operate at the active face. As the active face moves around the landfill, these waste tipper engines move with it. Currently, these engines operate in Fill Area 1, but when the District approves the Fill Area 2 expansion, which is expected to be finalized before the end of the year, the engines will move to Fill Area 2 (in about 2013). The stack parameters for these portable diesel are listed below.

Summary of Stack Parameters Provided by Applicant:

Height feet		Diameter inches	Exhaust acfm (wet)	Temp ^{o}F	Velocity m/s
P-206	10.5	2.5	718	1061	106.999
P-207 9	.25	2.5	650	968	96.866
P-208	10.5	2.5	718	1061	106.999
P-209	10.5	2.5	650	968	96.866

Total annual emissions from the fours engines combined (two 127 hp engines and two 137 hp engines) are listed below. These engines will be limited to 12000 hours/year of combined operation.

(tons/yr all four engines)

NOx		CO	POC	PM10	SO2
Total	5.151	1.629	0.271	0.035	0.302

The locations for each fill area of the Altamont Landfill are identified as polygons with the vertices listed below.

NAD 27 Vertices for Altamont Landfill

Fill Area 1		Fill Area 2	
Easting X	Northing Y	Easting X	Northing Y
618401	4178662	619411	4179062
618184	4179270	619558	4179089
618542	4179582	619749	4179076
618664	4179592	620286	4179119
618683	4179703	620506	4179318
618740	4179707	620494	4179733
618918	4179699	620048	4179797
619086	4179703	619959	4179753
619241	4179511	619926	4179791

619451	4179095	619570	4180100
619362	4179019	619362	4179915
619249	4179010	619040	4179850
619249	4178732	618913	4179697
619090	4178682	619087	4179704
619009	4178733	619246	4179504
618977	4178684	619451	4179095
618665	4178677		
618653	4178730		

For the other questions, the A-16 Landfill Gas Flare is being permitted to operate continuously at the maximum annual operating rate. Thus, maximum hourly emissions are equal to annual average hourly emissions. The maximum hourly and maximum annual permitted emission rates for criteria pollutants are listed below.

A-16 Flare Emissions

NOx		CO	POC	PM10	SO2
lbs/hour	7.920	26.400	1.845	2.258	8.793
tons/year	34.690	115.632	8.083	9.889	38.515

Thanks,
Harold Lips

-----Original Message-----
From: Keith.McGregor@CH2M.com [mailto:Keith.McGregor@CH2M.com]
Sent: Tuesday, July 28, 2009 4:50 PM
To: Harold Lips
Cc: Jerry.Salamy@CH2M.com; Doug.Urry@CH2M.com; b.buchynsky@dgc-us.com
Subject: MEP: Data Request for Cumulative Impact Modeling

Good Afternoon Harold,

We have a couple of follow up questions related to the cumulative sources identified in the vicinity of the Mariposa Energy Project. Both questions are related to the information provided for the Waste Management of Alameda County applications:

Application 17305 IC Engine: Based on the information provided, it appears this application is for four portable IC engines. Please confirm if these sources will be permitted as permanent stationary sources. If so, would you please provide the stack coordinates, stack parameters, and emission rates (hourly, daily, and annual).

Application 19206 and Application 188819 Landfill Gas Flare and CO Emission Increase: Based on the information provided, the total annual emission limits are available but it is unclear what the short term emission rates would be. Does the permit application also provide maximum hourly/short term emission rates?

Thank you for your assistance,
Keith McGregor
CH2MHILL

From: Harold Lips [mailto:HLips@baaqmd.gov]
Sent: Thursday, April 16, 2009 7:42 AM
To: McGregor, Keith/SAC
Subject: RE: Data Request for Cumulative Impact Modeling

Keith,

I added one more data table to the information for the Tesla Power Project. It is the emission data presented in the same format as for the East Altamont Energy Center.

Thanks,
Harold Lips

-----Original Message-----
From: Keith.McGregor@CH2M.com [mailto:Keith.McGregor@CH2M.com]
Sent: Wednesday, April 15, 2009 3:37 PM
To: Harold Lips
Subject: RE: Data Request for Cumulative Impact Modeling

Thank you for the information Harold.

From: Harold Lips [mailto:HLips@baaqmd.gov]
Sent: Wednesday, April 15, 2009 2:49 PM
To: McGregor, Keith/SAC
Cc: Glen Long; James Cordova
Subject: FW: Data Request for Cumulative Impact Modeling

Keith,

Attached is the data you request concerning the Mariposa Energy Facility.

Thanks,

Harold Lips
Principal Air Quality Engineer
Bay Area Air Quality Management District
415-749-4743
hlips@baaqmd.gov

-----Original Message-----
From: Keith.McGregor@CH2M.com [mailto:Keith.McGregor@CH2M.com]
Sent: Thursday, March 26, 2009 8:37 AM
To: Barry Young
Cc: b.buchynsky@dgc-us.com; Jerry.Salamy@CH2M.com; Doug.Urry@CH2M.com; Glen Long; James Cordova
Subject: DGC: Data Request for Cumulative Impact Modeling

Good Morning Barry,

CH2MHILL is currently working on the preparation of an Application for Certification (AFC) for the Mariposa Energy Facility (MEF). The MEF will be a 200 MW simple cycle peaking unit owned and operated by the Diamond Generating Corporation. MEF would be located within the BAAQMD boundaries near the intersection of Alameda, Contra Costa, and San Joaquin Counties. A modeling protocol has been prepared for the project and has been submitted to the BAAQMD for review. As noted in the modeling protocol, a cumulative air quality modeling impacts analysis will be required by the California Energy Commission (CEC) as part of the AFC process. Prior to completing the cumulative impacts analysis, the CEC requests that the applicant contact the respective air districts to obtain the appropriate source information.

Therefore, on behalf of Diamond Generating Corporation, CH2MHILL would like to request a list of all new or modified stationary emissions within a 6-mile radius that would:
1.) have received construction permits but are not yet operational, or are in the permitting process (such as, the NSR or CEQA permitting process), and
2.) have a potential to emit 5 tons or more per year of NOx, CO, PM10, PM2.5, or SOx.

Based on the two criteria above, it is anticipated the following sources would be excluded from the cumulative impacts analysis: VOC sources, equipment shutdowns, permit-exempt equipment registrations, rule compliance, permit renewals, or replacement/system upgrades.

The coordinates for the four GE LM6000 turbines include the following (UTM Coordinates, NAD27, Zone 10):

Stack 1: 623140 m (E); 4,183,043 m (N)
Stack 2: 623155 m (E); 4,183,087 m (N)
Stack 3: 623,176 m (E); 4,183,148 m (N)
Stack 4: 623,191 m (E); 4,183,193 m (N)

If you have any questions regarding this request, please contact me at keith.mcgregor@ch2m.com or call me at (916) 286-0221.

Thank you,

Keith McGregor
Associate Project Manager
CH2MHILL
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95834

From: Jim Swaney [Jim.Swaney@valleyair.org]
Sent: Friday, July 24, 2009 11:22 AM
To: M cGregor, Keith/SAC
Cc: b. buchynsky@dgc-us.com; Salamy, Jerry/SAC; Urry, Doug/SAC
Subject: RE: ::::RE: MEP: SJVAPCD Data Request for Cumulative Impact Modeling
Attachments: RE: ::::RE: MEP: SJVAPCD Data Request for Cumulative Impact Modeling

Keith, attached is our information on sources within 6km that had ATC's in the past 2 years - there aren't any. Let me know if you have any questions or need any additional information.

Jim Swaney, P.E.
Permit Services Manager
Valley Air District
(559) 230-6000
(559) 230-6061 fax
www.valleyair.org

HEALTHY AIR LIVING
www.healthyairliving.com
Make one change for clean air!

From: Keith.McGregor@CH2M.com [mailto:Keith.McGregor@CH2M.com]
Sent: Wednesday, July 15, 2009 11:09 AM
To: Jim Swaney
Cc: b.buchynsky@dgc-us.com; Jerry.Salamy@CH2M.com; Doug.Urry@CH2M.com
Subject: ::::RE: MEP: SJVAPCD Data Request for Cumulative Impact Modeling

Good Morning Jim,

We have been moving forward with the CEC process for the Mariposa Energy Project (formerly the Mariposa Energy Facility) and anticipate we will be required to conduct a cumulative analysis within the next several weeks. I believe you mentioned during our meeting with you on April 30, 2009 that Leland Villalvazo was working on preparing the list of cumulative sources within 6 miles of the MEP site. However, according to my email archive I don't believe we have received a list of potential sources from the SJVAPCD.

Would you please confirm if the list has been prepared? If so, would you please forward?

Thank you,
Keith

From: McGregor, Keith/SAC
Sent: Thursday, March 26, 2009 9:09 AM
To: 'Jim.Swaney@valleyair.org'

Cc: 'b.buchynsky@dgc-us.com'; Salamy, Jerry/SAC; Urry, Doug/SAC
Subject: DGC: SJVAPCD Data Request for Cumulative Impact Modeling

Good Morning Jim,

CH2MHILL is currently working on the preparation of an Application for Certification (AFC) for the Mariposa Energy Facility (MEF). The MEF will be a 200 MW simple cycle peaking unit owned and operated by the Diamond Generating Corporation. MEF would be located within the BAAQMD boundaries near the intersection of Alameda, Contra Costa, and San Joaquin Counties. A modeling protocol has been prepared for the project and has been submitted to the BAAQMD for review. As noted in the modeling protocol, a cumulative air quality modeling impacts analysis will be required by the California Energy Commission (CEC) as part of the AFC process. Prior to completing the cumulative impacts analysis, the CEC requests that the applicant contact the respective air districts to obtain the appropriate source information.

Because the area within a six-mile radius of the project would also include a portion of the SJVAPCD, the cumulative impacts assessment for the AFC would also include the SJVAPCD sources that would have the potential to have a cumulative impact. Therefore, on behalf of Diamond Generating Corporation, CH2MHILL would like to request a list of all new or modified stationary emissions within a 6-mile radius that would:
1.) have received construction permits but are not yet operational, or are in the permitting process (such as, the NSR or CEQA permitting process), and
2.) have a potential to emit 5 tons or more per year of NOx, CO, PM10, PM2.5, or SOx.

Based on the two criteria above, it is anticipated the following sources would be excluded from the cumulative impacts analysis: VOC sources, equipment shutdowns, permit-exempt equipment registrations, rule compliance, permit renewals, or replacement/system upgrades.

The coordinates for the four GE LM6000 turbines include the following (UTM Coordinates, NAD27, Zone 10):

Stack 1: 623140 m (E); 4,183,043 m (N)
Stack 2: 623155 m (E); 4,183,087 m (N)
Stack 3: 623,176 m (E); 4,183,148 m (N)
Stack 4: 623,191 m (E); 4,183,193 m (N)

If you have any questions regarding this request, please contact me at keith.mcgregor@ch2m.com or call me at (916) 286-0221.

Thank you,

Keith McGregor
Associate Project Manager
CH2MHILL
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95834

Active A/Cs and Open Applications for Plants Within 7 Miles of UTM 623.137E, 4183.248N
(4/16/09)

- UTMs are in Datum 83, unless stated otherwise
- Listed only if potential emissions > 5 TPY of NOx, CO, PM10, PM2.5, or SOx
- Can only find open applications for existing plants since the UTM coordinates are not necessary entered before the A/C is issued
- Open Title V applications are not listed
- Can only list for the BAAQMD, not other air districts

The following facilities with active A/Cs (Authority to Construct) and Open Applications are located within 7.00 miles from the point specified (UTM 623.137E, 4183.248N).

Date Printed: APR 8, 2009

.....

Plant No.: 2066 [3.77 miles from the point specified] 619.016E 4178.794N
Waste Management of Alameda County
10840 Altamont Pass Rd
Livermore, CA 94551

Open A/Cs for Plant 2066

Application 19206 New Flare (A-16), UTM – 618.143E 4179.367N
A/C issued 11Feb09
No PO issued

Emission increases before any offsets applied

Organics	NOx	SOx	CO	PM 10
----------(Tons/Yr)----------				
.0000	34.6900	38.5150	95.0000	9.8890

S -16 Landfill Gas Flare

Stack	Area (sq ft)	Height (ft)	Flowrate (acfm)	Temp (F)
210	112.000	55.00	60792	1650

Applications currently being processed for plant 2066

Application 14814 Fill Area 2 Landfill Expansion
Application received 22Jun06
Probably all emission increases except POC < 5TPY

Application 15503 New Green Waste Composting Facility
Application received 05Dec06
Preliminary estimates are all non POC emissions increases are < 5TPY but possibility could be higher

Application 16731 Exemption
Application received 21Sep07
Emissions increases are probably < 5 TPY

Application 17305 IC Engine
Application received 28Jan08
Together, emission increases from this application for 4 portable engines will probably be > 5 TPY NOx

Application 18819 Establish Site-Wide CO Emission Cap; TV App #18820
Application received 03Sep08
Application to increase CO limits on proposed flare A-16 from 95 TPY to 115 TPY

Application 20251 APP:Alteration of Gas Collection System for S-2
Application received 06Mar09
Probably no emission increases

****

Plant No.:13050 [1.74 miles from the point specified] 625.310E 4185.010N
East Altamont Energy Center
Near Mountain Hs Rd
Byron, CA 94514

Open A/Cs Plant 13050

Application 2589 Title IV: Gas Turbine Power Generation
A/C issued 11Oct05
No PO issued

Emission increases before any offsets applied

Organics	NOx	SOx	CO	PM 10
----------(Tons/Yr)----------				
73.7000	263.0000	21.3300	793.5800	148.0000

Estimated Emissions Per source

Pollutant Source	Max. Annual Average (g/s)
NO_x	
Turbine/Duct Burner 1	2.50
Turbine/Duct Burner 2	2.50
Turbine/Duct Burner 3	2.50
Auxiliary Boiler	0.0635
Emergency Generator	0.0186
Fire Pump	0.00627
Each Cooling Tower Cell (19 total)	—
CO	
Turbine/Duct Burner 1	—
Turbine/Duct Burner 2	
Turbine/Duct Burner 3	
Auxiliary Boiler	
Emergency Generator	
Fire Pump	
Each Cooling Tower Cell (19 total)	
PM_{10}	
Turbine/Duct Burner 1	1.32
Turbine/Duct Burner 2	1.32
Turbine/Duct Burner 3	1.32
Auxiliary Boiler	0.115
Emergency Generator	0.00149
Fire Pump	0.000266
Each Cooling Tower Cell (19 total)	0.0159

East Altamont Energy Center Sources (Locations in **NAD27**) – Stack Information

Source	XUTM	YTUM	Elev(m)	Stk Ht(m)	Temp(K)	Vel(m)	Dia(m)
WESTTURB	625584.69	4184800.5	12	53.34	334.11	16.862	5.639
MIDTURB	625627.31	4184801.5	11.62	53.34	334.11	16.862	5.639
EASTTURB	625669.94	4184802.5	11.2	53.34	334.11	16.862	5.639
AUXBLR	625548.19	4184774.5	12	30.48	435.78	21.478	1.067
EMERGEN	625599.88	4184684	12.36	3.048	747.44	34.968	0.229
CTCELL1	625389.12	4184850	12.2	17.374	294.1110	10.019	10.26
CTCELL2	625404	4184850.5	12.2	17.374	294.1110	10.019	10.26
CTCELL3	625421	4184851	12.2	17.374	294.1110	10.019	10.26
CTCELL4	625438	4184851.75	12.2	17.374	294.1110	10.019	10.26
CTCELL5	625455	4184852.25	12.2	17.374	294.1110	10.019	10.26
CTCELL6	625472	4184852.75	12.2	17.374	294.1110	10.019	10.26
CTCELL7	625487	4184853.25	12.2	17.374	294.1110	10.019	10.26
CTCELL8	625504	4184853.75	12.2	17.374	294.1110	10.019	10.26
CTCELL9	625521	4184854.5	12.2	17.374	294.1110	10.019	10.26
CTCELL10	625537	4184855	12.2	17.374	294.1110	10.019	10.26

Source	XUTM	YTUM	Elev(m)	Stk Ht(m)	Temp(K)	Vel(m)	Dia(m)
CTCELL11	625553	4184855.5	12.2	17.374	294.1110	10.019	10.26
CTCELL12	625568	4184856	12.2	17.374	294.1110	10.019	10.26
CTCELL13	625586	4184856.5	12.2	17.374	294.1110	10.019	10.26
CTCELL14	625602	4184857.25	12.2	17.374	294.1110	10.019	10.26
CTCELL15	625619	4184857.75	12.2	17.374	294.1110	10.019	10.26
CTCELL16	625635	4184858.25	12.2	17.374	294.1110	10.019	10.26
CTCELL17	625653	4184858.75	12.2	17.374	294.1110	10.019	10.26
CTCELL18	625668	4184859.25	12.2	17.374	294.1110	10.019	10.26
CTCELL19	625685	4184860	12.2	17.374	294.1110	10.019	10.26

.....

Plant No. :13424 [4.66 miles from the point specified] 626.120E 4176.370N
Tesla Power Project
Midway Power
Livermore, CA 94550

Applications currently being processed for plant 13424

Application 3506 New Facility/Generator
Application received 15Oct01

No A/C issued
Estimated Emissions Increases

Pollutant	Proposed Project's Emissions (tons/year)
NO_x	249.9
CO	484.1
PM_{10}	209.4
SO_x	29.6

Estimated Emissions Per source

Pollutant Source	Max. Annual Average (g/s)
NO_x	
Turbine/Duct Burner 1	1.797
Turbine/Duct Burner 2	1.797
Turbine/Duct Burner 3	1.797
Turbine/Duct Burner 4	1.797
Fire Water Pump	2.77×10^{-3}
Emergency Generator	4.81×10^{-3}
Each Cooling Tower Cell (22 total)	—
CO	
Turbine/Duct Burner 1	—
Turbine/Duct Burner 2	
Turbine/Duct Burner 3	
Turbine/Duct Burner 4	
Fire Water Pump	
Emergency Generator	
Each Cooling Tower Cell (22 total)	
PM_{10}	
Turbine/Duct Burner 1	1.366
Turbine/Duct Burner 2	1.366
Turbine/Duct Burner 3	1.366
Turbine/Duct Burner 4	1.366
Fire Water Pump	9.35×10^{-5}
Emergency Generator	6.26×10^{-4}
Each Cooling Tower Cell (22 total)	2.55×10^{-2}

Stack Parameters (locations in **NAD27**)

Source ID	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temperature	Exit Velocity	Stack Diameter
	(m)	(m)	(m)	(m)	(K)	(m/s)	(m)
GT1	625968.8	4176031	118.87	60.96	358.71	16.809	5.7912
GT2	626011.4	4176031	118.87	60.96	358.71	16.809	5.7912
GT3	626095.8	4176031	118.87	60.96	358.71	16.809	5.7912
GT4	626138.3	4176031	118.87	60.96	358.71	16.809	5.7912
FWPUMP	626217.2	4175917	118.9	3	622	75	0.13
EMGEN	626066.9	4175976	118.9	1.94	787.04	95.37	0.2

Alternatives (15-17)

Background

The AFC describes alternative water supplies and routes from the City of Tracy waste water treatment plant and the Mountain House waste water treatment plant (6.5.3.1). These descriptions provide an overview of the route pipelines would take to provide water to the site, however, there are no graphics which depict these routes.

Data Request

15. Please provide maps (at no greater scale than 1 inch = 1 mile) showing the routes of the alternative water sources from Tracy and Mountain House to the MEP site. Each route should be clearly depicted on an individual figure or graphic.

Response:

Figure DR15-1 presents the alternate water supply pipeline route for recycled water from the Mountain House Community Services District (MHCSD) Waste Water Treatment Plant (WWTP) to the MEP site. This route avoids the proposed future Mountain House General Industrial development identified in the Mountain House Master Plan (http://www.co.san-joaquin.ca.us/commdev/cgi-bin/cdyn.exe/handouts-mtnhouse_MH_MP_map?grp=handouts-mtnhouse&obj=MH_MP_map). A conceptual alternate recycled water supply pipeline route from the City of Tracy WWTP to the MEP site is presented on Figure DR15-2.

Background

The AFC identifies that alternative water supplies from Mountain House and the City of Tracy were not feasible because of existing waste water allocation to other uses.

Data Request

16. Please provide the contact information for the Mountain House Waste Water Treatment Plant or Mountain House Community Services District, and letters identifying that recycled water supply cannot be provided by the Mountain House CSD.

Response:

As discussed in Sections 2.3.8.1 and 6.6.4 of the AFC, Mariposa Energy has incorporated water conservation into project design. MEP will use mechanical inlet air chillers rather than evaporative inlet air cooling. Additionally, an air-cooled condenser is proposed rather than cooling towers for the inlet air chiller system.

As stated on page 41 of the CEC 2003 Integrated Energy Policy Report, "*Consistent with the Board policy and the Warren-Alquist Act, the Energy Commission will approve the use of fresh water for cooling purposes by power plants which it licenses only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound." Additionally, as a way to reduce the use of fresh water and to avoid discharges in keeping with the Board's policy, the Energy Commission will require zero-liquid discharge technologies unless such technologies are shown to be "environmentally undesirable" or "economically unsound."* (www.energy.ca.gov/reports/100-03-019F.PDF). MEP as proposed is 100 percent consistent with this policy. MEP will not use fresh water for cooling purposes because alternative cooling technologies were incorporated into the project design. The major water uses at the MEP facility are demineralized water for injection into the LM 6000 PC Sprint gas turbines for initial NOx control and efficiency improvements minimizing greenhouse gas (GHG) emissions. Additionally, to the extent practical, all process waste water will be treated onsite in a mobile zero-liquid discharge unit for re-use in the process. No process waste water will be discharged from the facility, and only infrequent turbine wash waste water and insignificant amounts oily waste water will be hauled for offsite disposal.

MEP is within the service area of the Byron-Bethany Irrigation District (BBID), and is not located within the boundaries of the Mountain House Community Services District (MHCSD), which is in neighboring San Joaquin County. Therefore, Mariposa Energy is required to contract with BBID for the MEP water supply, regardless of the source. BBID has adopted a Recycled Water Policy to negotiate the purchase of recycled water from developments such as the MHCSD. BBID is prepared to use recycled water to meet the MEP water supply demands provided that a sufficiently reliable supply of tertiary recycled water may be obtained from MHCSD at a reasonable cost.

Notwithstanding Mariposa Energy's water conservation design considerations, consistency with CEC 2003 IEPR water use policy, and physical location within BBID's service territory, CH2M HILL contacted MHCSD on behalf of Mariposa Energy to obtain information about recycled water availability (personal communication between Peggie King of CH2M HILL and Nader Shareghi, Public Works Director, April 27, 2009). Mr. Shareghi indicated that the MHCSD priority for available recycled water will be for irrigation of the proposed golf course within the Mountain House Community, requiring approximately 1 million gallons per day (mgd) during the irrigation season. Mr. Shareghi can be contacted at (209) 831-5607.

The Mountain House Master Plan Public Draft version dated April 1994 included Chapter 14, Wastewater Reuse (this chapter was removed from the current version). Section 14.2 of the Draft Master Plan states "Provisions at Mountain House must be made for the reuse of the 5.68 mgd of treated wastewater effluent projected at buildout." Section 14.3 of this document identified agricultural irrigation as the most beneficial use of the reclaimed water, and indicated that the best beneficial use of reclaimed water may vary over the life of the project. A dual water system for reuse within the community was identified as an alternative beneficial use, but deemed prohibitively expensive at that time.

Section 4.4 of the Final Environmental Impact Report for Mountain House Master Plan and Specific Plan I (http://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm =94feir) indicates that if the proposed neighborhood parks, community parks, and the golf course (totaling 540 acres) were irrigated with reclaimed water, approximately 23 percent of the total wastewater flow at project buildout, or approximately 1.3 mgd, could be used for

irrigation of those areas, plus additional wastewater could be used to irrigate road buffers, medians, and other landscaping at public and commercial areas. This is consistent with the information provide by Mr. Shareghi in April 2009.

CH2M HILL obtained and reviewed 2008 and 2009 Discharger Self Monitoring Reports from the MHCSD Waste Water Treatment Plant (WWTP) facility. During the period from January 2008 to September 2009, the average daily flow was 0.472 mgd, with a minimum of 0.088 mgd and a maximum of 0.731 mgd recorded. If PG&E required continuous operation of MEP over a 24-hour or longer period, the daily water supply demand would be approximately 0.34 mgd, based on a rate of 236 gallons per minute. Therefore, MEP would use approximately 72 percent of the available recycled water during periods of operation. MEP will have a 520,000-gallon raw water supply storage tank; the tank can only be drawn down to 120,000 gallons to maintain required fire suppression storage. Even if 100 percent of the MHCSD recycled water supply were made available to MEP during periods of operation, MEP would require a back-up water supply source to ensure reliability, based on the relatively low MHCSD recycled water generation rates as compared to potential MEP demand, and the resulting potential for interruption in service.

Based on the requirements of California Code of Regulations Title 22, Sections 60303 – 60307, recycled water cannot be used for potable needs at MEP including drinking water, sinks, eye-washes, and safety showers. Additionally, based on preliminary discussions with Alameda County Fire Department (personal communication between Stephanie Moore of CH2M HILL and Bonnie Terra, Alameda County Fire Marshall, November 18, 2009), their preference is to only use Title 22 recycled water for fire suppression as a last resort. Therefore, MEP will require a fresh water source for potable demands and possibly fire suppression requirements.

Mariposa Energy provided a limited environmental review of the MHCSD WWTP alternate water supply option in Section 6.5.3.2 of the AFC. To assist Staff with their review of this project alternative and avoid the potential for future project delays should such an analysis ultimately be required, Mariposa Energy is currently completing a comprehensive environmental analysis. This analysis will also include evaluation of an increase in the site laydown area from 5.0 to 9.2 acres to accommodate additional laydown for the alternative water supply pipeline, or if the pipeline is not constructed as additional laydown, if needed, for the power plant itself. This analysis will be submitted for Staff review in December 2009.

Mariposa Energy performed a preliminary engineering pipeline route analysis for the alternate water supply pipeline alignment (see Attachment DR16-1). This analysis identified numerous utility crossings that would be required, including Union Pacific Railroad, Delta Mendota Canal, two petroleum pipelines, a natural gas pipeline, and several storm drain, water, electrical, and communications lines. Significant engineering design and third party coordination would be required to design and obtain approvals for encroachment of the existing utilities.

Mariposa Energy prepared a cost analysis to compare the present worth costs of various water supply scenarios (see Attachment DR16-2). This analysis demonstrates that the construction and operations of an alternate water supply pipeline to provide recycled water would be economically unsound for the limited water usage required for MEP. This analysis included capital costs of the water conveyance systems, and operations and maintenance

costs related to conveyance and pre-treatment systems. Scenarios considered include 1) BBID Canal 45 only, 2) BBID Canal 45 and MHCSD WWTP (50 percent from each source), 3) BBID Canal 45 and Tracy WWTP (50 percent from each source), 4) Tracy WWTP (with BBID Canal 45 for backup and potable needs), and 5) MHCSD WWTP (with BBID Canal 45 for backup and potable needs). Table DR16-1 summarizes the results of this analysis for the expected annual water usage (600 hours per year of operation plus 200 start and stop cycles). Additional detail and assumptions are provided in Attachment DR16-2 for both the expected annual usage and maximum permitted operating schedule of 4,000 hours per year plus 300 start and stop cycles.

TABLE DR16-1
MEP Water Supply Option Cost Analysis Summary

Costs ($)	BBID Canal 45	BBID/ MHWWTP (50/50)	BBID/ MHWWTP (100% recycle)	BBID/ Tracy WWTP (50/50)	BBID/ Tracy WWTP (100% recycle)
Capital Costs	890,250	3,801,900	3,801,900	5,555,250	5,555,250
Total Annual Costs	16,869	301,975	547,635	320,640	566,831
Present Value	1,064,676	7,969,310	11,595,979	9,868,167	13,502,674
Unit cost treated water ($/acre-ft)	766	5,731	8,338	7,096	9,709
Unit cost treated water ($/MWH)	0.17	1.28	1.87	1.59	2.18

Based on this cost analysis, additional conveyance system capital costs of $2.91M would be required to construct an additional pipeline and pump station to use recycled water from MHCSD WWTP. This cost is not economically justified based on MEP's use of alternative cooling technology and limited water usage. In the Chula Vista Energy Upgrade Final Staff Assessment (CEC 2008), Staff concluded that an estimated pipeline capital cost of $2M was economically unsound for the annual water demand of up to 90 acre-feet per year.

The estimated present value water supply cost per megawatt-hour (MWH) generated would increase from $0.17 to $1.87 by constructing the alternate water supply conveyance system and using 100 percent MHCSC recycled water for the expected MEP water demand, representing an eleven-fold increase in project water cost. In the GWF Henrietta Combined Cycle Amendment, Staff recently concluded that the use of recycled water was not feasible based on a five-fold cost increase from $2.60 per MWH to $13.32 per MWH for the first nine years (due to capital costs) and subsequent recycled water cost of $8.32 per MWH.

17. Please provide the contact information for the City of Tracy Waste Water Treatment Plant, and letters identifying that recycled water supply cannot be provided by the City of Tracy waste water treatment plant.

Response:

A recycled water reliability assessment was prepared for the Tracy WWTP facility based on daily effluent flow data from 2005 through 2007 (CH2M HILL, 2008). This study concluded

that the WWTP discharges at least 8 million gallons per day (mgd) 92.9 percent of the time, and discharges at least 4.52 mgd 100 percent of the time. Therefore recycled water is potentially available from this source. The City of Tracy point of contact is Steve Bayley, Deputy Director of Public Works; he can be reached at (209) 831-4434.

As discussed in Section 6.5.3.1 of the AFC, recycled water from the City of Tracy WWTP was considered as an alternate water supply source for MEP, but rejected based on the proportionally larger costs and potential environmental impacts associated the approximate 11.5-mile conveyance distance. Furthermore, as shown in Table DR16-1, the estimated present value water supply cost per megawatt-hour (MWH) generated would increase from $0.17 to $2.18, by constructing an alternate water supply conveyance system from the City of Tracy and using 100 percent City of Tracy recycled water for the expected MEP water demand, an almost thirteen-fold increase in cost. For the same reasons cited in Data Response 16, the use of recycled water from the City of Tracy does not make sense for MEP.

LEGEND

- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 1,250 2,500
Feet

FIGURE DR15-1
ALTERNATE WATER SUPPLY PIPELINE ROUTE - MOUNTAIN HOUSE WWTP
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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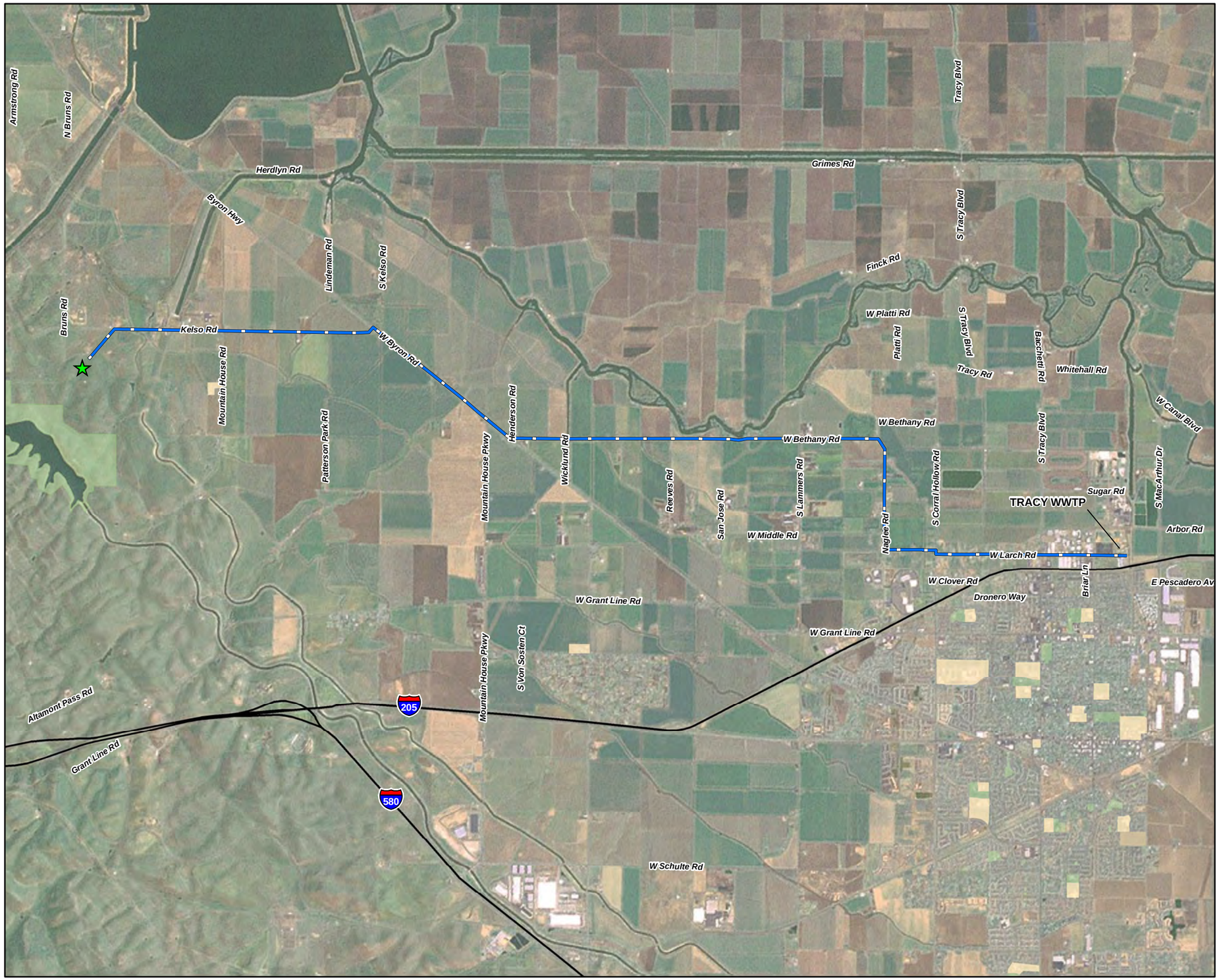

LEGEND

PROJECT SITE

TRACY WWTP ALTERNATE RECYCLED WATER SOURCE PIPELINE ROUTE

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 2,500 5,000
Feet

FIGURE DR15-2
TRACY WWTP ALTERNATE RECYCLED WATER SOURCE PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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Attachment DR16-1
Alternate Water Supply Pipeline Route Analysis

Diamond Generating Corporation Energy Plant Alternate Water Supply Pipeline Route Analysis

TO: Doug Urry/SAC

COPIES: Jeff Smith/SAC
Ben Romero/SAC

FROM: Jerimy Borchardt/SAC

DATE: November 17, 2009

On November 13, 2009 Ben Romero/CH2M HILL and Jerimy Borchardt/CH2M HILL accompanied Rick Gilmore/BBID and Gary Griffith/BBID on a field review of the proposed alternative water supply alignment for the Diamond Generating Corporation's proposed energy plant (Mariposa Energy Project) located in Alameda County. This Memorandum summarizes the constraints and challenges identified along the proposed alignment during the field review. This was a visual field survey only and was completed with BBID staff knowledge of the local utilities. No as-built drawings, GIS data, or USA markings were consulted prior to or during the site survey. If this alignment is selected as the preferred alternative, identification of all utilities, rights-of-way, easements, and property information will need to be collected and verified during the design of the pipeline.

Assumptions

Prior to the field survey assumptions were made to give CH2M HILL staff a general idea of what would be required for construction of the pipeline including pipe diameter, equipment, trench width, and trench depth. Below is a list of these assumptions:

- 6-inch diameter pipe
- Trench width: approximately 14-inches to 18-inchs
- Trench depth: approximately 4 feet maximum
- Backhoe for excavations and backfill
- Assume surface restoration (asphalt concrete, aggregate base course to meet County standards) as follows:
  - Full road width for reach in Wicklund Rd. One lane width (half roadway width) for reach in W. Byron Rd. From curb to median for reach in Great Valley Rd. Full lane width for reach in Kelso Rd.

Where conflicts with existing underground utilities exist, either the existing utility will need to be relocated or the proposed pipeline will need to avoid the existing utility. If the

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proposed pipeline is designed to avoid existing utilities it will likely require the use of blow off and air release valves.

Alignment Corridor Constraints

Mountain House Waste Water Treatment Plant (WWTP)

- Construct pumping station, either inline booster, or new wet well with vertical turbine pump
- Construct yard piping out to Wicklund Drain

Wicklund Road

- Acceptable to trench within road
- Overhead electrical along west side of road, approx. 10-15 feet from edge of pavement
- At approx. Station 50+00 48-inch water crossing with approx. 4-5 feet of cover
- Union Pacific Railroad (UPR) train tracks at Wicklund and W. Byron Road will require bore and jack or directional drilling.

West Byron Road

- UPR tracks along north side of road, approx. 75-80 feet from edge of pavement, would need to secure easement from UPR to place pipeline in their Right-of-Way (ROW)
- Two existing large diameter pipelines along fence line in UPR ROW on north side of tracks
- Overhead electrical along north side of road, approx. 10-15 feet from edge of pavement
- Petroleum pipeline along north side of road, approx. 55-60 feet from edge of pavement
- Natural Gas pipeline along north side of road, approx. 10 feet from edge of pavement
- At approx. Station 90+00, Henderson Road crossing with light signals, below grade controls, control cabinets, below grade electrical, and overhead telephone
- At approx. Station 100+00 potential Storm Drain (SD) crossing
- At approx. Station 100+00 high voltage underground crossing
- At approx. Station 115+00 dual 18-inch SD crossing
- At approx. Station 120+00 triple large diameter half moon culvert crossing
- At approx. Station 130+00 Modesto Irrigation District (MID) below grade electrical crossing
- At approx. Station 145+00 12-inch SD crossing

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- At approx. Stations 150+00, 155+00, 160+00, 165+00, and 170+00 unknown diameter SD crossings
- At approx. Station 189+00, Great Valley Road intersection, unknown diameter water lines, SD along south side of W. Byron Rd. Telephone and communication lines crossing Great Valley Rd

Great Valley Road

- Water line runs along road with multiple laterals
- SD line runs along road with multiple laterals

Great Valley Road and Kelso Road Intersection

- SD line with multiple laterals
- Underground electrical
- Water lines down each road in intersection

Kelso Road

- Water and SD lines along developed (curb and gutter) portion of Kelso Rd.
- Alameda County line at approx. Station 200+00
- At approx. Station 200+00 irrigation drainage, PG&E electrical, and communication conduit underground crossing
- At approx. Station 205+00 irrigation RCP with approx. 3-feet cover crossing
- At approx. Station 206+00 two separate underground electrical crossings
- At approx. Station 220+00 "Tile Drain" crossing approx. 9-10 feet of cover and Dry Creek 24-inch CMP crossing with approx. 6-7 feet of cover.
- At approx. Station 230+00 18-inch irrigation carrier pipe inside 24-inch casing with approx. 4 feet of cover
- At approx. Station 250+00 Mountain House Drain 30-inch CMP with approx. 2 feet of cover
- At approx. Station 257+00, Kelso Road and Mountain House Road intersection, 36-inch RCP with approx. 2 feet of cover and multiple AT&T telephone lines crossing Kelso Rd
- At approx. Station 279+00 drainage culvert and underground AT&T and electrical crossing
- At approx. Station 285+00, Delta Mendota Canal crossing
  - Existing triple 10 foot diameter RCP pipes
  - Direct bury of proposed pipeline only
  - Approx. 6 months needed for review and issuance of permit

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- At approx. Station 295+00 creek crossing, 8-10-inch RCP with approx. 1 foot of cover and Chevron Petroleum pipeline crossing
- At approx. Station 300+00 Canal 70 crossing, one 36-inch and one 48-inch RCP with approx. 3 feet of cover and PG&E underground electrical crossing

Preferred Alignment

Based on the constraints given above the preferred location of the pipeline is as follows:

- Wicklund Road: West edge of pavement/shoulder
- West Byron Road: North side of UPR tracks in UPR ROW adjacent to existing pipelines or north edge of pavement/shoulder
- Great Valley Road: West edge of pavement adjacent to concrete gutter
- Kelso Road: Either the north or south edge of pavement/shoulder is acceptable

It should be noted that the placement of the pipeline given above is in general terms. A more detailed Technical Memorandum and larger scale drawings are needed to provide a more precise alignment.

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Attachment DR16-2
Pipeline Cost Analysis

Diamond Generating Corporation - Mariposa
Water Delivery Options - Expected Usage (600 Hours of Operation, 200 start/stops)
Present Worth Analysis

(KML,11/11/09, Rev 1. Updated WDU 11/15/09, Updated PZ 11/15/09, WDU 11/16/09)

Assumptions					
Expected (0) or Maximum (1) Usage	0	Expected Usage			
Annual Usage	35				
Project Size (MW)	194				
Expected Annual Pump Station Use (hrs/yr)	800	800	4,300		
Power Cost ($/kW-hr)	0.10				
Water Rate (gpm)	236				
Pumped head (ft)	136	224	302	468	312
Water Unit Cost ($/af)	100	75	75	50	50

	Alt 1 BBID	**Alt 2 50/50 BBID/ MHWWTP**	**Alt 3 50/50 BBID/ TracyWWTP**	**Alt 4 100% Tracy WWTP**	**Alt 5 100% MH WWTP**
Capital Cost ($)					
Pipeline	713,250	3,437,400	5,160,750	5,160,750	3,437,400
Pump Station	177,000	364,500	394,500	394,500	364,500
Treatment Plant Improvements	-	-	-	-	
Total	**890,250**	**3,801,900**	**5,555,250**	**5,555,250**	**3,801,900**
Annual O&M Cost					
Pipeline Maintenance (1% Cap Cost/yr)	7,133	34,374	51,608	51,608	34,374
Pump Station Maintenance (3% Cap Cost/yr)	5,310	10,935	11,835	11,835	10,935
Pump Station Operations (calc'd)	926	1,526	2,057	3,188	2,125
MEP Pre-Treatment (calc'd)		65,051	65,051	123,523	123,523
Pretreatment backwash WW Hauling (calc'd)	-	187,464	187,464	374,928	374,928
Total O&M Costs	**13,369**	**299,350**	**318,015**	**565,081**	**545,885**
Water Cost	**3,500**	**2,625**	**2,625**	**1,750**	**1,750**
Total Annual Cost @ Expected ($)	**16,869**	**301,975**	**320,640**	**566,831**	**547,635**
Present Worth Analysis					
O&M Escalation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Cost Escalation	1.00%	1.00%	1.00%	1.00%	1.00%
Discount Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Life of Project (years)	40	40	40	40	40
Present Value ($)	**1,064,676**	**7,969,310**	**9,868,167**	**13,502,674**	**11,595,979**
Unit Cost treated water ($/acre-ft)	**766**	**5,731**	**7,096**	**9,709**	**8,338**
Unit Cost treated water ($/MWH)	**0.17**	**1.28**	**1.59**	**2.18**	**1.87**

Notes:
1) Does not include potable water capital/treatment/supply costs.
2) Alt 2 and 3 assumes 50% from each source
3) Alt 4 and 5 assumes 100% from recycle, BBID is constructed for backup and potable (capital costs only).
4) Alt 3 assumes Tracy WWTP water treatment cost are equal to Mountain House WWTP treatment costs.
Both WWTP's produce tertiary effluent for MEP water source.
5) See the "wtr treat cost" worksheet tab for water treatment cost assumptions

Year	Present Value at Expected Water Usage				
-	890,250	3,801,900	5,555,250	5,555,250	3,801,900
1	16,869	301,975	320,640	566,831	547,635
2	17,238	309,485	328,616	580,976	561,300
3	17,616	317,182	336,792	595,473	575,306
4	18,003	325,072	345,171	610,334	589,662
5	18,399	333,158	353,760	625,565	604,376
6	18,804	341,446	362,563	641,177	619,458
7	19,219	349,940	371,586	657,178	634,917
8	19,644	358,647	380,834	673,580	650,762
9	20,079	367,571	390,312	690,391	667,003
10	20,524	376,718	400,028	707,623	683,650
11	20,979	386,093	409,985	725,285	700,712
12	21,446	395,701	420,191	743,388	718,201
13	21,923	405,550	430,652	761,943	736,127
14	22,412	415,644	441,374	780,962	754,500
15	22,913	425,991	452,364	800,456	773,333
16	23,425	436,595	463,627	820,438	792,636
17	23,950	447,464	475,172	840,918	812,421
18	24,487	458,605	487,006	861,910	832,701
19	25,037	470,023	499,134	883,427	853,488
20	25,600	481,727	511,565	905,481	874,793
21	26,177	493,722	524,307	928,086	896,632
22	26,767	506,017	537,366	951,257	919,015
23	27,372	518,619	550,752	975,006	941,958
24	27,991	531,536	564,472	999,348	965,475
25	28,625	544,775	578,534	1,024,299	989,579
26	29,274	558,344	592,948	1,049,873	1,014,285
27	29,938	572,252	607,721	1,076,086	1,039,608
28	30,618	586,508	622,863	1,102,954	1,065,564
29	31,315	601,119	638,383	1,130,494	1,092,169
30	32,029	616,095	654,290	1,158,721	1,119,439
31	32,759	631,444	670,595	1,187,654	1,147,390
32	33,508	647,178	687,307	1,217,310	1,176,039
33	34,274	663,303	704,436	1,247,707	1,205,404
34	35,059	679,832	721,993	1,278,864	1,235,503
35	35,862	696,773	739,988	1,310,799	1,266,354
36	36,685	714,137	758,432	1,343,532	1,297,976
37	37,528	731,935	777,337	1,377,084	1,330,389
38	38,391	750,177	796,714	1,411,473	1,363,611
39	39,275	768,874	816,575	1,446,722	1,397,663
40	40,180	788,039	836,932	1,482,852	1,432,566

DGC MEP - WATER TREATMENT COST CALCULATIONS & ASSUMPTIONS

Expected Annual Pump Station Use = Process WW Operating = 800 (hours/year)

MEP TERTIARY RECYCLED SOURCE WATER ADDITIONAL TREATMENT COSTS (Tracy or Mountain House WW)

Pre-Treatment Rental Trailers Design Cases	Pre-Treatment Water Produc-tion (gpm)	Pre-Treatment Water Production (Kgal/yr)	Rental Trailer Equipment Cost ($/yr)	Rental Trailer Chemical Cost ($/yr)	Trailer Freight Cost ($/yr)	Rental Trailer Field Service Rep. Cost ($/yr)	Total Rental Trailer Cost ($/Kgal)	Total Rental Trailer Cost ($/yr)
Pre-Treatment	244.094	11,716.5	$5,400.00	$116,943.85	$403.20	$776.00	$10.54	$123,523.05
Pre-Treat, 50% with BBID	244.094	5,858.3	$5,400.00	$58,471.92	$403.20	$776.00	$11.10	$65,051.12

Pre-Treatment Wastewater Pick-up & Hauling	Process WW Production for 59°F (gpm)	Process WW Production (Kgal/yr)	Process Wastewater Hauling Cost ($/Kgal)	Process Wastewater Hauling Cost ($/yr)	
Process WW	9.76	468.7	$800.00	$374,928.00	applies to use of Tracy or Mountain House WW

WATER TREATMENT ASSUMPTIONS:

1. All calculations for annual average, 59 F day
2. Cost estimates for current year, 2009. Not escalated.
3. Trailer freight cost at calculated at $2.52 per mile for 160 mile round trip
4. Trailer freight cost for trailers not containing regenerable resins assumed returned to service provider annually per local service provider contacted.

Diamond Generating Corporation - Mariposa
Water Delivery Options - Maximum Usage (4,000 Hours of Operation, 300 start/stops)
Present Worth Analysis

(KML,11/11/09, Rev 1. Updated WDU 11/15/09, Updated PZ 11/15/09, WDU 11/16/09)

Assumptions					
Expected (0) or Maximum (1) Usage	1	Maximum Usage			
Annual Usage	187				
Project Size (MW)	194				
Expected Annual Pump Station Use (hrs/yr)	4,300	800	4,300		
Power Cost ($/kW-hr)	0.10				
Water Rate (gpm)	236				
Pumped head (ft)	136	224	302	468	312
Water Unit Cost ($/af)	100	75	75	50	50

	Alt 1 BBID	**Alt 2 50/50 BBID/ MHWWTP**	**Alt 3 50/50 BBID/ TracyWWTP**	**Alt 4 100% Tracy WWTP**	**Alt 5 100% MH WWTP**
Capital Cost ($)					
Pipeline	713,250	3,437,400	5,160,750	5,160,750	3,437,400
Pump Station	177,000	364,500	394,500	394,500	364,500
Treatment Plant Improvements	-	-	-	-	
Total	**890,250**	**3,801,900**	**5,555,250**	**5,555,250**	**3,801,900**
Annual O&M Cost					
Pipeline Maintenance (1% Cap Cost/yr)	7,133	34,374	51,608	51,608	34,374
Pump Station Maintenance (3% Cap Cost/yr)	5,310	10,935	11,835	11,835	10,935
Pump Station Operations (calc'd)	4,979	8,200	11,056	17,133	11,422
MEP Pre-Treatment (calc'd)		320,866	320,866	635,152	635,152
Pretreatment backwash WW Hauling (calc'd)	-	1,007,619	1,007,619	2,015,238	2,015,238
Total O&M Costs	**17,421**	**1,381,994**	**1,402,983**	**2,730,966**	**2,707,121**
Water Cost	**18,700**	**14,025**	**14,025**	**9,350**	**9,350**
Total Annual Cost @ Expected ($)	**36,121**	**1,396,019**	**1,417,008**	**2,740,316**	**2,716,471**
Present Worth Analysis					
O&M Escalation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Cost Escalation	1.00%	1.00%	1.00%	1.00%	1.00%
Discount Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Life of Project (years)	40	40	40	40	40
Present Value ($)	**1,311,747**	**24,083,404**	**26,016,553**	**45,552,376**	**43,577,095**
Unit Cost treated water ($/acre-ft)	**175**	**3,222**	**3,481**	**6,094**	**5,830**
Unit Cost treated water ($/MWH)	**0.04**	**0.72**	**0.78**	**1.37**	**1.31**

Notes:
1) Does not include potable water capital/treatment/supply costs.
2) Alt 2 and 3 assumes 50% from each source
3) Alt 4 and 5 assumes 100% from recycle, BBID is constructed for backup and potable (capital costs only).
4) Alt 3 assumes Tracy WWTP water treatment cost are equal to Mountain House WWTP treatment costs.
Both WWTP's produce tertiary effluent for MEP water source.
5) See the "wtr treat cost" worksheet tab for water treatment cost assumptions

Year	Present Value at Expected Water Usage				
-	890,250	3,801,900	5,555,250	5,555,250	3,801,900
1	36,121	1,396,019	1,417,008	2,740,316	2,716,471
2	36,744	1,430,709	1,452,223	2,808,684	2,784,243
3	37,379	1,466,265	1,488,316	2,878,759	2,853,707
4	38,027	1,502,707	1,525,309	2,950,585	2,924,907
5	38,689	1,540,057	1,563,225	3,024,205	2,997,885
6	39,365	1,578,340	1,602,087	3,099,664	3,072,686
7	40,054	1,617,577	1,641,918	3,177,008	3,149,356
8	40,757	1,657,794	1,682,743	3,256,285	3,227,941
9	41,476	1,699,013	1,724,586	3,337,541	3,308,489
10	42,209	1,741,260	1,767,473	3,420,828	3,391,050
11	42,957	1,784,562	1,811,429	3,506,195	3,475,672
12	43,721	1,828,943	1,856,483	3,593,695	3,562,409
13	44,501	1,874,432	1,902,660	3,683,381	3,651,313
14	45,298	1,921,056	1,949,990	3,775,308	3,742,438
15	46,111	1,968,843	1,998,500	3,869,531	3,835,839
16	46,941	2,017,822	2,048,221	3,966,108	3,931,574
17	47,789	2,068,024	2,099,182	4,065,098	4,029,701
18	48,655	2,119,477	2,151,415	4,166,561	4,130,279
19	49,539	2,172,215	2,204,951	4,270,559	4,233,369
20	50,442	2,226,269	2,259,823	4,377,155	4,339,036
21	51,364	2,281,672	2,316,064	4,486,414	4,447,342
22	52,306	2,338,457	2,373,709	4,598,404	4,558,355
23	53,268	2,396,659	2,432,793	4,713,191	4,672,141
24	54,251	2,456,313	2,493,351	4,830,846	4,788,770
25	55,254	2,517,457	2,555,420	4,951,441	4,908,313
26	56,280	2,580,126	2,619,039	5,075,049	5,030,842
27	57,327	2,644,359	2,684,245	5,201,745	5,156,434
28	58,397	2,710,196	2,751,078	5,331,607	5,285,163
29	59,490	2,777,676	2,819,580	5,464,714	5,417,108
30	60,606	2,846,840	2,889,792	5,601,146	5,552,351
31	61,747	2,917,730	2,961,756	5,740,988	5,690,972
32	62,913	2,990,389	3,035,516	5,884,324	5,833,058
33	64,104	3,064,863	3,111,117	6,031,241	5,978,693
34	65,321	3,141,195	3,188,606	6,181,829	6,127,968
35	66,564	3,219,433	3,268,029	6,336,180	6,280,972
36	67,835	3,299,624	3,349,435	6,494,388	6,437,800
37	69,133	3,381,816	3,432,873	6,656,549	6,598,546
38	70,460	3,466,061	3,518,394	6,822,762	6,763,309
39	71,817	3,552,408	3,606,049	6,993,128	6,932,189
40	73,203	3,640,911	3,695,894	7,167,752	7,105,289

DGC MEP - WATER TREATMENT COST CALCULATIONS & ASSUMPTIONS

Expected Annual Pump Station Use = Process WW Operating = 4300 (hours/year)

MEP TERTIARY RECYCLED SOURCE WATER ADDITIONAL TREATMENT COSTS (Tracy or Mountain House WW)

Pre-Treatment Rental Trailers Design Cases	Pre-Treatment Water Produc-tion (gpm)	Pre-Treatment Water Production (Kgal/yr)	Rental Trailer Equipment Cost ($/yr)	Rental Trailer Chemical Cost ($/yr)	Trailer Freight Cost ($/yr)	Rental Trailer Field Service Rep. Cost ($/yr)	Total Rental Trailer Cost ($/Kgal)	Total Rental Trailer Cost ($/yr)
Pre-Treatment	244.094	62,976.2	$5,400.00	$628,573.19	$403.20	$776.00	$10.09	$635,152.39
Pre-Treat, 50% with BBID	244.094	31,488.1	$5,400.00	$314,286.59	$403.20	$776.00	$10.19	$320,865.79

Pre-Treatment Wastewater Pick-up & Hauling	Process WW Production for 59°F (gpm)	Process WW Production (Kgal/yr)	Process Wastewater Hauling Cost ($/Kgal)	Process Wastewater Hauling Cost ($/yr)	
Process WW	9.76	2,519.0	$800.00	$2,015,238.00	applies to use of Tracy or Mountain House WW

WATER TREATMENT ASSUMPTIONS:

1. All calculations for annual average, 59 F day
2. Cost estimates for current year, 2009. Not escalated.
3. Trailer freight cost at calculated at $2.52 per mile for 160 mile round trip
4. Trailer freight cost for trailers not containing regenerable resins assumed returned to service provider annually per local service provider contacted.

BBID Canal 45 Conceptual Design Cost Estimate Summary
Prepared by J. Smith - June 15, 2008

Item	Quantitv	Unit	Unit Cost	Item Total Cost	
Pipeline					
6-inch Pipe	9,000	lf	$ 30	$270,000	
CARV's	3	ea	$ 8,500	$25,500	
Surface Restoration-Asphalt	1	ls	$ 180,000	$180,000	$475,500
Pump Station					
Sitework	1	ls	$ 15,000	$15,000	
Structures and Piping	1	ls	$ 25,000	$25,000	
Pumps and other Equipment	1	ls	$ 48,000	$48,000	
Electrical I &C	1	ls	$ 30,000	$30,000	$118,000
Subtotal				**$593,500**	
Contingencv (25%)				$148,375	
Construction Cost Total				**$741,875**	
Admin Engr., Construct. Management (20%)				$148,375	
PROJECT TOTAL				**$890,250**	

Assumptions

1. Pipe diameter is 6-inches based on flow of 250 gpm (3.4 ft per second pipe velocity)
2. Pipe cost is $5/di-lf for rural roads
3. Asphalt restoration is for 7,000 foot long by 3-foot wide trench repair with 3-inch thick asphalt
4. Starting elevation for water is 55 feet, while DGC facility elevation assumed to be about 130 feet.
5. Friction losses for pipe at 250 gpm are 5.7 feet/1000 feet - total friction loss is (5.7 times 9) = 51 feet
6. Total pumping head is 75 feet (static) + 51 feet (friction) + 10 feet misc. = 136 feet.
7. Pump calculates to 12.3 using 70% efficiency - round up to 20 horsepower.
8. *MEP Water Production Cost per year based on 59°F Annual Average Temperature @ 600-hr/yr operation plus 200 starts & stops @ 30 minutes each.*
9. *Demin Trailer capacity based off of BBID effluent total dissolved solids (TDS) level 230mg/l.*

Hourly Pumping Cost using 236 gpm and $0.10/kW-hr = **$ 0.92**

MOUNTAIN HOUSE WWTP Conceptual Design Cost Estimate Summary
Prepared by J. Smith - May 11, 2009

Item	Quantity	Unit	Unit Cost	Item Total Cost	
Pipeline					
6-inch Pipe					
- Heavy Traffic Control and Congestion (Byron Highway)	12,400	lf	$ 54	$669,600	
- More rural roads (W Bethany, Kelso)	19,700	lf	$ 30	$591,000	
Crossings					
- Railroad	1	ls	$ 70,000	$70,000	
- Byron Highway	1	ls	$ 50,000	$50,000	
- BBID Canal 70	1	ls	$ 50,000	$50,000	
CARV's	3	ea	$ 8,500	$25,500	
Surface Restoration-Asphalt	1	ls	$ 360,000	$360,000	$1,816,100
Pump Station					
Sitework	1	ls	$ 10,000	$10,000	
Structures and Piping	1	ls	$ 25,000	$25,000	
Pumps and other Equipment	1	ls	$ 70,000	$70,000	
Electrical I &C	1	ls	$ 20,000	$20,000	$125,000
Subtotal				**$1,941,100**	
Contingency (25%)				$485,275	
Construction Cost Total				**$2,426,375**	
Admin Engr., Construct. Management (20%)				$485,275	
PROJECT TOTAL				**$2,911,650**	

Assumptions

1. Pipe diameter is 6-inches based on flow of 250 gpm (3.4 ft per second pipe velocity)
2. Pipe cost is $9/di-lf for heavy congestion areas
3. Pipe cost is $5/di-lf for rural roads
4. Asphalt restoration is expected in Kelso Road only - other roads on shoulder
5. Asphalt restoration is for 14,000 foot long by 3-foot wide trench repair with 3-inch thick asphalt
6. Starting elevation for water is 10 feet, while DGC facility elevation assumed to be about 130 feet.
7. Friction losses for pipe at 250 gpm are 5.7 feet/1000 feet - total friction loss is (5.7 times 32) = 182 feet
8. Total pumping head is 120 feet (static) + 182 feet (friction) + 10 feet misc. = 312 feet.
9. Pump calculates to 228 hp using 70% efficiency - round up to 30 horsepower.
10. MEP Water Production Cost per year based on 59°F Annual Average Temperature @ 600-hr/yr operation plus 200 starts & stops @ 30 minutes each
11. Pre-Treatment & Demin Trailer capacities based off of MHWWTP effluent total dissolved solids (TDS) level 840mg/l.

*Hourly Pumping Cost using 236 gpm and $0.10/kW-hr =* ***$ 1.98***

Tracy WWTP Conceptual Design Cost Estimate Summary
Prepared by J. Smith - June 4, 2009

Item	Quantitv	Unit	Unit Cost	Item Total Cost	
Pipeline					
6-inch Pipe					
- Very Heavy Traffic Control and Congestion (W Larch from WWTP to Tracy Blvd))	4,000	lf	$ 72	$288,000	
- More rural roads (Larch, Naglee, W Bethany))	32,000	lf	$ 30	$960,000	
- Heavy Traffic Control and Congestion (Byron Highway)	8,500	lf	$ 54	$459,000	
- More rural roads (Kelso)	16,500	lf	$ 30	$495,000	
Crossings					
- Canal (Larch Rd)	1	ls	$ 30,000	$30,000	
- Canal (W Bethany Rd)	1	ls	$ 50,000	$50,000	
- Railroad	1	ls	$ 70,000	$70,000	
- Byron Highway	1	ls	$ 50,000	$50,000	
- BBID Canal 70	1	ls	$ 50,000	$50,000	
CARV's	6	ea	$ 8,500	$51,000	
Surface Restoration-Asphalt	1	ls	$ 462,000	$462,000	$2,965,000
Pump Station					
Sitework	1	ls	$ 10,000	$10,000	
Structures and Piping	1	ls	$ 25,000	$25,000	
Pumps and other Equipment	1	ls	$ 85,000	$85,000	
Electrical I &C	1	ls	$ 25,000	$25,000	$145,000
Subtotal				**$3,110,000**	
Contingencv (25%)				$777,500	
Construction Cost Total				**$3,887,500**	
Admin Engr., Construct. Management (20%)				$777,500	
PROJECT TOTAL				**$4,665,000**	

Assumptions

1. Pipe diameter is 6-inches based on flow of 250 gpm (3.4 ft per second pipe velocity)
2. Pipe cost is $12/di-lf for very heavy congestion areas
3. Pipe cost is $9/di-lf for heavy congestion areas
4. Pipe cost is $5/di-lf for rural roads
5. Asphalt restoration is expected in 0.75 miles Larch and Kelso Road only - other roads on shoulder
6. Asphalt restoration is for 18,000 foot long by 3-foot wide trench repair with 3-inch thick asphalt
7. Starting elevation for water is 20 feet, while DGC facility elevation assumed to be about 130 feet.
8. Friction losses for pipe at 250 gpm are 5.7 feet/1000 feet - total friction loss is (5.7 times 61) = 348 feet
9. Total pumping head is 110 feet (static) + 348 feet (friction) + 10 feet misc. = 468 feet.
10. Pump calculates to 42.2 using 70% efficiency - round up to 50 horsepower.
11. MEP Water Production Cost per year based on 59°F Annual Average Temperature @ 600-hr/yr operation plus 200 starts & stops @ 30 minutes each
12. Pre-Treatment & Demin Trailer capacities based off of MHWWTP effluent total dissolved solids (TDS) level 840mg/l, Tracy WWTP effluent data was not used.

Hourly Pumping Cost using 236 gpm and $0.10/kW-hr = **$ 3.15**

Biological Resources (18-23)

Background

The AFC (page 5.2-2, last paragraph) states that equipment and supplies related to transmission-line work will be stored in a temporary laydown area located immediately adjacent to PG&E's gas compressor station and along the work corridor as determined feasible. Uncertainty about the location of where disturbance is likely to occur will make it difficult for staff to complete its analysis and, if necessary, recommend mitigation measures.

Data Request

18. Please identify where an alternate laydown area might be if the proposed location is not determined feasible.

Response:

Equipment laydown for the construction of the 0.7-mile transmission line will be limited to the 0.6-acre lay down area adjacent to the PG&E Kelso Substation and Bethany Compressor Station and/or the proposed temporary laydown area adjacent to the MEP site.

Background

Protocol rare-plant surveys were conducted for early-blooming species in April of 2009. For plants blooming mid to late season, protocol surveys were planned for late spring and summer of 2009. The AFC (page 5.2-18) states that the results of all three surveys will be summarized in a rare plant report. Staff needs the final rare plant report to complete its analysis and, if necessary, recommend mitigation measures.

Data Request

19. Please provide the results of the three rare-plant surveys including any proposed impact avoidance, minimization, and mitigation measures beyond those provided in the AFC.

Response:

The MEP Rare Plant Report is included as Attachment DR19-1.

Background

AFC Section 5.2.1.4.1 Special-status Plants explains that 34 special-status plant species were initially considered for the project but that habitats were not suitable for 10 of those plants. Paragraph two of this section (page 5.2-17) names only 9 special-status plants and explains why they are considered unlikely to occur.

Data Request

20. Please provide a full list of special-status plant species considered, and name all those that were eliminated from further consideration and why.

Response:

Regarding Data Request 20 and 21, inconsistencies related to the comprehensive and focused lists of special-status species (plants and animals) were the result of inadvertent errors in tallying. All plants and animals potentially occurring in the project area have been accounted for as shown in the revised text (from Sections 5.2.1.4.1 and 5.2.1.4.2 of the AFC) and tables (Table 5.2-3R and Table 5.2-5R). In addition, some minor additional information was added to Table 5.2-3R regarding potential occurrence in the project area to support the rationale for no further analysis.

5.2.1.4.1 Special-status Plants

Information acquired from the CNDDB (species listed as endangered, threatened, or California Species of Special Concern species), CNPS (Lists 1 and 2), and USFWS species list resulted in 34 special-status plant species that either are known to occur, or could potentially occur, within the nine quad search area (Clifton Court Forebay, Brentwood, Woodward Island, Holt, Union Island, Tracy, Midway, Altamont, and Byron Hot Springs 7.5-minute USGS quadrangles) (Table 5.2-3R). This list also indicates plants designated as Covered Species in the ECCHCP and EACCS. These conservation plans have covered these species due to their rarity, state or federal status, and significance to their overall land management goals.

The MEP site is located entirely within non-native annual grassland (see Section 5.2.1.2); therefore, 8 special-status species suitable for other habitats were considered to have no potential of occurrence here. The Hospital Canyon larkspur (*Delphinium californicum ssp. interius*) and chaparral ragwort (*Senecio aphanactis*) are species associated with chaparral habitats. Another 5 special-status species considered unlikely for occurrence are endemic to freshwater marsh or slough habitats of the Delta: Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Mason's lilaeopsis (*Lilaeopsis masonii*), Delta mugwort (*Limosella subulata*), marsh skullcap (*Scutellaria galericulata*), and Suisun marsh aster (*Symphyotrichum lentum*). Finally, the Delta button-celery (*Eryngium racemosum*) is a riparian scrub species and, therefore, is not considered potentially present at the MEP site.

The remaining 26 special-status plant species in Table 5.2-3R have a low to moderate potential for occurrence on the MEP site, within the temporary laydown areas, and along the linear features because of their association with annual grassland habitat or seasonal wetlands. Previously, this section described the Lee Property as disturbed by cattle grazing, a cogeneration facility, and activities associated with a former wind farm. To a greater degree, the Bruns Road right of way is disturbed, which may include periodic mowing or herbicidal weed control by the county. Although these types of disturbances may diminish the likelihood of special-status plants occurrence, they do not necessarily preclude rare plants. Research has shown that native grassland plants actually benefit from an appropriate level of rangeland disturbance such as grazing: the exotic grasses are grazed, allowing native herbaceous species—with generally diminished grazing value—to flourish.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Plants					
Large-flowered fiddleneck	*Amsinckia grandiflora*	FE, CE,1B, ECCHCP: No, EACCS: No	Apr-May	Cismontane woodland, valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Bent-flowered fiddleneck	*Amsinckia lunaris*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Coastal bluff scrub, cismontane woodland, valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Alkali milk-vetch	*Astragalus tener* var. *tener*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Playas, valley and foothill grassland, vernal pools/alkaline.	Low, alkaline wetland areas lacking in project area. There are no known records of occurrence in the project area. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Heartscale	*Atriplex cordulata*	1B, ECCHCP: No, EACCS: No	Apr-Oct	Chenopod scrub, meadows and seeps, valley and foothill grassland.	Moderate, there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Brittlescale	*Atriplex depressa*	1B, ECCHCP: Yes, EACCS: No	Apr-Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools.	Moderate, there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
San Joaquin spearscale	*Atriplex joaquiniana*	1B, ECCHCP: Yes, EACCS: Yes	Apr-Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland/alkaline.	Moderate, there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Big-scale balsamroot	*Balsamorhiza macrolepis* var. *macrolepis*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Chaparral, cismontane woodland, valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Big tarplant	*Blepharizonia plumosa*	1B, ECCHCP: Yes, EACCS: Yes	Jul-Oct	Valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs and here are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Round-leaved filaree	*California macrophylla*	1B, ECCHCP: Yes, EACCS: No	Mar-May	Cismontane woodland, valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Bristly sedge	*Carex comosa*	2, ECCHCP: No, EACCS: No	May-Sep	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland	Low, potentially suitable habitat in project area is disturbed and no known records of occurrences in project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Brown fox sedge	*Carex vulpinoidea*	2, ECCHCP: No, EACCS: No	May-Jun	Marshes and swamps (freshwater), riparian woodland.	Low, potentially suitable habitat in project area is disturbed and no known records of occurrences in project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Lemmon's jewelflower	*Caulanthus coulteri* var. *lemmonii*	1B, ECCHCP: No, EACCS: No	Mar-May	Valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	1B, ECCHCP: No, EACCS: Yes	May-Oct (Nov)	Valley and foothill grassland (alkaline).	Low, project area dominated by non-native annual grasses and forbs and here are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Hispid bird's-beak	*Cordylanthus mollis* ssp. *hispidus*	1B, ECCHCP: No, EACCS: No	Jun-Sep	Meadows and seeps, playas, valley and foothill grassland/alkaline.	Low, project area dominated by non-native annual grasses and forbs and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	FE, CE,1B, ECCHCP: No, EACCS: Yes	May-Oct	Chenopod scrub, valley and foothill grassland/alkaline.	Low, project area dominated by non-native annual grasses and forbs and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Livermore tarplant	*Deinandra bacigalupi*	1B, ECCHCP: No, EACCS: Yes	Jun-Oct	Meadows and seeps (alkaline).	Low, potentially suitable habitat in project area is disturbed and no known records of occurrences in project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Hospital Canyon larkspur	*Delphinium californicum* ssp. *interius*	1B, ECCHCP: No, EACCS: No	Apr-Jun	Chaparral (openings), cismontane woodland (mesic).	None, chaparral habitat does not occur in the project area.
Recurved larkspur	*Delphinium recurvatum*	1B, ECCHCP: No, EACCS: Yes	Mar-Jun	Chenopod scrub, cismontane woodland, valley and foothill grassland/alkaline.	Moderate, CNDDB occurrence in an alkaline meadow located less than 1,000 feet of the Water supply pipeline. However, this species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Delta button-celery	*Eryngium racemosum*	CE,1B, ECCHCP: No, EACCS: No	Jun-Sep	Riparian scrub (vernally mesic clay depressions).	None, riparian habitat does not occur in the project area.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Diamond-petaled California poppy	*Eschscholzia rhombipetala*	1B, ECCHCP: No, EACCS: No	Mar-Apr	Valley and foothill grassland (alkaline).	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Diablo helianthella	*Helianthella castanea*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Woolly rose-mallow	*Hibiscus lasiocarpus*	2, ECCHCP: No, EACCS: No	Jun-Sep	Marshes and swamps (freshwater)	Low, potentially suitable habitat in project area is disturbed and no known records of occurrences in project area. Protocol-level surveys for this species scheduled for the Summer 2009.
Contra Costa goldfields	*Lasthenia conjugens*	FE, 1B, ECCHCP: No, EACCS: No	Mar-Jun	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*	1B, ECCHCP: No, EACCS: No	May-Jul (Sep)	Marshes and swamps (freshwater and brackish).	None, this species generally associated with Delta water bodies (i.e., sloughs). There are no known records of occurrence in the project area.
Mason's lilaeopsis	*Lilaeopsis masonii*	CR,1B, ECCHCP: No, EACCS: No	Apr-Nov	Marshes and swamps (brackish or freshwater), riparian scrub.	None, this species generally associated with Delta water bodies (i.e., sloughs). There are no known records of occurrence in the project area.
Delta mudwort	*Limosella subulata*	2, ECCHCP: No, EACCS: No	May-Aug	Marshes and swamps	None, this species generally associated with Delta water bodies (i.e., sloughs). There are no known records of occurrence in the project area.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Showy golden madia	*Madia radiata*	1B, ECCHCP: No, EACCS: No	Mar-May	Cismontane woodland, valley and foothill grassland.	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Little mousetail	*Myosurus minimus* ssp. *apus*	2, ECCHCP: No, EACCS: No	Mar-Jun	Valley and foothill grassland, vernal pools (alkaline)	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Hairless popcorn-flower	*Plagiobothrys glaber*	1B, ECCHCP: No, EACCS: No	Mar-May	Meadows and seeps (alkaline).	Low, there are no known records of occurrence in the project area. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Marsh skullcap	*Scutellaria galericulata*	2, ECCHCP: No, EACCS: No	Jun-Sep	Meadows and seeps (mesic), marshes and swamps.	None, this species generally associated with Delta water bodies (i.e., sloughs). There are no known records of occurrence in the project area.
Chaparral ragwort	*Senecio aphanactis*	2, ECCHCP: No, EACCS: No	Jan-Apr	Chaparral, cismontane woodland, coastal scrub /sometimes alkaline.	None, there are no known records of occurrence in the project area and suitable habitat does not occur in the project area.
Suisun Marsh aster	*Symphyotrichum lentum*	1B, ECCHCP: No, EACCS: No	May-Nov	Marshes and swamps (brackish and freshwater).	None, this species generally associated with Delta water bodies (i.e., sloughs). There are no known records of occurrence in the project area.
Saline clover	*Trifolium depauperatum* var. *hydrophilum*	1B, ECCHCP: No, EACCS: No	Apr-Jun	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools.	Low, there are no known records of occurrence in the project area. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Caper-fruited tropidocarpum	*Tropidocarpum capparideum*	1B, ECCHCP: No, EACCS: No	Mar-Apr	Valley and foothill grassland (alkaline hills).	Low, project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Insects and Crustaceans					
Mid-valley fairy shrimp	*Branchinecta mesovallensis*	ECCHCP: Yes, EACCS: No	RES	Shallow vernal pools, swales and various artificial ephemeral wetland habitats.	Moderate, project area is located on edge of this species range, but suitable habitat is present and *Branchinecta* sp. has been observed near the MEP site.
Conservancy fairy shrimp	*Branchinecta conservatio*	FE, ECCHCP: No, EACCS: No	RES	Large, cool-water vernal pools with moderately turbid water.	None, large playa pools do not occur in the project area and no known records in the project vicinity.
Longhorn fairy shrimp	*Branchinecta longiantenna*	FE, ECCHCP: Yes, EACCS: Yes	RES	Vernal pools, seasonally ponded areas within vernal swales, and ephemeral freshwater habitats.	Low, no known records in the project area; potentially suitable habitat is present but this species is quite rare, as they are only known from four disjunct populations outside the project area.
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT, ECCHCP: Yes, EACCS: Yes	RES	Vernal pools, ephemeral alkali pools, seasonal drainages, stock ponds, vernal swales and rock outcrops.	High, suitable habitat is present and *Branchinecta* sp. has been observed near the MEP site.
Vernal pool tadpole shrimp	*Lepidurus packardi*	FE, ECCHCP: Yes, EACCS: No	RES	Typically larger playa pools or vernal pool complexes.	Low, large playa pools and vernal pool complexes lacking in the project area; no known records in the project vicinity.
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT, ECCHCP: No, EACCS: No	RES	The species is nearly always found on or close to its host plant, elderberry.	None, the elderberry host plant does not occur in the project area; no known records in the project area.
Amphibians					
California tiger salamander, central population	*Ambystoma californiense*	FT, CSC, ECCHCP: Yes, EACCS: Yes	RES	Grassland, oak savanna, and edges of mixed woodlands. Breeding: vernal pools, temporary rainwater ponds, permanent human-made ponds if predatory fishes are absent.	High, CNDDB occurrences within 1 mile of MEP. Potentially suitable aestivation and dispersal habitat in project area.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Western spadefoot toad	*Spea hammondii*	CSC, ECCHCP: No, EACCS: Yes	RES	Open areas with sandy or gravelly soils, in mixed woodlands, grasslands; rain pools which do not contain bullfrogs, fish, or crayfish are necessary for breeding.	Low, no known record occurrences in project area and sandy/gravelly soils are lacking in the project area.
California red-legged frog	*Rana draytonii*	FT, CSC, ECCHCP: Yes, EACCS: Yes	RES	Grasslands and streamsides with plant cover; permanent water sources: lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps.	High, CNDDB occurrences within 0.5 mile of MEP and on the Lee Property. Suitable breeding, aestivation, and dispersal habitat in project area.
Reptiles					
San Joaquin coachwhip	*Masticophis flagellum ruddocki*	CSC, ECCHCP: No, EACCS: Yes	RES	Open, dry, treeless areas, including grassland and saltbush scrub. Takes refuge in rodent burrows, under vegetation and surface objects.	Low, no known record occurrences in project area, and grasslands with a shrub component lacking in project area.
Alameda whipsnake	*Masticophis lateralis euryxanthus*	FT, CT, ECCHCP: Yes, EACCS: Yes	RES	Open areas in canyons, rocky hillsides, chaparral scrublands, open woodlands, pond edges, and stream courses.	None, no suitable chaparral habitat and known record occurrences present in the project vicinity.
Giant garter snake	*Thamnophis gigas*	FT, CT, ECCHCP: Yes, EACCS: Yes	RES	Marshes, sloughs, drainage canals, and irrigation ditches, especially around rice fields, and occasionally in slow-moving creeks of the Central Valley floor.	Low, no known record occurrence in the project area. Project area located above the valley floor and outside the known range of this species.
Silvery legless lizard	*Anniella pulchra pulchra*	CSC, ECCHCP: Yes, EACCS: Yes	RES	Occurs in moist warm loose soil with plant cover. Occurs in sparsely vegetated areas.	Low, no known record occurrences in project area, loose friable soils suitable for this species lacking in project area.
California coast horned lizard	*Phrynosoma coronatum* (frontale population)	CSC, ECCHCP: No, EACCS: Yes	RES	Grasslands, woodlands, and chaparral, with open areas and patches of loose soil; and frequently found near ant hills.	Low, no known record occurrences in project area and ant prey base not observed during multiple site surveys
Western pond turtle	*Actinemys marmorata*	CSC, ECCHCP: Yes, EACCS: Yes	RES	Ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation.	Moderate, CNDDB occurrences within 1 mile of MEP. Suitable breeding pond located in the project area along the Water supply pipeline corridor.
Birds					
Tricolored blackbird	*Agelaius tricolor*	CSC, ECCHCP: Yes, EACCS: Yes	RES (primarily)	Near open accessible water with dense emergent vegetation (e.g., cattails).	Moderate, no known record occurrences in project area, but onsite marsh habitat found along the water supply pipeline provides suitable breeding habitat.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Golden eagle	*Aquila chrysaetos*	BGPA, CFP, ECCHCP: Yes, EACCS: Yes	RES (primarily)	Open grasslands and savannahs; Nests on cliffs of all heights and in large trees in open areas.	Detected during April 2009 rare plant survey foraging in project area grasslands; suitable breeding habitat not present in project area.
Loggerhead shrike	*Lanius ludovicianus*	CSC, ECCHCP: No, EACCS: Yes	RES (primarily	Open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches.	Detected during February 2009 site visits; foraging habitat only, as no trees or shrubs will be impacted during construction.
Western burrowing owl	*Athene cunicularia*	CSC, ECCHCP: Yes, EACCS: Yes	Primarily RES (may WNTR to South)	Open, dry grassland. Usually nests in old burrow of ground squirrel, or other small mammal.	Detected during April 2009 plant surveys. Suitable breeding and foraging habitat in project area.
Short-eared owl	*Asio flammeus*	CSC; ECCHCP: No; EACCS: No	WNTR	Usually found in open areas with few trees such as annual and perennial grasslands, prairies, dunes, wetlands and irrigated lands.	Low, winter migrant to central valley and western Sierra Nevada foothills. Suitable roosting and resting habitat not present in the project area. No known records in the project area.
Swainson's hawk	*Buteo swainsoni*	CT, ECCHCP: Yes, EACCS: Yes	SUM	Open riparian habitat, in scattered trees or small groves in sparsely vegetated flatlands. Usually near water in the Central Valley.	High, CNDDB occurrences within 1 mile of MEP; foraging habitat only, as no trees will be impacted during construction.
Northern harrier	*Circus cyaneus*	CSC, ECCHCP: No, EACCS: Yes	RES (primarily)	Flat, open areas of tall, dense grasses, moist or dry shrubs, and edges for nesting, cover, and feeding.	Detected, species observed during a February 2009 site survey within 1 mile of MEP. Suitable foraging habitat only in project area.
White-tailed kite	*Elanus leucurus*	CFP, ECCHCP: No, EACCS: Yes	RES	Open grasslands, meadows, farmlands and emergent wetlands. Groves of dense, broad-leafed deciduous trees used for nesting and roosting.	Moderate, no known record occurrences in project area. Although no suitable breeding habitat in the project area, suitable foraging habitat is present.
Grasshopper sparrow	*Ammodramus savannarum*	CSC, ECCHCP: No, EACCS: No	SUM	Native grassland with mix of grasses and forbs for nesting and foraging.	Moderate, no known record occurrences in project area, but suitable breeding habitat is present.
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	CSC ECCHCP: No, EACCS: No	WNTR	Dense emergent wetland of cattails, tules, and other wetland plants, often along border of lake or pond.	Moderate, no known record occurrences in project area, but marsh wetland located along water supply pipeline corridor provides suitable breeding habitat.

TABLE 5.2-3R
Comprehensive List of Special-status Species Potentially Occurring in the MEP Area.

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Mammals					
San Joaquin kit fox	*Vulpes macrotis mutica*	FE, CT, ECCHCP: Yes, EACCS: Yes	RES	Annual grasslands or grassy open stages of vegetation, some agricultural areas.	High, CNDDB occurrences within 1 mile of MEP. Suitable foraging habitat in project area; small mammal burrow located on site may provide denning opportunities for this species.
American badger	*Taxidea taxus*	CSC, ECCHCP: No, EACCS: Yes	RES	Friable soils, and relatively open, uncultivated ground; grasslands, savannas.	Moderate, CNDDB occurrences within 1 mile of MEP. Suitable foraging habitat in project area; small mammal burrow located on site may provide denning opportunities for this species.
Pallid bat	*Antrozous pallidus*	CSC, ECCHCP: Yes, EACCS: Yes	RES	Shrub-steppe grasslands; day roosts in caves, crevices, mines, and occasionally in hollow trees and buildings.	Low, suitable roosting habitat lacking in project area; however may disperse through the project area.
Western mastiff bat	*Eumpos perotis californicus*	CSC, ECCHCP: No, EACCS: Yes	RES	Broad open areas; chaparral, oak woodland, grassland, and agricultural areas; primarily cliff-dwelling; building roosts.	Low, suitable roosting habitat lacking in project area; however may disperse through the project area.

Notes:

[a] **Status.**

Federal Status
FE = federally listed as endangered
FT = federally listed as threatened
BGPA = Bald and Golden Eagle Protection Act

State Status
CE = state listed as endangered
CT = state listed as threatened
CFP = state fully protected
CR = state rare
CSC = state species of concern

California Native Plant Society (CNPS) Status
1A = plants presumed extinct in California
1B = plants rare, threatened, or endangered in California, but more common elsewhere
2 = plants rare, threatened, or endangered in California, but more common elsewhere

East Contra Costa Habitat Conservation Plan (ECCHCP), East Alameda County Conservation Strategy (EACCS)
Yes = covered species
No = not a covered species

[b] **Season**. Blooming period for plants. Season of use for animals. RES = Resident; SUMR = Summer; WNTR = Winter

[c] **Primary Habitat.** Most likely habitat association

Sources: CNDDB, 2009, and CNPS, 2008 (Clifton Court Forebay, Brentwood, Woodward Island, Holt, Union Island, Tracy, Midway, Altamont, and Byron Hot Springs Quads searched)

Background

AFC Section 5.2.1.4.2 Special-status Wildlife (page 5.2-21) states that information acquired from several sources resulted in a list of 34 special-status wildlife species that could occur within a nine USGS-quadrangle search area of the California Natural Diversity Database. The AFC states that these are listed in Table 5.2-3; however, this table names only 29 special-status wildlife species. This comprehensive list was then refined to 17 species potentially affected by the project based on the results of reconnaissance field surveys and an analysis of habitat suitability, coupled with known species ranges. The focused list is provided in Table 5.2-5; however, there are only 13 species listed in this table. In order to complete its analysis, staff must fully understand how many and which wildlife species were initially considered, and which ones were eliminated from further consideration and why.

Data Request

21. Similar to what was done in the special-status plant discussion, please provide a complete list of species initially considered, a refined list of species that received further consideration in the AFC, and explain why those that were eliminated would not be expected to occur in the project area.

Response:

Revised text from Section 5.2.1.4.2 of the AFC is provided below.

5.2.1.4.2 Special-status Wildlife

Information acquired from the CNDDB (species listed as endangered or threatened, or California Species of Special Concern), USFWS, and other sources resulted in a list of 29 special-status wildlife species that could occur within the nine quad search area (Table 5.2-3R). Based on the results of the reconnaissance-level field surveys and an analysis of habitat suitability (coupled with known species' ranges), the comprehensive list of special-status wildlife was refined into a list of 11 species with the highest potential to be affected by project construction. The refined list is based on the assumption that the project area supports potential breeding habitat and overlaps with the species' distributional range. The species with no or low potential of occurrence in the project area were not analyzed further for the reasons described in Table 5.2-3R. The focused list is shown in Table 5.2-5R. Of these, 8 special-status wildlife species are known to occur (CNDDB, 2009) within the 1-mile radius survey areas of the MEP site.

TABLE 5.2-5R
Special-status Species Potentially Affected during MEP Construction

Common Name	*Scientific Name*	Status[a]	Within 1 mi of MEP (Y/N)
Crustacea			
Mid-valley fairy shrimp	*Branchinecta mesovallensis*	--/--	Y
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT/--	Y

TABLE 5.2-5R
Special-status Species Potentially Affected during MEP Construction

Common Name	*Scientific Name*	Status[a]	Within 1 mi of MEP (Y/N)
Amphibians			
California tiger salamander, central population	*Ambystoma californiense*	FT/CSC	Y
California red-legged frog	*Rana draytonii*	FT/CSC	Y
Reptiles			
Western pond turtle	*Actinemys marmorata*	--/CSC	Y
Birds			
Tricolored blackbird	*Agelaius tricolor*	--/CSC	N
Western burrowing owl	*Athene cunicularia*	--/CSC	Y[b]
Grasshopper sparrow	*Ammodramus savannarum*	--/CSC	N
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	--/CSC	N
Mammals			
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/CT	Y
American badger	*Taxidea taxus*	--/CSC	Y

Notes:

[a] **Status.**

Federal Status
FE = federally listed as endangered
FT = federally listed as threatened

State Status
CT = state listed as threatened
CSC = state species of concern

[b] Species observed during 2009 MEP reconnaissance survey; others recorded in project vicinity by CNDDB or other sources.

Background

The second bullet of the Executive Summary in Section 1.1.2 Key Project Benefits (page 1-2) explains that the project is a zero liquid discharge facility and that process wastewater and stormwater runoff from plant equipment process areas will be treated on site and then recycled. Section 5.2.1.6.4 Stormwater Detention Basin (page 5.2-31) then discusses a multi-stage discharge structure to be installed inside the new stormwater detention basin for particulates to settle out before stormwater discharges off the site into one of two grass-lined swales located along the perimeter of the MEP site.

The Water Quality section of the AFC (page 5.15-16, Section 5.15.2.2) differentiates primary wastewater, which includes stormwater runoff from all of the plant equipment process areas that would be entirely recycled, from secondary wastewater, which includes sanitary wastewater that would discharge through an

onsite leach field or be removed for offsite treatment. Neither would apparently discharge off the site. The next section (page 5.15-16, Section 5.15.2.3) discusses stormwater runoff and drainage, which would discharge to one of two swales routing "upgradient" stormwater around the site. This section implies that this could include oily water contaminated by roads, plant equipment, and other impervious surfaces.

The difference between stormwater from plant equipment process areas that will be recycled and stormwater that will be routed to grass-lined swales but that could mix with oily water from the plant site is not clear. This concern has implications for special-status species that could be attracted to the grass-lined swales. Table 5.15-5 Pre- and Post-development Runoff for the MEP Site does not make the distinction clear, nor does it differentiate quantities of the two types of stormwater.

Data Request

22. Please provide a clear explanation for the difference between stormwater that would be recycled and stormwater that would discharge to grass-lined swales, where each would originate, how they are separate or separated, how they could mix, and how much is expected from each source.

Response:

Stormwater collected in process areas will drain into the general plant drain system to be recycled. General plant drains will collect containment area washdown, sample drain water, and facility equipment drainage. These process areas are depicted in Figure DR22-1. Water from these areas will be collected in a system of floor drains, hub drains, sumps, and piping and routed through an oil/water separator prior to treatment in the zero-liquid discharge (ZLD) system.

Equipment drain contents will originate from the following process areas: water injection skids, auxiliary skids, sprint skids, transfer pump skids, lube oil coolers, oil/water separator, fuel gas waste sump, step-up transformer, auxiliary transformer, demineralized trailer area, aqueous ammonia storage area, auxiliary skid drains, and sample drains from CEMS station. Equipment drains that may be contaminated with oil will be valved shut to prevent rain water from draining, unless the water has been first inspected and allowed to do so. Following inspection, the collected water will be routed through the oil/water separator and recycled in the ZLD system.

Stormwater runoff that is outside of the process areas mentioned above will be captured in the site stormwater drainage system and conveyed to the onsite extended detention basin located at the north end of the MEP site. All surfaces within the site perimeter (including the surface of the perimeter road) will drain to the extended detention basin, with the exception of the process areas described above. Process area drainage will be conveyed and treated in a separate contained system; no mixing will occur with the non-process area site stormwater. The total MEP site drainage area shown on Figure DR22-1 is 7.53 acres (328,007 square feet). The process area drainage will represent approximately 3.6 percent (11,878 square feet) of the total MEP site stormwater drainage area. Therefore, the two-year peak runoff from the site drainage area (area S-1 on Figure DR22-1) totaling 5.09 cubic feet per

second (cfs) would yield runoff of 0.18 cfs to the process area drainage system and 4.91 cfs to the site stormwater drainage system.

Two grass-lined swales will convey upgradient stormwater drainage around the MEP site. MEP site runoff will not drain directly to these swales. The extended detention basin effluent will discharge to the western grass-lined swale, as depicted on Figure DR22-1.

Background

Table 5.2-7 Agency Contacts for Biological Resources provides contact information and a brief summary of discussions with personnel from four state and federal agencies. For permits normally issued by the state, the Energy Commission will issue a permit on an in-lieu basis, but the applicant would nevertheless submit permit applications to state agencies for their review and comment.

Data Request

23. Please provide an update on coordination efforts with USACE for a Clean Water Act Section 404 permit, USFWS for a federal Endangered Species Act Section 7 biological opinion, and CDFG for a Fish and Game Code Section 2081 incidental take authorization (or consistency determination) and streambed alteration agreement. Provide any supporting documents (letters, emails, or records of conversation) that result from communication with these agencies, including impact mitigation recommendations, and the steps the applicant has taken or plans to take to apply for these permits, and provide copies of applications for a state incidental take authorization permit and a streambed alteration agreement.

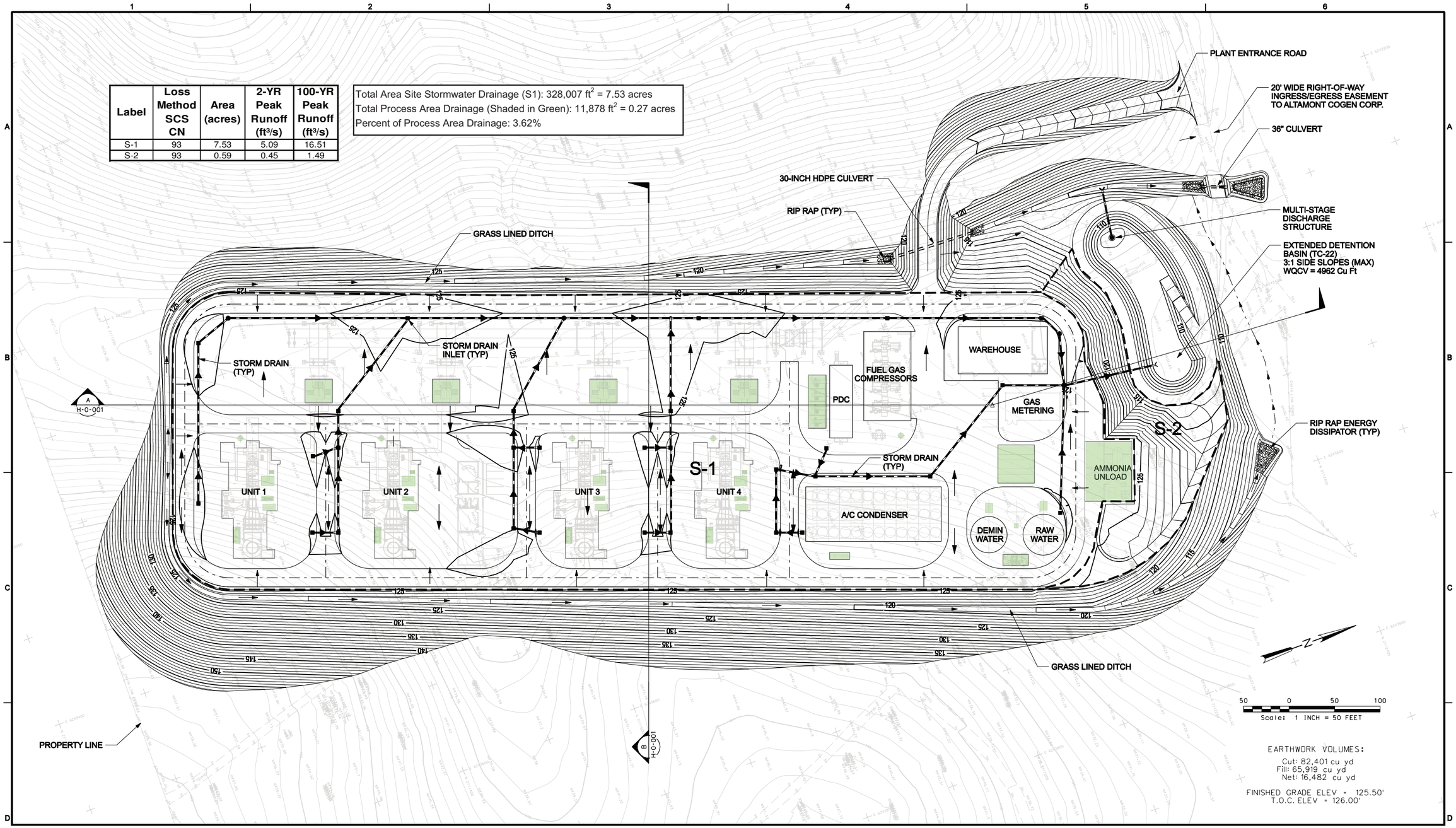
Response:

On behalf of Mariposa Energy, LLC, CH2M HILL's Project Manager (Doug Urry), Project Biologist (Todd Ellwood), and Wetlands Ecologist (Russell Huddleston) met Marc Fugler, USACE Regulatory Project Manager, on site for a preliminary Jurisdictional Determination (JD) on November 19, 2009. Mr. Fugler agreed with the methodology and accepted the results of the project's Wetlands Delineation Report. By the first week of December, CH2M HILL will send the USACE an updated summary of all waters of the U.S. (including wetlands) in the project area, including their respective acreages. CH2M HILL will also include with the transmittal a set of updated map figures showing the extent of jurisdictional features, including those found along the alternate recycled water supply pipeline route. Mr. Fugler stated that he will issue a jurisdiction verification letter to Mariposa Energy, LLC within about one week of receipt of this updated data, or mid December 2009. Mr. Fugler indicated that Nationwide Permit (NWP) #12 (Utility Line Projects) could authorize project related impacts to the jurisdictional features. CH2M HILL will prepare and submit a Preconstruction Notification (PCN) for NWP #12 to Mr. Fugler in early January 2010. Included with the PCN will be a Biological Assessment for Section 7 consultation.

A site visit is scheduled on December 22, 2009 at 10:00 a.m. with the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG). Representing the agencies will be Ms. Kim Squires (USFWS) and Ms. Marcia Grefsrud (CDFG). The field meeting will assist the USFWS and CDFG with Section 7 ESA consultation and a CDFG consistency determination. Also on the agenda are: 1) a review of the draft MEP Biological Assessment (BA) including the proposed mitigation measures and ratios; 2) a field review of four drainage features which may be regulated by Fish and Game code Section 1602; and 3) discussion of the Section 7 process, including the USACE preliminary JD and submittal of the BA to USACE in January 2010. CH2M HILL will prepare and submit Section 1602 Streambed Alteration Agreement application in early 2010.

Label	Loss Method SCS CN	Area (acres)	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
S-1	93	7.53	5.09	16.51
S-2	93	0.59	0.45	1.49

Total Area Site Stormwater Drainage (S1): 328,007 ft^2 = 7.53 acres
Total Process Area Drainage (Shaded in Green): 11,878 ft^2 = 0.27 acres
Percent of Process Area Drainage: 3.62%



LEGEND

Process Areas

FIGURE DR22-1
PROCESS AREA DRAINAGE
Mariposa Energy Project
Alameda County, California

CH2MHILL

Attachment DR19-1
Rare Plant Survey Report

Rare Plant Survey Report for the Mariposa Energy Project

Prepared for

Mariposa Energy, LLC

November 2009

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

Executive Summary

Botanical surveys for the proposed Mariposa Energy Project (MEP) in unincorporated Alameda County were conducted during the spring and summer of 2009. MEP would be located approximately 10 miles northwest of the city of Tracy and would consist of a natural gas-fired, simple-cycle electrical generating facility with a generating capacity of 200 megawatts. The survey area included the proposed facility site as well as an adjacent laydown area and associated project linear features including natural gas and water supply pipelines, a transmission line to the Pacific Gas and Electric Company Kelso Substation, and an alternate water supply pipeline route from the Mountain House Community Services District wastewater treatment plant. Surveys for special-status plants were completed in April, May, and August following established protocols and methodology. No rare, threatened, or endangered plants were observed in the project study area. One special-status plant, heartscale (*Atriplex cordulata*), was observed north of the proposed transmission line alignment, on the east side of Bruns Road, in an alkaline meadow north of the Kelso Substation.

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Acronyms and Abbreviations

BBID	Byron Bethany Irrigation District
BIOS	Biogeographic Information and Observation System
CDFG	California Department of Fish and Game
CNDDB	California Natural Diversity Database
HUC	Hydrologic Unit Code
MHCSD	Mountain House Community Service District
kV	kilovolt
MEP	Mariposa Energy Project
NRCS	Natural Resource Conservation Service
PG&E	Pacific Gas and Electric Company
USFWS	United States Fish and Wildlife Service
WRCC	Western Region Climate Center
WWTP	Wastewater treatment plant

SECTION 1.0

Introduction

Mariposa Energy, LLC proposes to construct, own, and operate an electrical generating plant in unincorporated Alameda County, California. The Mariposa Energy Project (MEP) will be a natural gas-fired, simple-cycle electrical generating facility rated at a nominal generating capacity of 200 megawatts.

This report present the results of botanical surveys for rare, threatened, and endangered plant species conducted for the proposed project. Information on the project location and environmental setting are provided below, study methods and results are provided in the following sections.

1.1 Project Location

The MEP site is located in northeastern Alameda County, approximately 10 miles northwest of Tracy, 12 miles northeast of Livermore and 12 miles southeast of Brentwood (Figure 1-1). The site is located in the northwest 1/4 of Section 1, Township 02 south, Range 03 east (Mount Diablo Base and Meridian) in the Clifton Court Forebay United States Geological Survey 7.5-minute quadrangle. The facility will be located southeast of the intersection of Bruns Road and Kelso Road. MEP would occupy approximately 10 acres of a 158-acre parcel, located immediately south of Pacific Gas and Electric Company's (PG&E) Bethany Compressor Station and 230-kilovolt (kV) Kelso Substation (Figure 1-2). The assessor's parcel number is 099B-7050-001-10. The center of the project site is located at 37° 47′ 23.86″ north latitude and 121° 36′ 06.35″ west longitude.

Linear features associated with the project include a transmission line, natural gas pipeline, and water supply pipeline (Figure 1-2). MEP will interconnect to the Kelso Substation via a new 0.7-mile, 230-kV transmission line that will run north on the project parcel, then across Kelso Road and into the existing substation. The natural gas pipeline will consist of approximately 580 feet of new 4-inch-diameter pipe that will run directly northeast from the project site to interconnect with PG&E's high-pressure natural gas pipeline, which is located on the parcel. A new gas metering station will be constructed on the MEP site. Service water will be provided from a new connection to the Byron Bethany Irrigation District (BBID) via a new pump station and a 6-inch-diameter, 1.8-mile-long pipeline placed in or along the east side of Bruns Road, from Canal 45 south to the project site. An alternative water supply pipeline route extending from the project site to the Mountain House wastewater treatment plant (WWTP) was also included in the botanical study area. The alternate water line would extend to the northeast across the project parcel and continue approximately 2.5 miles east along Kelso Road to the Byron Highway. The alignment would then continue to the southeast along the highway for 2.3 miles to Wicklund Road where it would then continue directly north to the WWTP facility (Figure 1-3).

1.2 Environmental Setting

MEP is located at the northeastern edge of the Eastern Hills subsection of the Central Valley Coast Range Ecological Subregion (Miles and Goudey, 1998), immediately bordering the alluvial plain of the San Joaquin Valley to the east. Regionally, the landscape is characterized by low foothills along the northeastern edge of the Diablo Range. In the vicinity of the MEP site the landscape is characterized by a series of gently rolling hills to the south and west with low terraces to the north and east. Elevation ranges from approximately 75 to 175 feet above mean sea level with slopes between approximately 2 to 12.5 percent. Drainage is generally to the east and north. The following sections provide a description of the general habitats, climate, regional hydrology, and soils.

1.2.1 Habitats and Land Use

Habitats and land use in the project area consist of California annual grassland, alkaline meadow, ruderal, developed/landscaped areas, agriculture, seasonal wetlands/swales, and drainages/canals. Descriptions of these types are provided below. Figures 1-4a through 1-4e depict the general habitats and land use in the vicinity of the Project area. Figures 1-5a through 1-5k show the habitat types along the alternative water supply pipeline route. Representative photographs of the habitats are provided in Appendix A.

California Annual Grassland

California annual grassland is the predominant natural community type found throughout the project area. Characteristic species include non-native grasses such as foxtail barley (*Hordeum murinum*), soft chess (*Bromus hordeaceus*), and wild oat (*Avena barbata*). Common forbs include bur clover (*Medicago polymorpha*), filaree (*Erodium moschatum*), black mustard (*Brassica nigra*), and gumweed (*Grindelia camporum*). The grassland habitat on the 158-acre project parcel is currently used for cattle grazing. The proposed laydown site was previously developed for wind energy. The windmill towers have been removed, but some remnants of the cement tower bases and miscellaneous debris was scattered throughout the area at the time of the survey.

Alkaline Sink Wetland

Alkaline sink wetland habitat is present on the north side of the PG&E Kelso Substation, west of Bruns Road. The majority of this habitat occurs outside the immediate survey area for the project with the exception of a few small areas along water supply pipeline route on the east side of Bruns Road. Vegetation in this area is characterized by saltgrass (*Distichlis spicata*) and seepweed (*Suaeda moquinii*). Other common associated species include sand spurry (*Spergularia marina*), alkali heath (*Frankenia salina*), and common spikeweed (*Centromadia pungens*). Soils in this area are moderately to strongly alkaline with pH ranging from 8.4 to 9.6.

Ruderal

Ruderal areas are most common along the alternate water line in the road and railroad rights-of-way along the Byron Highway. Ruderal vegetation also occurs along other roadsides, in fallow agricultural fields, and around developed areas. The ruderal habitat along the edges of roads, railroad tracks, and agricultural fields are routinely sprayed with

herbicides and/or mowed. These areas are generally characterized by invasive, non-native species such as mustards (*Brassica* spp.), prostrate pigweed (*Amaranthus albus*), redroot amaranth (*Amaranthus retroflexus*), fennel (*Foeniculum vulgare*), poison hemlock (*Conium maculatum*), yellow star-thistle (*Centaurea solstitialis*), bristly oxtongue (*Helminthotheca echioides*), prickly lettuce (*Lactuca serriola*), Russian thistle (*Salsola tragus*), bull mallow (*Malva nicaeensis*), puncturevine (*Tribulus terrestris*), and various non-native annual grasses.

Developed/Landscaped Areas

Developed and landscaped areas in the vicinity of MEP include the Byron Power Cogen Plant, located in the center of the project parcel (immediately north of the proposed project site), the PG&E Bethany Compressor Station and the Kelso Substation north of Kelso Road, and the BBID headquarters along Bruns Road. Scattered residential parcels, farm buildings, and industrial areas are also present along the alternate water supply pipeline alignment. Common landscape plants in these areas include oleander (*Nerium oleander*), Bishop pine (*Pinus muricata*), California fan palm (*Washingtonia filifera*), walnut (*Juglans hindsii*), London plane (*Platanus* x *acerifolia*), Tasmanian bluegum (*Eucalyptus globulus*), Lombardy poplar (*Populus nigra*), sheoak (*Casuarina* sp.), fountaingrass (*Pennisetum* sp.), rose (*Rosa* sp.), and rosemary (*Rosmarinus officinalis*).

Agriculture

Agricultural lands along the proposed water supply pipeline are limited to field crops (i.e., wheat, alfalfa and hay) immediately north and south of the BBID facilities on the east side of Bruns Road. Several agricultural fields, including alfalfa, various grains and hay are also present along the alternative water supply pipeline.

Seasonal Wetlands and Swales

Two small seasonal wetlands are present along the existing access road to the Byron Power Cogen Plant. The two distinct basins are hydrologically connected by a partially collapsed 18-inch-diameter corrugated metal pipe under the gravel road. Vegetation within the basins is generally sparse and includes species such as popcorn flower (*Plagiobothrys stipitatus*), coyote thistle (*Eryngium vaseyi*), Italian ryegrass (*Lolium multiflorum*), gumweed (*Grindelia camporum*), dense-flower willowherb (*Epilobium densiflorum*), wooly marbles (*Psilocarphus oregonus*), brass buttons (*Cotula coronopifolia*) and water pygmyweed (*Crassula aquatica*). A seasonal wetland characterized by dense cattails (*Typha latifolia)* is present on the south side of Kelso Road, along the alternate water supply pipeline route.

Three weakly expressed, low topographic swales are present in the project area. Two swales were observed along the transmission line route and one swale was observed along the proposed water supply pipeline route. The vegetation in these areas is generally similar to the adjacent grassland, except for the fact that Mediterranean barley (*Hordeum marinum*) becomes the dominant annual grass species within the swale areas, where soft chess and foxtail barley are abundant in the adjacent grassland. Other associated species include sparse saltgrass, alkali heath, and Italian ryegrass, all of which also occur in the adjacent grassland habitat.

Drainages/Canals

The proposed water supply pipeline would cross a seasonal drainage on the east side of Bruns Road, approximately 0.3 mile south of the intersection with Kelso Road. Within the project study area the drainage channel is well defined with gently sloping banks. The area immediately around the cement box culvert under Bruns Road is characterized by dense perennial pepperweed (*Lepidium latifolium*). To the east, the channel is characterized by saltgrass, with scattered rabbitsfoot grass (*Polypogon monspeliensis*), Italian ryegrass, sand spurry, and brass buttons (*Cotula coronopifolia*). From the project area this channel continues to the northeast for approximately 900 feet where it enters an impoundment area. The drainage continues on the north side of the impoundment area, but is more of a low swale-like feature characterized by saltgrass, Mediterranean barley, soft chess, and foxtail barley.

A small swale-like drainage feature is located along Bruns Road immediately west of PG&E's Bethany Compressor Station, approximately 600 feet north of the intersection of Kelso Road. Vegetation within the channel is characterized by dense saltgrass, Italian ryegrass and meadow barley (*Hordeum brachyantherum*). This drainage flows to the east where it enters a rock-lined, linear drainage channel that flows east through the PG&E facility.

There is a well-defined channel on the east side of Bruns Road approximately 0.3 miles north of the intersection with Kelso Road where there is a 6-foot by 6-foot cement box culvert under the road. The drainage channel is characterized by dense growth of cosmopolitan bulrush (*Bolboschoenus maritimus*) with scattered rabbitsfoot grass, curly dock (*Rumex crispus*) and cattail (*Typha domingensis*). The outer edges of the channel are characterized by dense cover of saltgrass with sparse lambs quarters (*Chenopodium album*). The vegetated channel flows to the north into a larger open water area and then continues to flow to the north-northeast into a large seasonal wetland area located outside of the project study area.

A second well-defined channel along the water supply pipeline route is located approximately 0.7 miles north of the intersection with Kelso Road. The deeper parts of this channel are characterized by dense cattails (*Typha latifolia* and *T. domininingensis*) with saltgrass growing around the outer edges. Mexican rush (*Juncus mexicanus*) and curly dock are also present in scattered locations. The channel continues to flow to the east into a larger wetland area located outside of the project study limits.

A few small earthen agricultural irrigation and roadside drainage ditches are present along the alternate water supply pipeline alignment. Vegetation associated with these features includes swamp pricklegrass (*Crypsis schoenoides*), Bermudagrass (*Cynodon dactylon*), jungle rice (*Echinochloa colona*), and rough cocklebur (*Xanthium strumarium*).

A minimal area of BBID's water delivery system, including small sections of Canal 45, Canal 70 and the W 1 D Canal occur within the project study area. These open water features appear to be routinely maintained and were devoid of emergent vegetation at the time of the survey.

1.2.2 Climate and Hydrology

The regional climate is characterized by cool wet winters and hot, dry summers. Average temperatures range from a low of 36°F in January to a high of 90°F in July (Western Regional Climate Center [WRCC], 2009). The average annual rainfall recorded at the Livermore weather station (044997) is 14.5 inches, with the majority (82 percent) of the annual precipitation occurring between November and March (WRCC, 2009).

The botanical surveys were conducted during a slightly below-average rainfall year. Based on daily climate data recorded at the Livermore weather station, located approximately 12 miles southeast of the project study area, rainfall between November 1, 2008 and March 31, 2009 was 7.1 inches, or approximately 80 percent of the average rainfall for this period (University of California Integrated Pest Management, 2009). The lower-than-normal rainfall was due to below-average precipitation from November through January; precipitation was slightly above average in February and March (Figure 1-6).

MEP is located in the San Joaquin Delta Hydrologic Unit (HUC 18040003), which has a drainage area of 433,302 acres (Biogeographic Information and Observation System [BIOS], 2009). Drainage in the vicinity of the project area is generally to north, where it is diverted around Clifton Court Forebay and into Italian Slough (aka, Brushy Creek). The natural hydrology in the vicinity of the project area has been historically altered by the construction of reservoirs, aqueducts, canals, and agricultural drainages. Regionally the most significant modifications are associated with the State Water Project, which was initiated in 1959 and fully operational by 1965. Water is diverted from the Delta into Clifton Court Forebay and is then pumped from the Harvey O. Banks Delta Pumping Plant into the Bethany Reservoir, where the South Bay Pumping Plant lifts water into the South Bay Aqueduct and the California Aqueduct.

1.2.3 Soils

Eight soil series occur within the limits of the project study area. General information on the soils based on local soil surveys (Natural Resource Conservation Service [NRCS]; 1992; 1977; 1966) and official soil series descriptions (NRCS, 2009) are provided below. All soil colors are for moist soils unless otherwise noted.

Altamont Clays (AaC)

The Altamont series consists of well-drained soils with slow permeability on rolling hills and steep slopes east of Livermore, and are derived from weathered shale and fine-grained sandstone. In a representative profile, the surface layer to a depth of 28 inches is dark brown (10YR 3/3) clay. A very thin grayish brown (10 YR 5/2) [dry] surface crust may be present in some areas and very dark brown to black films are often present on the upper ped surfaces. Light-colored calcium carbonate films and segregations are often common below 7 inches, and soils become slightly alkaline with depth. The clay content in this soil ranges from 35 to 60 percent and wide, deep cracks are common throughout once the soil is dry.

Linne Clay Loam (LaD, LbD, LaC)

The Linne series consists of well-drained calcareous soils found on rolling hills and slopes that are derived from weathered shale and sandstone. In a typical profile the upper 14 inches is a moderately alkaline, black (10 YR 2/1) clay loam. Between 14 and 29 inches

the soil is a moderately alkaline, very dark gray (10 YR 3/1) clay loam. Light colored lime filaments and deposits are present in the lower part of the horizon, increasing with depth. Permeability is moderately slow and these soils have medium to very rapid runoff.

Rincon Clay Loam (RdB)

Rincon soils are found on alluvial fans and nearly level valley floors east of Livermore and north of Mountain House where they formed in alluvium derived from sedimentary materials. In a typical profile the surface horizon is a slightly acidic, very dark gray (l0YR 3/1) silty clay loam to a depth of 16 inches. From 16 to 25 inches the soil is very dark grayish brown (l0YR 3/2) sandy clay, often with clay films along the ped surfaces. These soils are well drained with slow permeability and slow to rapid runoff.

San Ysidro Loam (Sa, Sc)

The San Ysidro series consists of moderately well-drained soils formed in alluvium derived from sedimentary rocks. These soils occur on old valley fill and low terraces east of Livermore. In a representative profile the surface layer (0 to 14 inches) is a slightly acidic, dark brown (10YR 4/3 to 3/3) fine sandy loam with few fine, distinct, brownish yellow (10YR 6/6) concentrations. Below 14 inches, the soil is a dark brown (7.5YR 4/4) clay with a thin light gray (10 YR 6/2) bleach layer. Many moderately thick clay films are present along the ped surfaces and pore linings and common, fine iron and manganese concentrations are present. These soils have slow to medium runoff and very slow permeability.

Solano Fine Sandy Loam (Sf, Sfaa)

Solano soils are formed in alluvium derived from mixed sedimentary materials and are found on nearly level low terraces and in valley plains with slightly irregular or hummocky surface micro-topography. In a typical profile the surface horizon is a strongly acidic, dark grayish brown (10 YR 4/2) loam with few, fine, distinct dark reddish brown (5 YR 3/4) concentrations. Below 9 inches the soil is neutral to slightly alkaline, brown (10 YR 4/3) clay loam with dark thin clay films on ped surfaces and pore linings. These soils are somewhat poorly drained with very slow to slow runoff and very slow permeability.

Stomar Clay Loam (252, 253)

Stomar soils are very deep, well-drained soils found on dissected alluvial fans and terraces. These soils formed in alluvium from sedimentary rocks sources, predominantly sandstone and shale. In a typical profile the surface is a dark brown (10YR 3/3) to dark grayish brown (10YR 4/2) clay loam to a depth of 20 inches. These soils have slow permeability and negligible to high runoff.

Vernalis Clay Loam (268)

Vernalis soils formed in alluvium from mixed rock sources and are found on alluvial fans and flood plains. These soils are very deep, well drained and have moderate permeability with negligible to low runoff. In a typical profile the surface is a dark grayish brown (10YR 4/2) clay loam to a depth of 20 inches. The surface is often slightly alkaline (pH 7.4) becoming moderately alkaline (pH 8.1 -8.2) at depths below 34 inches.

Willows Clay (274)

The Willows soils are very deep, poorly to very poorly drained sodic soils found in basins. These soils formed in alluvium from mixed rock sources. In a typical profile the surface layer to a depth of 13 inches is a neutral (pH 7.0) to slightly alkaline (pH 7.5), very dark gray (5Y 3/1) clay. From 13 to 28 inches the soils is a strongly alkaline (pH 8.8) very dark gray (5Y 3/1) clay. These soils have very slow permeability, slow runoff with intermittent water tables at depths of 24 to 60 inches. In some areas, the water tables have been lowered by drainage and water control structures. Willows soils are uncommon in the survey area, only found in small patches along the alternate water supply pipeline route.

SECTION 2.0

Methods

The field investigation included both reconnaissance and protocol-level surveys to search for and document any special-status plants in the project study area. Reconnaissance-level surveys were completed by CH2M HILL biologists Russell Huddleston and Todd Ellwood on December 31, 2008, to obtain a general characterization of the habitats in the vicinity of project study area, as well as an overall understanding of the project and required work areas. Protocol-level surveys were conducted within the project survey area on April 7, April 15, May 20, and August 18, 2009. The following sections provide additional details on the pre-field preparations and survey methods.

2.1 Pre-field Preparations

Preparation for the protocol-level special-status plant surveys included compiling a list of rare, threatened, or endangered plant species that have the potential to occur within the limits of the project study area. A target list of special-status plant species was compiled based on the habitats and vegetation communities observed during the site reconnaissance surveys, as well as information from the following sources:

- United States Fish and Wildlife Service (USFWS) Species list for the Clifton Court Forebay USGS 7.5-minute Quadrangle (USFWS, 2009);
- California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) search for the Clifton Court Forebay, Midway, Altamont, Holt, Union Island, Tracy, Woodward Island, Brentwood, and Byron Hot Springs USGS 7.5-minute quadrangles (CDFG, 2009);
- California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (electronic version) search for the Clifton Court Forebay, Midway, Altamont, Holt, Union Island, Tracy, Woodward Island, Brentwood, and Byron Hot Springs USGS 7.5-minute quadrangles (CNPS, 2009).

The database searches identified 36 special-status plant species with reported or potential occurrences in the 12-quadrangle vicinity of the study area. Table 2-1 provides a list and summary information on the species considered potentially occurring in the project study area. Species list from the various data bases searches are included in Appendix B.

2.2 Reference Populations

Reference sites for four special-status plants were visited prior to the field surveys. Reference populations provide information on the current phonology, ensure proper identification of target species, and confirm that both the timing and environmental conditions are suitable for conducting the botanical surveys. Given the large number of potentially occurring plants it was impractical to observe reference populations for all of the

TABLE 2-1
Special-status Plant Species Potentially Occurring in the Project Study Area

Scientific Name	Common Name	Status		Habitat	Blooming Period	Potential To Occur
		Fed/State	CNPS			
Amsinckia grandiflora	large-flowered fiddleneck	E/E	1B.1	Cismontane woodland, Valley and foothill grassland	Apr-May	**Low:** Suitable habitat is present, but the CNDDB includes only 6 presumably extent populations; nearest occurrence is approximately 10 miles south of the Project area at the Lawrence-Livermore Laboratory.
Amsinckia lunaris	bent-flowered fiddleneck	-/-	1B.2	Coastal bluff scrub, Cismontane woodland, Valley and foothill grassland	Mar-Jun	**Moderate:** Suitable habitat is present; nearest occurrence is less than five miles from the Project study area.
Astragalus tener var. *tener*	alkali milk-vetch	-/-	List 1B.2	Playas, grasslands and vernal pools usually on clay or alkaline soils	Mar-Jun	**Moderate:** Suitable habitat is present; historic occurrence within 5 miles of the Project study area; possibly extirpated
Atriplex cordulata	heartscale	-/-	List 1B.2	Chenopod scrub, moist meadows, seeps and grassland; usually on sandy alkaline soils	Apr-Oct	**Present:** Species observed in alkaline meadow north of PG&E Kelso Substation, just north of the Project study area
Atriplex depressa	brittlescale	-/-	List 1B.2	Chenopod scrub, meadows, seeps, playas, grasslands and vernal pools; usually on alkaline clay soils	May-Oct	**High:** Suitable habitat is present; nearest occurrence is approximately 3 miles from the Project study area.
Atriplex joaquiniana	San Joaquin spearscale	-/-	List 1B.2	Chenopod scrub, meadows seeps, playas and grasslands; usually on alkaline soils	Apr-Oct	**High:** Suitable habitat is present; nearest occurrence less than two miles from the Project study area.
Blepharizonia plumosa	big tarplant	-/-	List 1B.1	Grassland	Jul-Oct	**High:** Suitable habitat is present; nearest occurrence approximately 6.5 miles from the Project study area

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Special-status Plant Species Potentially Occurring in the Project Study Area

Scientific Name	Common Name	Status		Habitat	Blooming Period	Potential To Occur
		Fed/State	CNPS			
California macrophylla	round-leaved filaree	-/-	List 1B.1	Cismontane woodlands and grassland; generally on clay soils	Mar-May	**Moderate:** Suitable habitat is present; several historic occurrences in the Project vicinity from 1920's and 1930's; no recent observations
Carex comosa	bristly sedge	-/-	List 2.1	Coastal prairie, marshes, lake margins and grasslands	May-Sep	**Low:** Suitable habitat is present; only one historic occurrence near Holt; possibly extirpated
Carex vulpinoidea	brown fox sedge	-/-	List 2.2	Freshwater marshes and riparian woodland	May-Jun	**Low:** Limited suitable habitat present; nearest occurrence approximately 13 miles north of the Project study area
Caulanthus coulteri var. *lemmonii*	Lemmon's jewelflower	-/-	1B.2	Pinyon and juniper woodland, Valley and foothill grassland	Mar-May	**Low:** Marginal suitable habitat is present; only two historic occurrences from 1930's near Corral Hollow
Centromadia parryi ssp. *congdonii*	Congdon's tarplant	-/-	1B.2	Valley and foothill grassland (alkaline)	May-Oct (Nov)	**High:** Suitable habitat is present; nearest occurrence approximately 5 miles from the Project study area
Cordylanthus mollis ssp. *hispidus*	hispid bird's-beak	-/-	List 1B.1	Meadows, seeps, playas, and grasslands; usually on alkaline soils	Jun-Sep	**Moderate:** Suitable habitat is present; nearest occurrence approximately 8 miles from the Project study area
Cordylanthus palmatus	palmate-bracted bird's-beak	E/E	List 1B.1	Chenopod scrub, Valley and foothill grassland (alkaline)	May-Oct	**Moderate:** Suitable habitat is present; nearest occurrence approximately 8 miles from the Project study area.
Deinandra bacigalupii	Livermore tarplant	-/-	1B.2	Meadows and seeps(alkaline)	Jun-Oct	**Moderate:** Suitable habitat is present; nearest occurrence approximately 8 miles from the Project study area.

TABLE 2-1
Special-status Plant Species Potentially Occurring in the Project Study Area

Scientific Name	Common Name	Status		Habitat	Blooming Period	Potential To Occur
		Fed/State	CNPS			
Delphinium californicum ssp. *interius*	Hospital Canyon larkspur	-/-	1B.2	Chaparral(openings) and Cismontane woodland (mesic)	Apr-Jun	**Low:** No suitable habitat present; historic occurrence from late 1920's 13 miles south-southwest of the Project study area.
Delphinium recurvatum	recurved larkspur	-/-	1B.2	Chenopod scrub, Cismontane woodland, Valley and foothill grassland/alkaline	Mar-Jun	**High:** Suitable habitat present; nearest reported occurrence just east of the water supply pipeline route along Bruns Road.
Eryngium racemosum	Delta button-celery	-/SE	List 1B.1	Riparian scrub associated with vernally mesic clay depressions	Jun-Sep	**Low:** Marginal habitat present, nearest reported occurrence approximately 8 miles north of the Project study area.
Eschscholzia rhombipetala	diamond-petaled California poppy	-/-	List 1B.1	Grasslands, usually alkaline, clay soils	Mar-Apr	**Moderate:** Suitable habitat present; nearest reported occurrence approximately 5.5 miles southwest of the Project study area.
Friillaria agrestis	stinkbells	-/-	4.2	Chaparral, Cismontane woodland, Pinyon and juniper woodland, Valley and foothill grassland (clay, sometimes serpentinite)	Mar-Jun	**Moderate:** Suitable habitat present; nearest reported occurrence approximately 7.5 miles northwest of the Project study area.
Helianthella castanea	Diablo helianthella	-/-	1B.2	Broad-leaf upland forest, Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland, Valley and foothill grassland	Mar-Jun	**Moderate:** Suitable habitat present; nearest reported occurrence approximately 10 miles northwest of the Project study area.

TABLE 2-1
Special-status Plant Species Potentially Occurring in the Project Study Area

Scientific Name	Common Name	Status		Habitat	Blooming Period	Potential To Occur
		Fed/State	CNPS			
Hibiscus lasiocarpus	woolly rose-mallow	-/-	List 2.2	Freshwater marshes	Jun-Sep	**Low:** Limited to very marginal suitable habitat present along seasonal drainages and canals; several occurrences within 5 miles of the Project study area along larger sloughs, rivers and canals.
Isocoma arguta	Carquinez goldenbush	-/-	List 1B.1	Grasslands often on alkaline soils	Aug-Dec	**Low:** Suitable habitat present; no reported occurrences in the Project vicinity.
Lasthenia conjugens	Contra Costa goldfields	FE/-	List 1B.1	Cismontane woodland, alkaline playas, vernal pools and mesic grasslands	Mar-Jun	**Low:** Suitable habitat present; no reported occurrences in the Project vicinity.
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	-/-	List 1B.2	Freshwater marshes	May-Jul (Sep)	**Low:** Limited to very marginal suitable habitat present along seasonal drainages; several occurrences within 5 miles of the Project site along larger sloughs, rivers and canals.
Lilaeopsis masonii	Mason's lilaeopsis	-/SR	List 1B.1	Brackish/freshwater marshes and riparian scrub	Apr-Nov	**Low:** Limited to very marginal suitable habitat is present along seasonal drainages; several occurrences within 5 miles of the Project site along larger sloughs, rivers and canals.
Limosella subulata	Delta mudwort	-/-	List 2.1	Brackish/freshwater marshes	May-Aug	**Low:** Limited to very marginal suitable habitat is present along seasonal drainages; several occurrences within 5 miles of the Project site along larger sloughs, rivers and canals.

TABLE 2-1
Special-status Plant Species Potentially Occurring in the Project Study Area

Scientific Name	Common Name	Status		Habitat	Blooming Period	Potential To Occur
		Fed/State	CNPS			
Madia radiata	showy golden madia	-/-	1B.1	Cismontane woodland, Valley and foothill grassland	Mar-May	**Low:** Suitable habitat is present; only occurrence is a historic record from the 1920's near Corral Hollow
Myosurus minimus ssp. *apus*	little mousetail	-/-	3.1	Valley and foothill grassland, Vernal pools(alkaline)	Mar-Jun	**Present*:** Myosurus minimus found on Lee Property, east of transmission line alignment study area; however, this sub-species is not currently recognized as a distinct taxon.
Plagiobothrys glaber	hairless popcorn-flower	-/-	1A	Meadows and seeps(alkaline), Marshes and swamps(coastal salt)	Mar-May	**Low:** Species is presumed extinct; only record is from the 1940's near Livermore.
Scutellaria galericulata	marsh skullcap	-/-	List 2.2	Lower montane coniferous forest, moist meadows and freshwater marshes	Jun-Sep	**Low:** Only known occurrence is along the Middle River between Victoria Island and Upper Jones Tract.
Senecio aphanactis	chaparral ragwort	-/-	2.2	Chaparral, Cismontane woodland, Coastal scrub/sometimes alkaline	Jan-Apr	**Low:** Marginal suitable habitat present; nearest reported occurrence is approximately 10 miles south of the Project study area.
Symphyotrichum lentum	Suisun Marsh aster	-/-	List 1B.2	Brackish/freshwater marshes	May-Nov	**Low:** Limited to very marginal suitable habitat present along seasonal drainages; several occurrences within 5 miles of the Project site along larger sloughs, rivers and canals.
Trifolium depauperatum var. *hydrophilum*	saline clover	-/-	List 1B.2	Marshes, moist grasslands and vernal pools, generally on alkaline soils	Apr-Jun	**Low:** Only record is an undocumented occurrence near Livermore, approximately 12 miles southwest of the project site.

TABLE 2-1
Special-status Plant Species Potentially Occurring in the Project Study Area

Scientific Name	Common Name	Status		Habitat	Blooming Period	Potential To Occur
		Fed/State	CNPS			
Tropidocarpum capparideum	caper-fruited tropidocarpum	-/-	List 1B.1	Grasslands, generally on alkaline soils	Mar-Apr	**High:** Suitable habitat is present; nearest occurrence is less than 3 miles from the Project study area.

Notes:

Taxonomy follows the current status per the Jepson On-Line Interchange (University of California, Berkley, 2009)

Status Codes:

Federal/State
FE Federally-listed endangered species
SE State-listed endangered species
SR State-listed rare species

CNPS designations
1B Plants rare, threatened, or endangered in California and elsewhere
2 Plants rare, threatened, or endangered in California, but more common elsewhere

CNPS Threat Codes
.1 Seriously endangered in California
.2 Fairly endangered in California

Habitat and Blooming Period information based on the CNPS (2009) *Electronic Inventory of Rare, Threatened and Endangered Plants of California*

target species. Imprecise location information, uncertainty of population status, distance from the project study area, and restricted access to private property also precluded visits to some reference locations. Collection information from the Consortium of California Herbaria (University of California, Berkley, 2009), local floras (Beidleman and Kozloff, 2003), and photographs of target species (CalPhotos, 2009) were also reviewed prior to the surveys to assist in identification of potential special-status and other plant species. Photographs of reference populations are provided in Appendix C.

The following reference sites were visited:

- **Diamond-petaled California poppy (*Eschscholzia rhombipetala*):** A total of 16 individuals were observed on April 6, 2009, on a north-facing slope north of Tesla Road, approximately 12 miles east of Livermore (CNDDB Occurrence #6). Eight of the plants were vegetative only, six were in bloom and two were in the fruiting stage.
- **Contra Costa goldfields (*Lasthenia conjugens*):** A large population was observed in Solano County along Scally Road, south of Highway 12 (CNDDB Occurrence #20) on April 15, 2009. At that time, several hundred individuals were in full bloom.
- **Livermore tarplant (*Deinandra bacigalupi*):** Several thousand plants were observed on August 18, 2009 at the Springtown Wetland Reserve north of Highway 580, on the west side of North Vasco Road in Livermore (CNDDB Occurrence #2). Nearly all of the plants were in full flower at this time.
- **Palmate-bracted bird's beak (*Cordylanthus palmatus*):** Approximately 100 plants were observed on August 18, 2009, at the Springtown Wetland Reserve north of Highway 580 on the west of side of North Vasco Road in Livermore (CNDDB Occurrence #10). All of the plants were in the vegetative state at the time of the survey, but this species was readily identifiable.

Reference locations for two other rare plants were also visited, but the species were not observed.

- **Hispsid bird's beak (*Cordylanthus mollis* ssp. *hispidus*):** This species has also been reported from the Springtown Wetland Reserve north of Highway 580 on the west of side of North Vasco Road in Livermore (CNDDB Occurrence #15). During the August 18, 2009, visit to this location no plants were observed in the general area identified by the CNDDB; however, due to time constraints an exhaustive survey of the entire area was not conducted.
- **Recurved larkspur (*Delphinium recurvatum*):** A population of 150 individuals of this species was reported from the west side of Bruns Road, approximately 0.6 miles north of Kelso Road, just south of the Contra Costa/Alameda county line in 1991 (CNDDB occurrence #61). While an extensive survey was not completed for this area, no plants were observed in this area during the April and May botanical surveys.

2.3 Field Surveys

Protocol-level surveys were conducted throughout the approximately 41-acre project study area for the proposed power plant facility and laydown area. In addition, surveys were completed along the natural gas pipeline, transmission line, and water supply pipeline alignments. The survey area for the project linear features generally included 50 feet to either side of the centerline of the alignment, except in areas where the water supply pipeline would be located within or immediately adjacent to an existing roadway, in which case only the areas adjacent to the excavation were included in the analysis as it was assumed areas on the opposite side of the roadway would not be affected. Botanical surveys were completed during the appropriate season to identify all of the potential special-status plant species identified in Table 2-1. Field surveys were completed on April 7, April 15, May 20, and August 18, 2009. The surveys were floristic in nature, meaning that all species encountered were identified to the taxonomic level needed to determine if they have special-status determinations. Surveys were conducted in accordance with the botanical survey guidelines of the U.S. Fish and Wildlife Service (USFWS, 1996), California Department of Fish and Game (CDFG, 2000) and the California Native Plant Society (CNPS, 2001).

Botanical surveys were completed by walking meandering transects throughout the natural terrestrial habitats included in the project study area and recording all plant species observed. Developed and landscaped areas associated with residential and industrial developments such as PG&E's Kelso Substation and the BBID headquarters were not intensively surveyed. Planted agricultural crops were also not included in the protocol-level surveys; however, the edges of all agricultural fields within the survey area were included. Any plant species that was not readily identifiable was either keyed in the field using *Plants of the San Francisco Bay Region* (Beidleman and Kozloff, 2003) or *The Jepson Manual, Higher Plants of California* (Hickman, 1993) or was collected for later identification, if a suitable number of plants was present. A complete list of plant species observed during the botanical surveys is presented in Appendix D. Plant taxonomy used throughout this report follows the currently accepted name for the taxon per the University of California's Jepson Interchange for California Floristics (U.C. Berkley, 2009).

SECTION 3.0

Results

No special-status plants were identified within the Project survey area. Incidental observations of one special status plant, heartscale (*Atriplex cordulata*), were noted in the vicinity of the proposed transmission line route, in an alkaline meadow north of the PG&E Kelso Substation, east of Bruns Road (Figure 3-1).

There is a reported occurrence of recurved larkspur (CNDDB Occurrence #61) near the project study area on the west side of Bruns Road, approximately 0.6 miles north of Kelso Road, just south of the Contra Costa/Alameda county line. Although most of this area was located outside of the study limits, the reported location was investigated during the April and May field surveys to look for this species and none were observed.

SECTION 4.0

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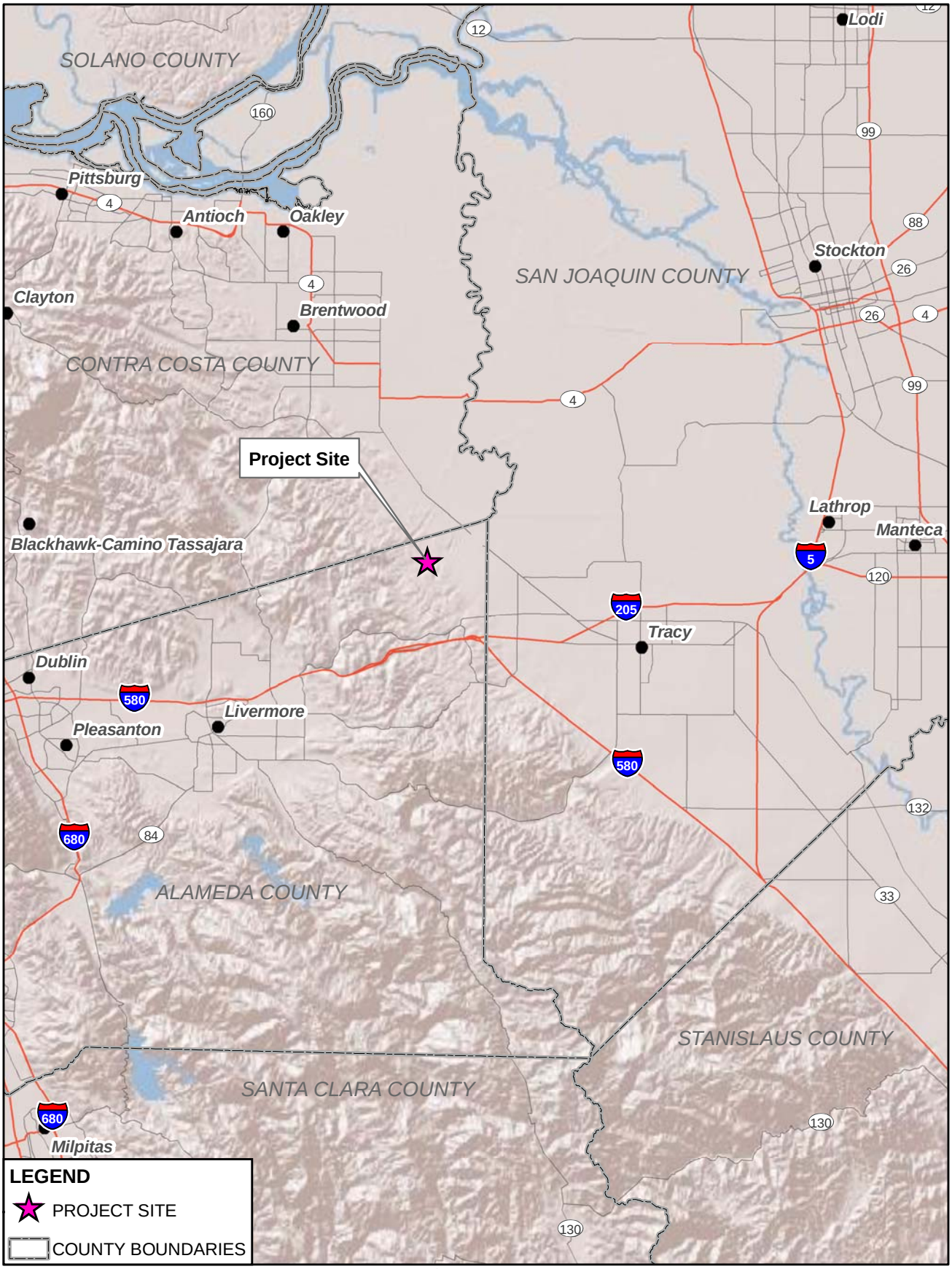
Figures



N

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Miles

FIGURE 1-1
PROJECT VICINITY
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 750 1,500
Feet

FIGURE 1-2
SITE LOCATION
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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LEGEND

- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 1,250 2,500
Feet

FIGURE 1-3
ALTERNATE WATER SUPPLY PIPELINE ROUTE - MOUNTAIN HOUSE WWTP
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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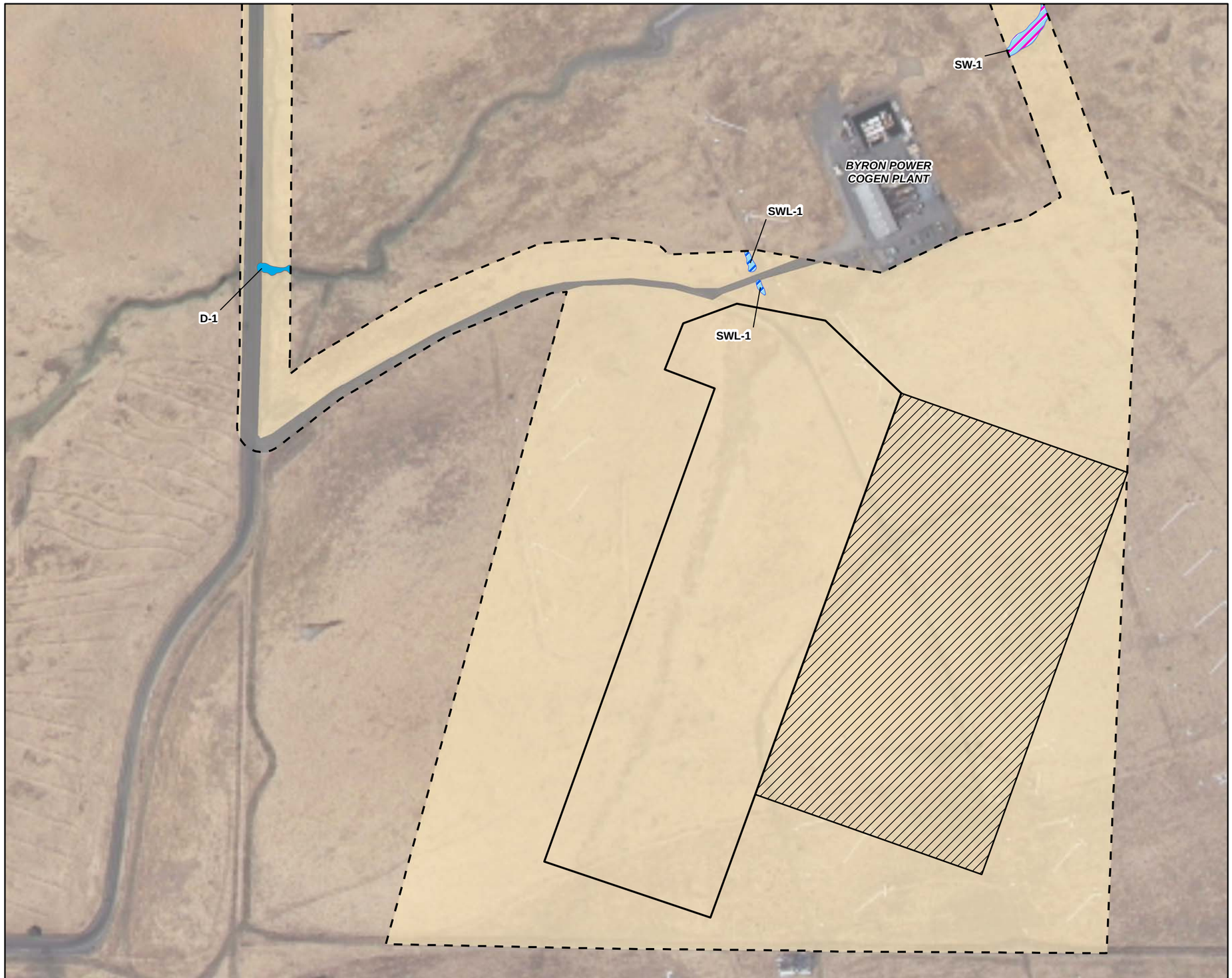

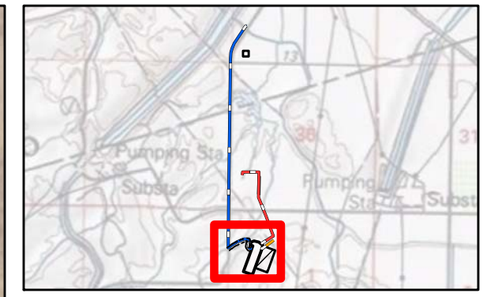

LEGEND

POTENTIAL JURISDICTIONAL WATERS/WETLANDS
- DITCH
- ALKALI SINK WETLAND
- DRAINAGE WETLAND
- WATERS OF THE U.S.

POTENTIAL NON-JURISDICTIONAL WATERS/WETLANDS
- EROSIONAL CHANNEL
- CANAL
- SEASONAL WETLAND
- SWALE

HABITAT COMMUNITIES
- CALIFORNIA ANNUAL GRASSLAND
- INDUSTRIAL, LANDSCAPE
- POND
- ROAD

SITES
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- PROJECT STUDY AREA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 100 200
Feet

FIGURE 1-4A
HABITAT MAPS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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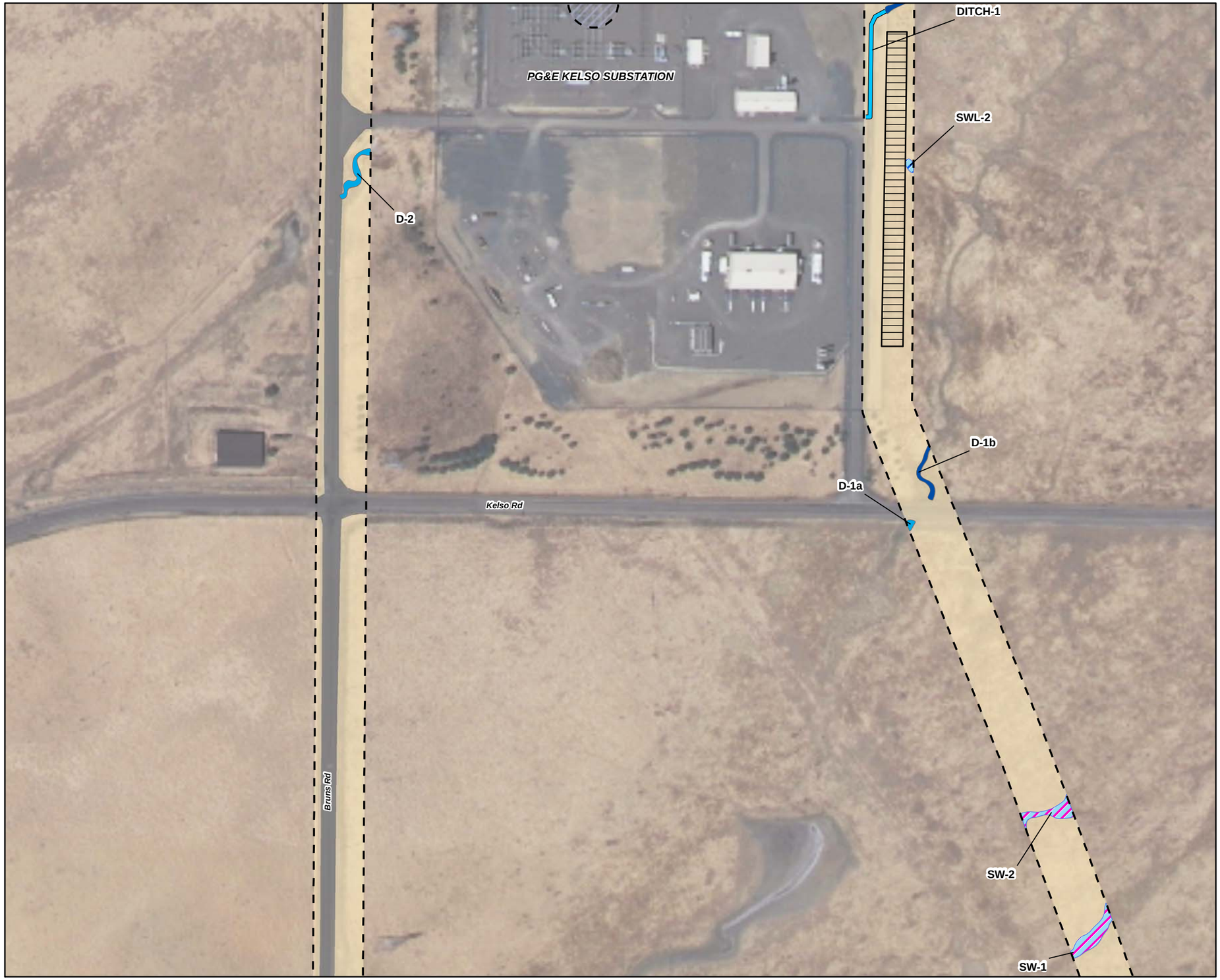

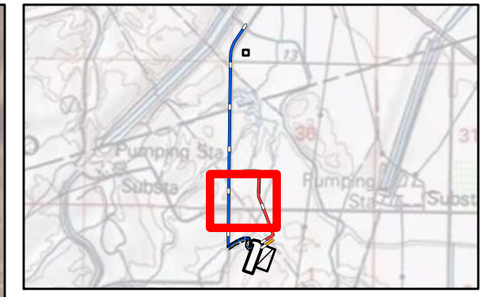

LEGEND

POTENTIAL JURISDICTIONAL WATERS/WETLANDS
- DITCH
- ALKALI SINK WETLAND
- DRAINAGE WETLAND
- WATERS OF THE U.S.

POTENTIAL NON-JURISDICTIONAL WATERS/WETLANDS
- EROSIONAL CHANNEL
- CANAL
- SEASONAL WETLAND
- SWALE

HABITAT COMMUNITIES
- CALIFORNIA ANNUAL GRASSLAND
- INDUSTRIAL, LANDSCAPE
- POND
- ROAD

SITES
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- PROJECT STUDY AREA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 100 200
Feet

FIGURE 1-4B
HABITAT MAPS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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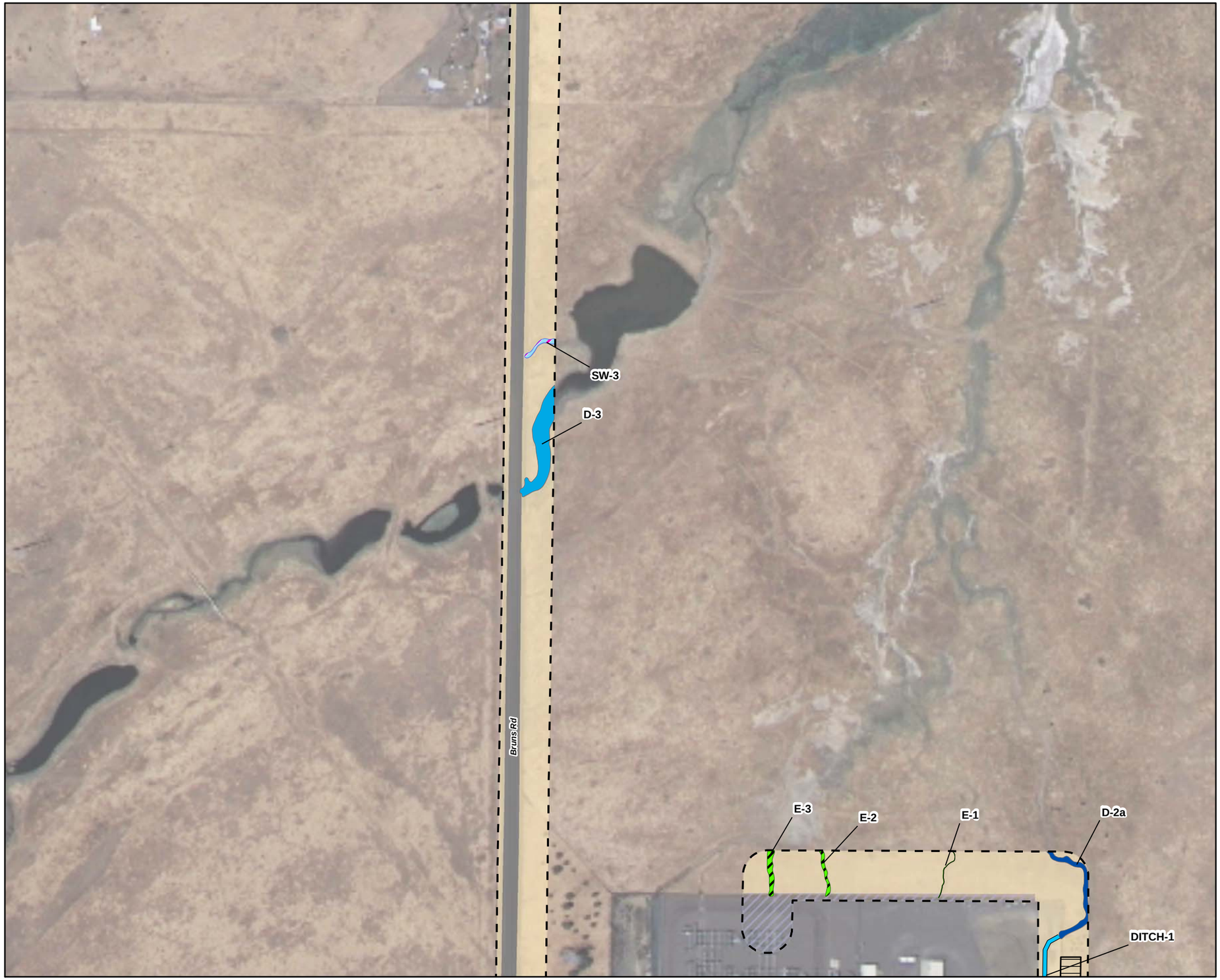

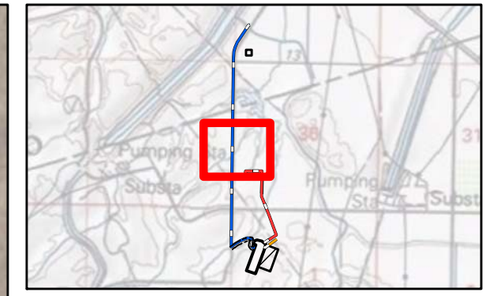

LEGEND

POTENTIAL JURISDICTIONAL WATERS/WETLANDS
- DITCH
- ALKALI SINK WETLAND
- DRAINAGE WETLAND
- WATERS OF THE U.S.

POTENTIAL NON-JURISDICTIONAL WATERS/WETLANDS
- EROSIONAL CHANNEL
- CANAL
- SEASONAL WETLAND
- SWALE

HABITAT COMMUNITIES
- CALIFORNIA ANNUAL GRASSLAND
- INDUSTRIAL, LANDSCAPE
- POND
- ROAD

SITES
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- PROJECT STUDY AREA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 100 200
Feet

FIGURE 1-4C
HABITAT MAPS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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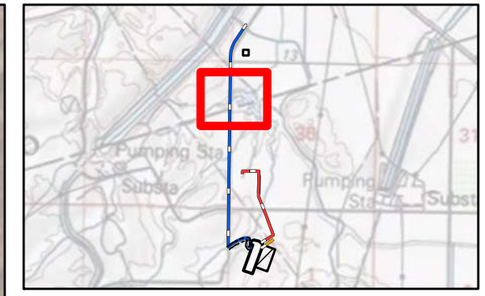

LEGEND

POTENTIAL JURISDICTIONAL WATERS/WETLANDS
- DITCH
- ALKALI SINK WETLAND
- DRAINAGE WETLAND
- WATERS OF THE U.S.

POTENTIAL NON-JURISDICTIONAL WATERS/WETLANDS
- EROSIONAL CHANNEL
- CANAL
- SEASONAL WETLAND
- SWALE

HABITAT COMMUNITIES
- CALIFORNIA ANNUAL GRASSLAND
- INDUSTRIAL, LANDSCAPE
- POND
- ROAD

SITES
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- PROJECT STUDY AREA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 100 200
Feet

FIGURE 1-4D
HABITAT MAPS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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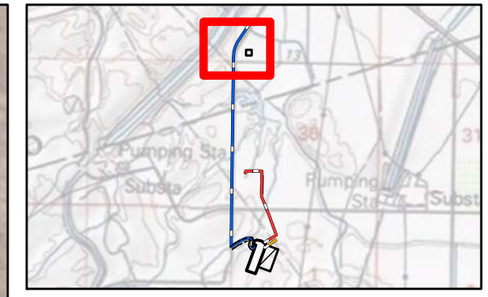

LEGEND

POTENTIAL JURISDICTIONAL WATERS/WETLANDS
- DITCH
- ALKALI SINK WETLAND
- DRAINAGE WETLAND
- WATERS OF THE U.S.

POTENTIAL NON-JURISDICTIONAL WATERS/WETLANDS
- EROSIONAL CHANNEL
- CANAL
- SEASONAL WETLAND
- SWALE

HABITAT COMMUNITIES
- CALIFORNIA ANNUAL GRASSLAND
- INDUSTRIAL, LANDSCAPE
- POND
- ROAD

SITES
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- PROJECT STUDY AREA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 100 200
Feet

FIGURE 1-4E
HABITAT MAPS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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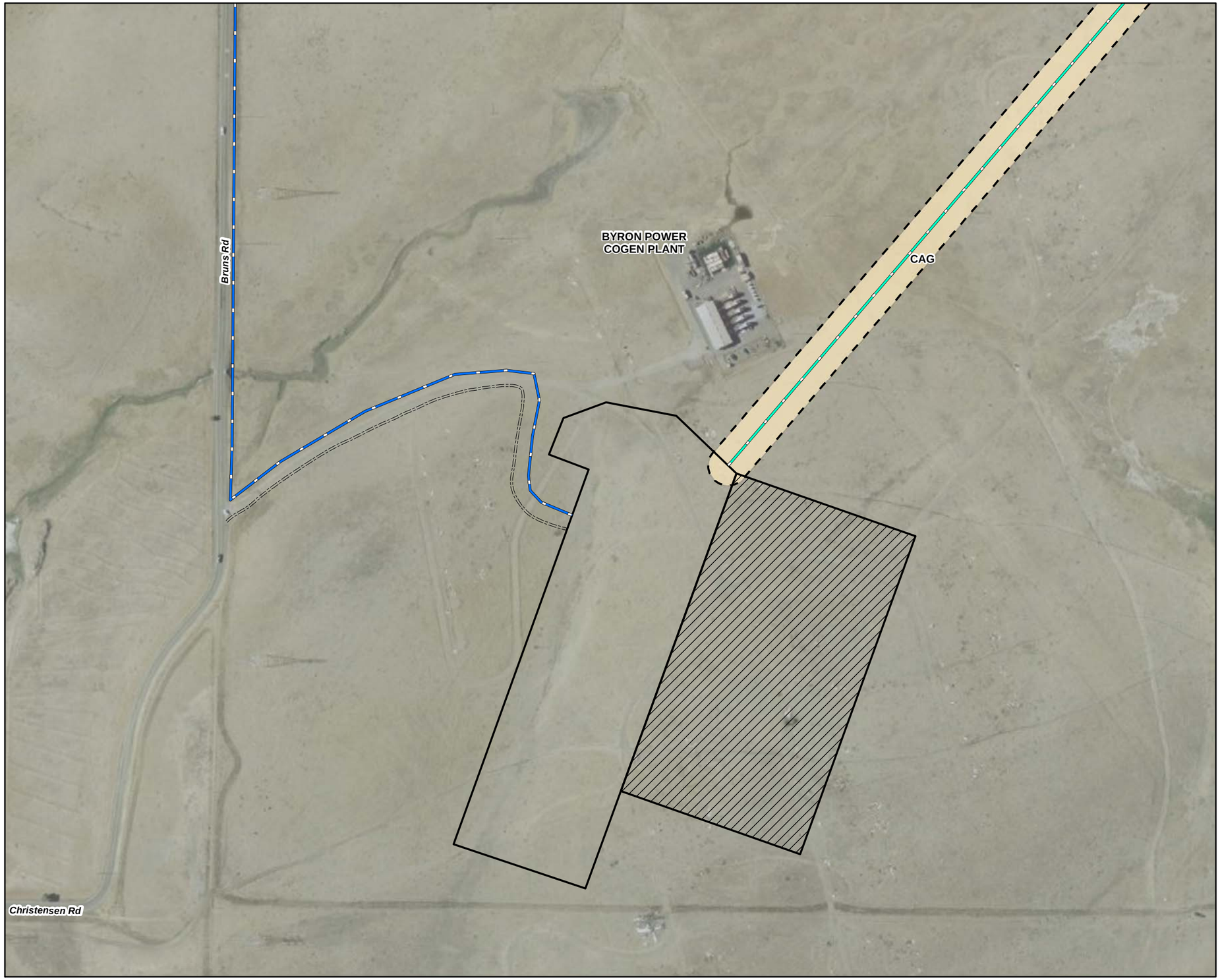
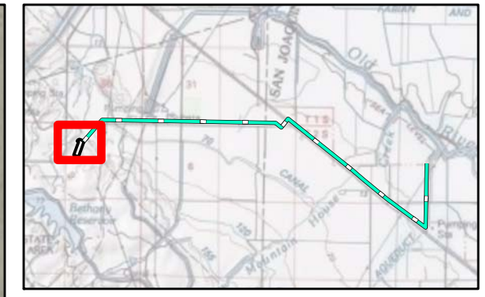




LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

1 OF 11

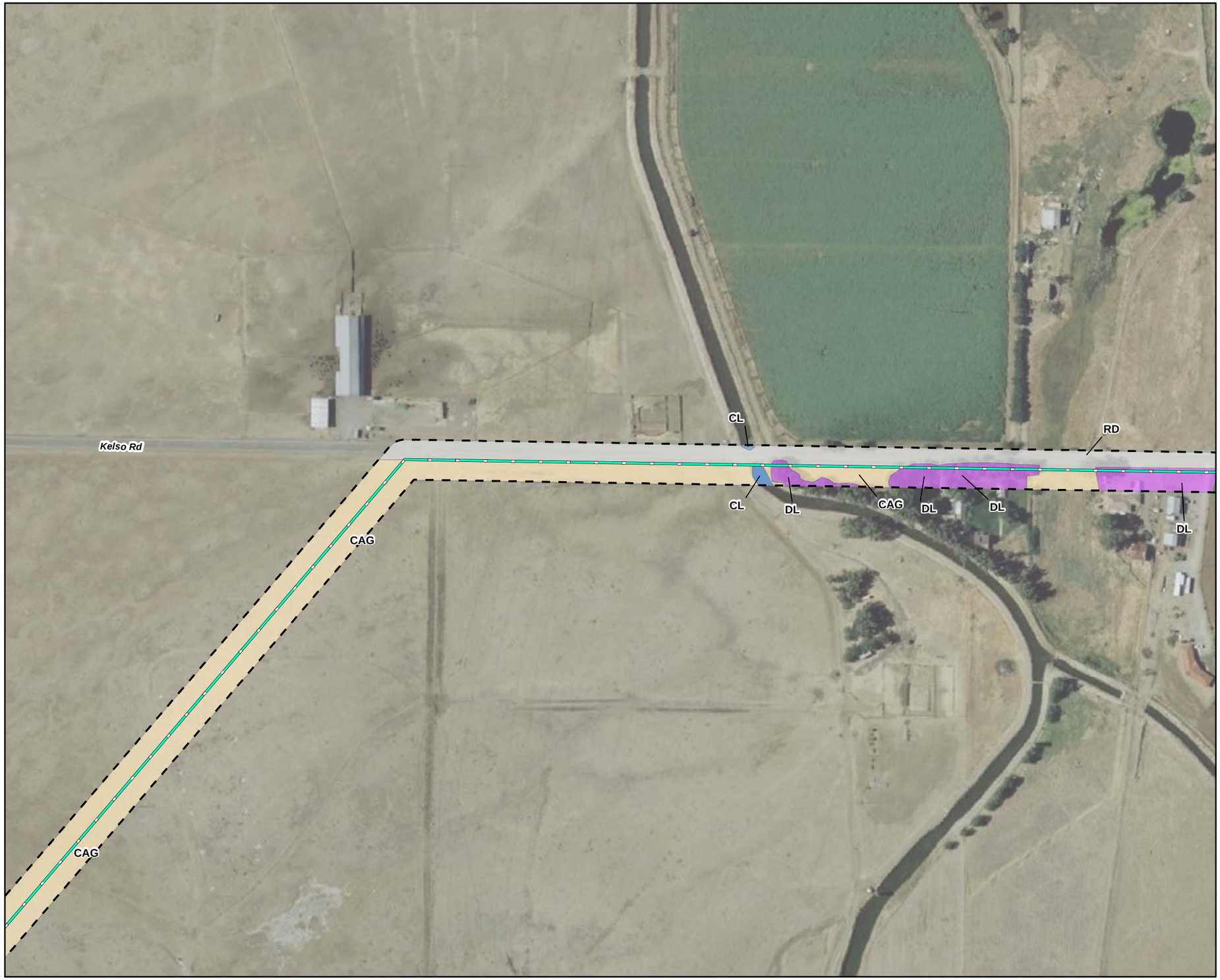
This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

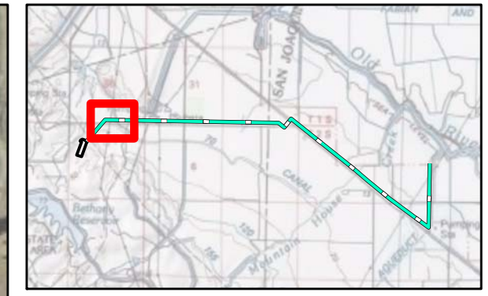
N

0 125 250
Feet

FIGURE 1-5A
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL





LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

2 OF 11

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

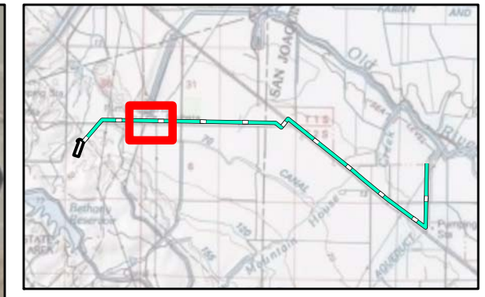
N

0 125 250
Feet

FIGURE 1-5B
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

SAC\\ZION\SACGIS\PROJ\DIAMOND_376670\MAPFILES\AFC_MAPS\ALTERNATEWATERRT_HABITAT.MXD MHASKELL 11/20/2009 15:29:48

CH2MHILL



LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

3 OF 11

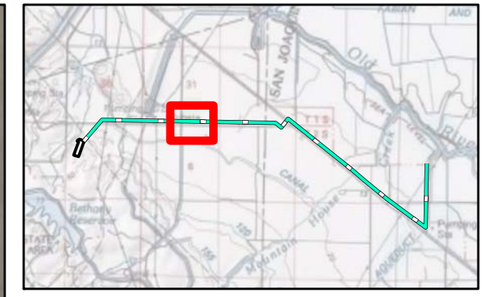
This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5C
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL



LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

4 OF 11

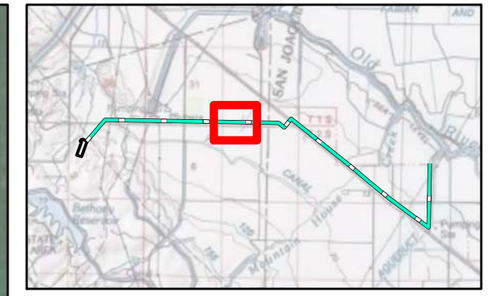
This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5D
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL



LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

5 OF 11

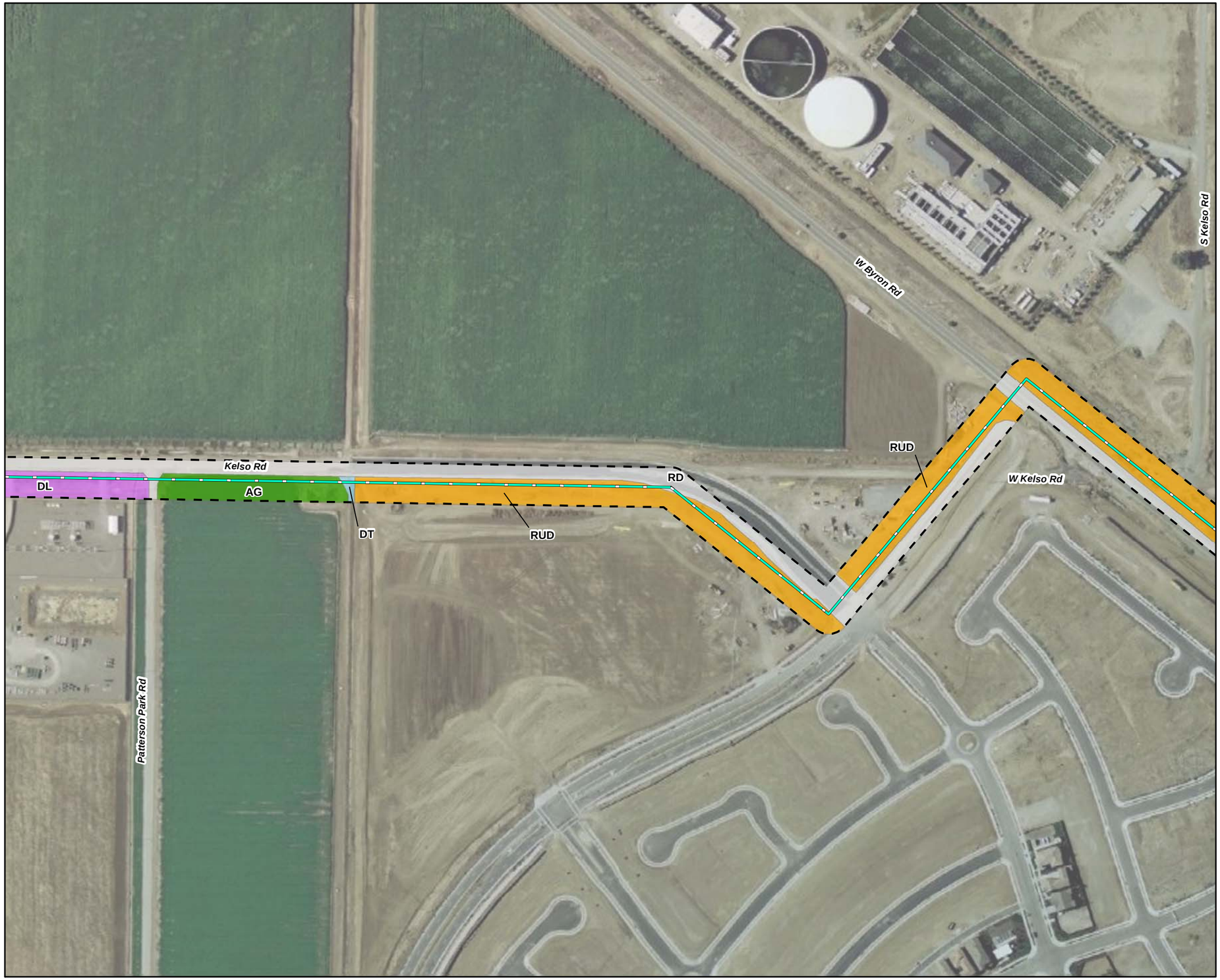
This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

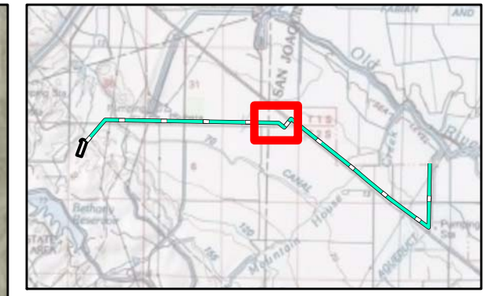
N

0 125 250
Feet

FIGURE 1-5E
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL





LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

6 OF 11

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5F
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE

MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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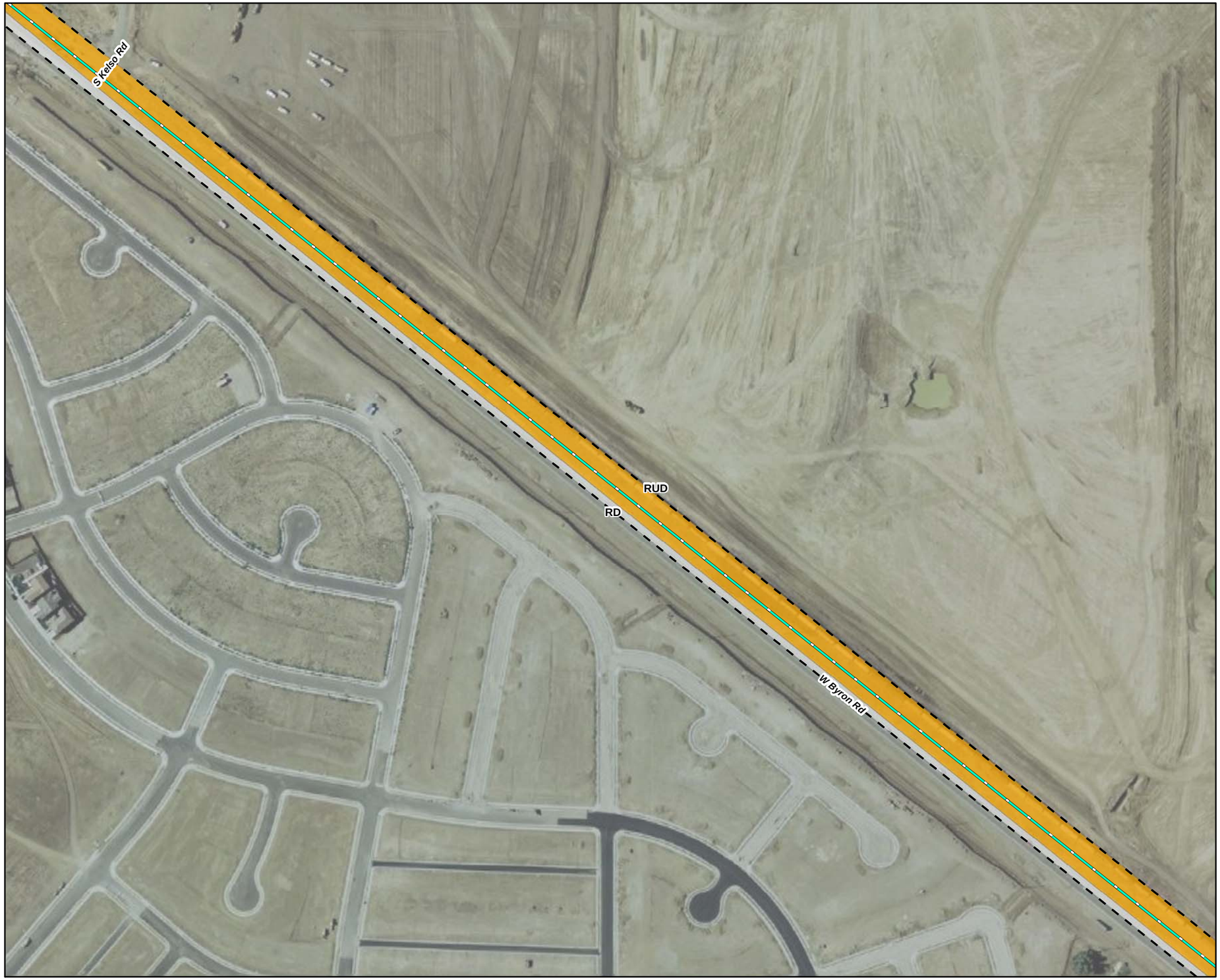
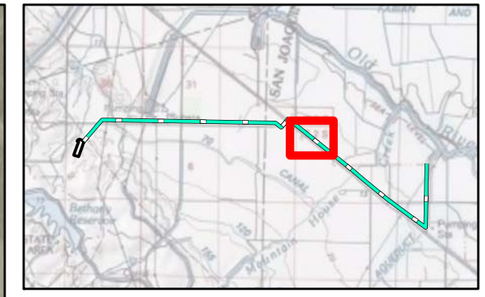




LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

7 OF 11

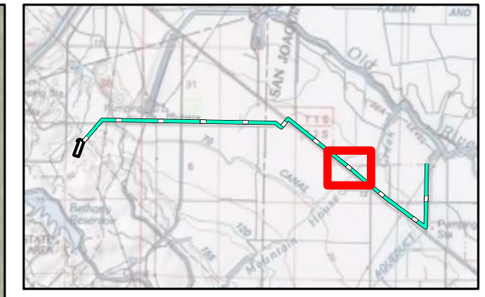
This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5G
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL



LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

8 OF 11

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5H
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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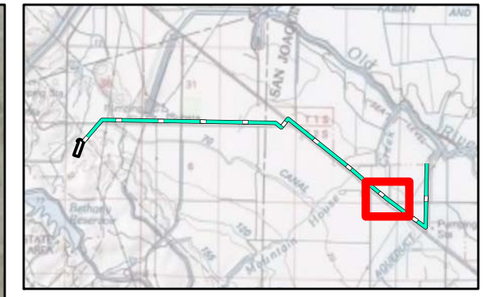


LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

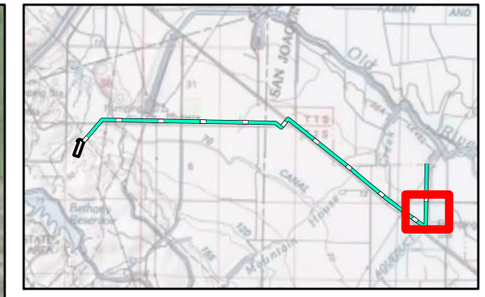
9 OF 11

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5I
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA



LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

10 OF 11

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5J
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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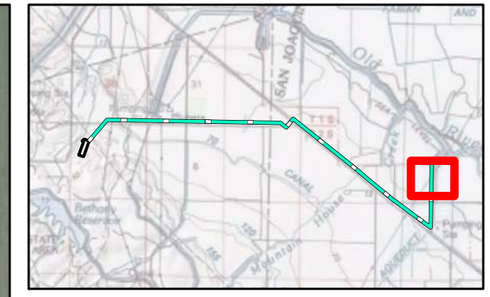

LEGEND

- ACCESS ROAD
- ALTERNATE WATER SUPPLY PIPELINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- PROJECT SITE
- 50 FOOT BUFFER

HABITAT TYPES

- AGRICULTURE (AG)
- CALIFORNIA ANNUAL GRASSLAND (CAG)
- CANAL (CL)
- DEVELOPED/LANDSCAPED (DL)
- DITCH (DT)
- ROAD (RD)
- RUDERAL (RUD)
- SEASONAL WETLAND (SW)

SOURCE: CH2M HILL Biological Survey, 2009.

11 OF 11

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 125 250
Feet

FIGURE 1-5K
HABITAT TYPES ALONG ALTERNATE WATER SUPPLY PIPELINE ROUTE
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

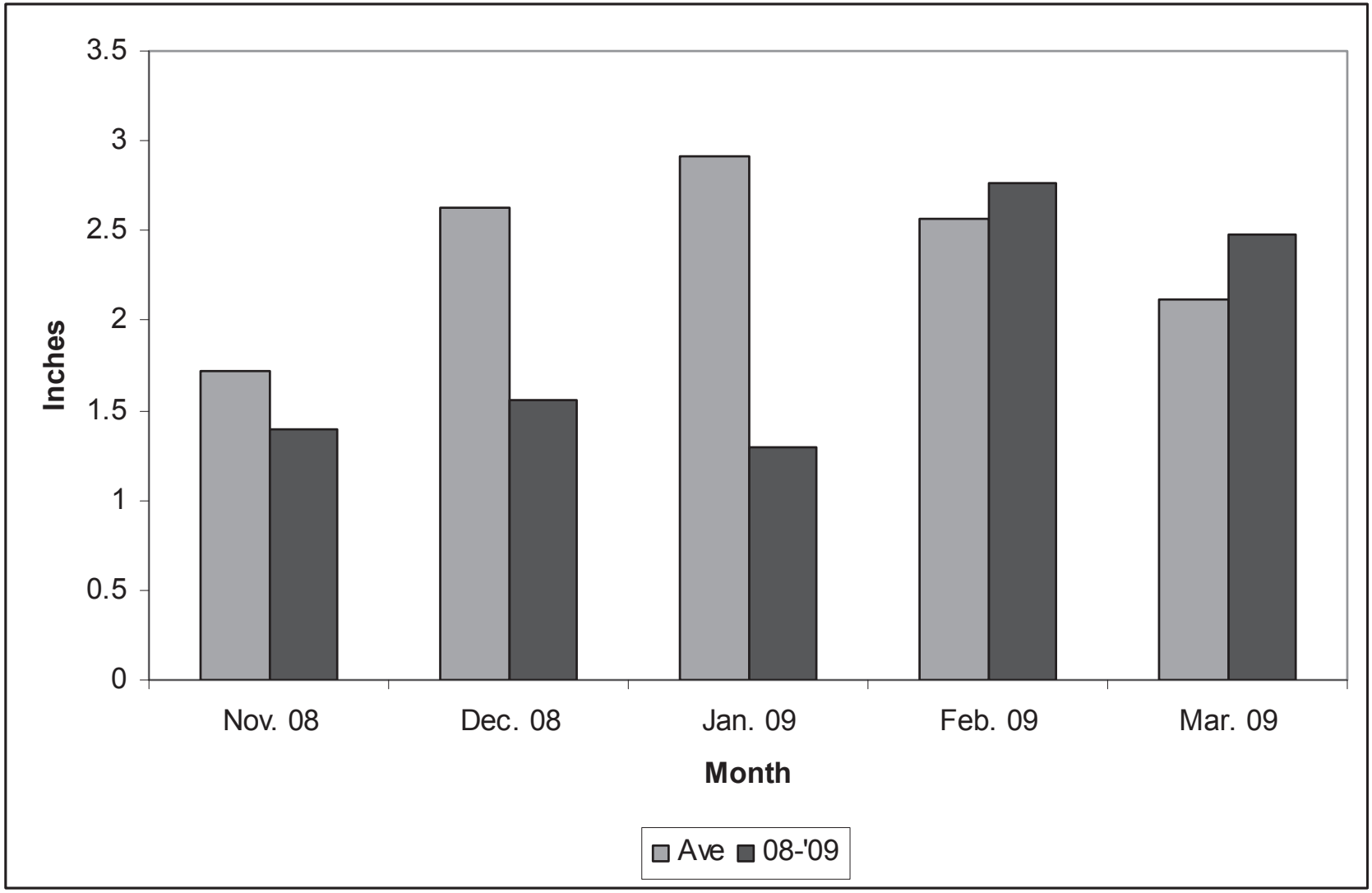

FIGURE 1-6
PRECIPITATION DATA NOVEMBER 2008 THROUGH MARCH 2009
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

FIGURE 3-1
SPECIAL-STATUS PLANT LOCATIONS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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Appendix A
Representative Site Photographs

Proposed plant site; looking south from existing gravel access road

Proposed lay-down area; view north from southern boundary of the property

Proposed power line route; view north toward Kelso Road from the south end of the alignment

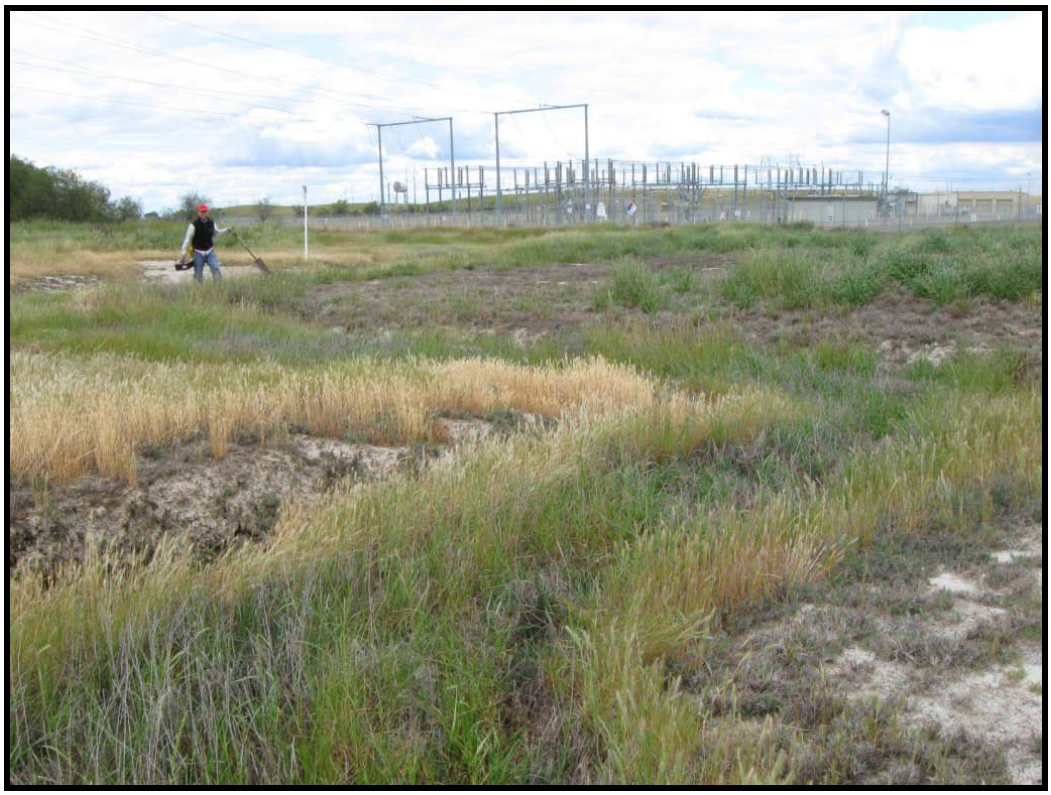
Proposed power line route; view south from the near the northeast corner of the PG&E facility at the intersection of Bruns and Kelso Roads

Proposed natural gas pipeline route; looking east-northeast from the northeast corner of the proposed facility site

Preferred service water pipeline route; view north along Bruns Road, south of Kelso Road

Preferred service water pipeline route; view north along Bruns Road, north of the Byron Bethany Irrigation District Headquarters facility

Drainage 1; view east from fence line east of Bruns Road



Drainage 2; view east northeast from Bruns Road

Drainage 3; view north from the east side of Bruns Road

Drainage 4; view east from Bruns Road

Alkaline Meadow Habitat east of Bruns Road, just north of Drainage 4

Alkaline meadow habitat north of PG&E's Kelso substation, just north of the Project survey area for the proposed transmission line; *Atriplex cordulata* (CNPS 1B) observed in this area.

Atriplex cordulata (CNPS 1B) observed just outside Project study area north of the PG&E's Kelso substation.

Alternate service water pipeline route; looking west along south side of Kelso Road, east of Mountain House Parkway

Alternate service water pipeline route; looking southeast along the Byron Highway adjacent to the Union Pacific Railroad tracks

Alternate service water pipeline route; looking north along Wicklund Road

Alternate service water pipeline route; looking north from Bethany Road toward water treatment facility.

Appendix B
Special-status Species Lists

APPENDIX B – CNPS

CNPS 9-Quad search for the Clifton Court Forebay 7.5 Munute Quadrangle

Scientific Name	Common Name	CNPS	State	Federal
Amsinckia grandiflora	large-flowered fiddleneck	1B.1	Endangered	Endangered
Amsinckia lunaris	bent-flowered fiddleneck	1B.2		
Astragalus tener var. tener	alkali milk-vetch	1B.2		
Atriplex cordulata	heartscale	1B.2		
Atriplex depressa	brittlescale	1B.2		
Atriplex joaquiniana	San Joaquin spearscale	1B.2		
Balsamorhiza macrolepis var. macrolepis	big-scale balsamroot	1B.2		
Blepharizonia plumosa	big tarplant	1B.1		
California macrophylla	round-leaved filaree	1B.1		
Carex comosa	bristly sedge	2.1		
Carex vulpinoidea	brown fox sedge	2.2		
Caulanthus coulteri var. lemmonii	Lemmon's jewelflower	1B.2		
Centromadia parryi ssp. congdonii	Congdon's tarplant	1B.2		
Cordylanthus mollis ssp. hispidus	hispid bird's-beak	1B.1		
Cordylanthus palmatus	palmate-bracted bird's-beak	1B.1	Endangered	Endangered
Deinandra bacigalupii	Livermore tarplant	1B.2		
Delphinium recurvatum	recurved larkspur	1B.2		
Eryngium racemosum	Delta button-celery	1B.1	Endangered	
Eschscholzia rhombipetala	diamond-petaled California poppy	1B.1		
Helianthella castanea	Diablo helianthella	1B.2		
Hibiscus lasiocarpus	woolly rose-mallow	2.2		
Lasthenia conjugens	Contra Costa goldfields	1B.1		Endangered
Lathyrus jepsonii var. jepsonii	Delta tule pea	1B.2		
Lilaeopsis masonii	Mason's lilaeopsis	1B.1	Rare	
Limosella subulata	Delta mudwort	2.1		
Madia radiata	showy golden madia	1B.1		
Myosurus minimus ssp. apus	little mousetail	3.1		
Plagiobothrys glaber	hairless popcorn-flower	1A		
Scutellaria galericulata	marsh skullcap	2.2		
Senecio aphanactis	chaparral ragwort	2.2		

APPENDIX B – CNPS

CNPS 9-Quad search for the Clifton Court Forebay 7.5 Munute Quadrangle

Scientific Name	Common Name	CNPS	State	Federal
Symphyotrichum lentum	Suisun Marsh aster	1B.2		
Trifolium depauperatum var. hydrophilum	saline clover	1B.2		
Tropidocarpum capparideum	caper-fruited tropidocarpum	1B.1		

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 090824104248

Database Last Updated: January 29, 2009

Quad Lists

Listed Species

Invertebrates

Branchinecta conservatio
- Conservancy fairy shrimp (E)

Branchinecta longiantenna
- longhorn fairy shrimp (E)

Branchinecta lynchi
- Critical habitat, vernal pool fairy shrimp (X)
- vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
- valley elderberry longhorn beetle (T)

Lepidurus packardi
- vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris
- green sturgeon (T) (NMFS)

Hypomesus transpacificus
- Critical habitat, delta smelt (X)
- delta smelt (T)

Oncorhynchus mykiss
- Central Valley steelhead (T) (NMFS)
- Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
- Central Valley spring-run chinook salmon (T) (NMFS)
- winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
- California tiger salamander, central population (T)

Rana aurora draytonii
- California red-legged frog (T)

Reptiles

Masticophis lateralis euryxanthus

Alameda whipsnake [=striped racer] (T)

Thamnophis gigas

giant garter snake (T)

Mammals

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Lasthenia conjugens

Critical habitat, Contra Costa goldfields (X)

Proposed Species

Amphibians

Rana aurora draytonii

Critical habitat, California red-legged frog (PX)

Quads Containing Listed, Proposed or Candidate Species:

CLIFTON COURT FOREBAY (463D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** proje within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.

- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by t list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environment documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that n result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together t avoid or minimize the impact on listed species and their habitat. Such consultation would resu in a biological opinion by the Service addressing the anticipated effect of the project on listed proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and a likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct a indirect impacts to listed species and compensates for project-related loss of habitat. You shou include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essenti

to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose th for listing as threatened or endangered. By considering these species early in your plannir process you may be able to avoid the problems that could develop if one of these candida was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defir by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, yo will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 22, 2009.

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Amsinckia grandiflora large-flowered fiddleneck	PDBOR01050	Endangered	Endangered	G1	S1.1	1B.1
2	Amsinckia lunaris bent-flowered fiddleneck	PDBOR01070			G2	S2.2	1B.2
3	Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1			G1T1	S1.1	1B.2
4	Atriplex cordulata heartscale	PDCHE040B0			G2?	S2.2?	1B.2
5	Atriplex depressa brittlescale	PDCHE042L0			G2Q	S2.2	1B.2
6	Atriplex joaquiniana San Joaquin spearscale	PDCHE041F3			G2	S2.1	1B.2
7	Balsamorhiza macrolepis var. macrolepis big-scale balsamroot	PDAST11061			G3G4T2	S2.2	1B.2
8	Blepharizonia plumosa big tarplant	PDAST1C011			G1	S1.1	1B.1
9	California macrophylla round-leaved filaree	PDGER01070			G3	S3.1	1B.1
10	Carex comosa bristly sedge	PMCYP032Y0			G5	S2?	2.1
11	Carex vulpinoidea brown fox sedge	PMCYP03EN0			G5	S2.2	2.2
12	Caulanthus coulteri var. lemmonii Lemmon's jewelflower	PDBRA0M0E0			G4T2	S2.2	1B.2
13	Centromadia parryi ssp. congdonii Congdon's tarplant	PDAST4R0P1			G4T3	S3.2	1B.2
14	Cordylanthus mollis ssp. hispidus hispid bird's-beak	PDSCR0J0D1			G2T2	S2.1	1B.1
15	Cordylanthus palmatus palmate-bracted bird's-beak	PDSCR0J0J0	Endangered	Endangered	G1	S1.1	1B.1
16	Deinandra bacigalupii Livermore tarplant	PDAST4R0V0			G1	S1.2	1B.2
17	Delphinium californicum ssp. interius Hospital Canyon larkspur	PDRAN0B0A2			G3T2?	S2?	1B.2
18	Delphinium recurvatum recurved larkspur	PDRAN0B1J0			G2	S2.2	1B.2
19	Eryngium racemosum Delta button-celery	PDAPI0Z0S0		Endangered	G2Q	S2.1	1B.1
20	Eschscholzia rhombipetala diamond-petaled California poppy	PDPAP0A0D0			G1	S1.1	1B.1
21	Fritillaria agrestis stinkbells	PMLIL0V010			G3	S3.2	4.2
22	Helianthella castanea Diablo helianthella	PDAST4M020			G3	S3.2	1B.2
23	Hibiscus lasiocarpus woolly rose-mallow	PDMAL0H0Q0			G4	S2.2	2.2

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
24	Lathyrus jepsonii var. jepsonii Delta tule pea	PDFAB250D2			G5T2	S2.2	1B.2
25	Lilaeopsis masonii Mason's lilaeopsis	PDAPI19030		Rare	G3	S3.1	1B.1
26	Limosella subulata Delta mudwort	PDSCR10050			G4?Q	S2.1	2.1
27	Madia radiata showy golden madia	PDAST650E0			G2	S2.1	1B.1
28	Plagiobothrys glaber hairless popcorn-flower	PDBOR0V0B0			GH	SH	1A
29	Scutellaria galericulata marsh skullcap	PDLAM1U0J0			G5	S2.2?	2.2
30	Senecio aphanactis chaparral ragwort	PDAST8H060			G3?	S1.2	2.2
31	Symphyotrichum lentum Suisun Marsh aster	PDASTE8470			G2	S2.2	1B.2
32	Trifolium depauperatum var. hydrophilum saline clover	PDFAB400R5			G5T2?	S2.2?	1B.2
33	Tropidocarpum capparideum caper-fruited tropidocarpum	PDBRA2R010			G1	S1.1	1B.1

Appendix C
Reference Site Photographs

Diamond-petaled California poppy (*Eschscholzia rhombipetala*); observed April 6, 2009 on a north facing slope north of Tesla Road, approximately 12 miles east of Livermore

Contra Costa Goldfields (*Lasthenia conjugens*): observed along Scally Road, south of Highway 12 on April 15, 2009.

Livermore tarplant (*Deinandra bacigalupi*): observed on August 18, 2009 at the Springtown Wetland Reserve north of Highway 580, on the west side of North Vasco Road in Livermore.

Palmate-bracted bird's beak (*Cordylanthus palmatus*): observed on August 18, 2009 at the Springtown Wetland Reserve north of Highway 580 on the west of side of North Vasco Road in Livermore

Appendix D
Vascular Plants Observed

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]
Amaranthaceae			
Amaranthus albus	prostrate pigweed	I	A
Amaranthus blitoides	mat amaranth	N	A
Amaranthus retroflexus	redroot amaranth	I	A
Anacardiaceae			
Schinus molle	Peruvian peppertree	I (L[3])	T
Apiaceae			
Conium maculatum	poison hemlock	I (M[3])	B
Eryngium aristulatum	California eryngo	N	B P
Eryngium vaseyi	coyote thistle	N	B P
Foeniculum vulgare	sweet fennel	I (H[3])	P
Apocynaceae			
Nerium oleander	oleander	I	T S
Arecaceae			
Washingtonia filifera (planted landscape tree)	California fan palm	N	T
Asclepiadaceae			
Asclepias fascicularis	Mexican whorled milkweed	N	P
Asteraceae			
Achyrachaena mollis	blow wives	N	A
Baccharis pilularis	coyote brush	N	S
Carduus pycnocephalus	Italian plumeless thistle	I (M[3])	A B
Centaurea calcitrapa	red star-thistle	I (M[3])	A P
Centaurea solstitialis	yellow star-thistle	I (H[3])	A
Centromadia pungens (*Hemizonia pungens*)	common tarweed	N	A
Cichorium intybus	chicory	I	P
Cirsium vulgare	bull thistle	I (M[3])	B
Conyza bonariensis	asthma weed	I	A
Cotula coronopifolia	common brass buttons	I (L[3])	P
Gnaphalium palustre	western marsh cudweed	N	A
Grindelia camporum var. *camporum*	Great Valley gumweed	N	P
Helianthus annuus	common sunflower	N	A

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]
Helminthotheca echioides (*Picris echioides*)	bristly oxtongue	I (L^3)	A B
Hypochaeris glabra	smooth cat's ear	I (L^3)	A
Lactuca saligna	willowleaf lettuce	I	A
Lactuca serriola	prickly lettuce	I	A
Lasthenia californica	California goldfields	N	A
Matricaria matricarioides (*Chamomilla suaveolens, Matricaria discoidea*)	disc mayweed	I	A
Microseris douglasii ssp. *douglasii*	Douglas' silverpuffs	N	A
Psilocarphus oregonus	Oregon woollyheads	N	A
Senecio vulgaris	old-man-in-the-Spring	I	A
Silybum marianum	blessed milkthistle	I (L^3)	A B
Sonchus asper	spiny sowthistle	I	A
Sonchus oleraceus	common sowthistle	I	A
Xanthium spinosum	spiny cocklebur	N	A
Xanthium strumarium	rough cocklebur	N	A
Boraginaceae			
Amsinckia menziesii	Menzies' fiddleneck	N	A
Heliotropium curassavicum	salt heliotrope	N	P
Plagiobothrys greenei	Greene's popcornflower	N	A
Plagiobothrys stipitatus	stalked popcornflower	N	A
Plagiobothrys trachycarpus	roughfruit popcornflower	N	A
Brassicaceae			
Brassica nigra	black mustard	I (M^3)	A
Brassica rapa	field mustard	I (L^3)	A
Capsella bursa-pastoris	shepherd's purse	I	A
Hirschfeldia incana	shortpod mustard	I (M^3)	B P
Lepidium didymum (*Coronopus didymus*)	lesser swinecress	I	A
Lepidium draba subsp. *draba* (*Cardaria draba*)	whitetop	I	P
Lepidium latifolium	broadleaved pepperweed	I (H^3)	P
Lepidium latipes	San Diego pepperweed	N	A
Lepidium nitidum var. *nitidum*	shining pepperweed	N	A

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]
Raphanus sativus	cultivated radish	I (L[3])	A B
Sisymbrium orientale	hedgemustard	I	A
Casuarinaceae			
Casuarina sp.	sheoak	I	T
Callitrichaceae			
Callitriche marginata	winged water-starwort	N	A
Campanulaceae			
Downingia insignis	harlequin calicoflower	N	A
Caryophyllaceae			
Spergularia salina (*Spergularia marina*)	salt sandspurry	N	A
Stellaria media	common chickweed	I	A
Chenopodiaceae			
Allenrolfea occidentalis	iodine bush	N	S
Atriplex argentea var. *mohavensis*	silverscale saltbush	N	A
Atriplex cordulata	heartscale	N (1B[4])	A
Atriplex fruticulosa	ball saltbush	N	P
Atriplex triangularis (*Atriplex prostrate*)	triangle orache	N	A
Bassia hyssopifolia	fivehorn smotherweed	I (L[3])	A
Chenopodium album	lambsquarters	I	A
Chenopodium murale	nettleleaf goosefoot	I	A
Halogeton glomeratus	saltlover	I (M[3])	A
Salsola tragus	prickly Russian thistle	I (L[3])	A
Convolvulaceae			
Convolvulus arvensis	field bindweed	I	P
Cressa truxillensis	spreading alkaliweed	N	P
Crassulaceae			
Crassula aquatica	water pygmyweed	N	A
Crassula connata	sand pygmyweed	N	A
Cyperaceae			
Bolboschoenus maritimus (*Scirpus maritimus, Schoenoplectus maritimus*)	cosmopolitan bulrush	N	P

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]
Euphorbiaceae			
Croton setigerus (*Eremocarpus setigerus*)	dove weed	N	A
Chamaesyce maculata (*Euphorbia maculata*)	spotted sandmat	I	A
Fabaceae			
Astragalus asymmetricus	San Joaquin milkvetch	N	P
Lupinus bicolor	miniature lupine	N	A
Lupinus succulentus	hollowleaf annual lupine	N	A
Medicago polymorpha	burclover	I (L[3])	A
Medicago sativa	alfalfa	I	P
Melilotus indicus	annual yellow sweetclover	I	A
Trifolium hirtum	rose clover	I (M[3])	A
Frankeniaceae			
Frankenia salina	alkali seaheath	N	SS
Geraniaceae			
Erodium botrys	longbeak stork's bill	I	A
Erodium cicutarium	redstem stork's bill	I (L[3])	A
Erodium moschatum	musky stork's bill	I	A
Geranium dissectum	cutleaf geranium	I	A
Juglandaceae			
Juglans hindsii (planted landscape tree)	Northern California walnut	N	T
Juncaceae			
Juncus bufonius	toad rush	N	A
Juncus mexicanus	Mexican rush	N	P
Lamiaceae			
Lamium amplexicaule	henbit deadnettle	I	A
Marrubium vulgare	horehound	I (L[3])	P
Rosmarinus officinalis (landscape planting)	rosemary	I	S
Lythraceae			
Lythrum hyssopifolium	Purple loosestrife	I (L[3])	A B
Malvaceae			
Malva nicaeensis	bull mallow	I	A B

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]
Malvella leprosa	alkali mallow	-	A
Myrtaceae			
Eucalyptus globulus (planted landscape tree)	Tasmanian bluegum	I	T
Onagraceae			
Epilobium densiflorum	denseflower willowherb	N	A
Papaveraceae			
Eschscholzia californica	California poppy	N	A
Platanaceae			
Platanus x *acerifolia* (planted landscape tree)	London plane tree	I	T
Plantaginaceae			
Plantago elongata	prairie plantain	N	A
Plantago lanceolata	narrowleaf plantain	I (L^3)	P
Plantago major	common plantain	I	P
Pinaceae			
Pinus muricata (planted landscape tree)	Bishop pine	N	T
Poaceae			
Alopecurus saccatus	Pacific foxtail	N	A
Arundo donax	giant reed	I (H^3)	P
Avena barbata	slender oat	I (M^3)	A
Avena fatua	wild oat	I (M^3)	A
Bromus catharticus	rescuegrass	I	A P
Bromus diandrus	ripgut brome	I (M^3)	A
Bromus hordeaceus	soft brome	I (L^3)	A
Bromus madritensis ssp. *rubens* (*Bromus rubens*)	red brome	I (H^3)	A
Crypsis schoenoides	swamp pricklegrass	I	A
Cynodon dactylon	Bermudagrass	I (M^3)	P
Deschampsia danthonioides	annual hairgrass	N	A
Distichlis spicata	saltgrass	N	P
Echinochloa crus-galli	barnyardgrass	I	A
Echinochloa colona	jungle rice	I	A
Eragrostis sp.	lovegrass	I	A
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	N	P

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	I	A
Hordeum murinum ssp. *leporinum*	hare barley	I	A
Leymus triticoides	beardless wildrye	N	P
Lolium multiflorum (*Lolium perenne* ssp. *multiflorum*)	Italian ryegrass	I (M[3])	A B
Nassella pulchra	purple needlegrass	N	P
Panicum capillare	witchgrass	N	A
Parapholis incurva	curved sicklegrass	I	A
Phalaris minor	littleseed canarygrass	I	A
Puccinellia simplex	California alkaligrass	N	A
Poa annua	annual bluegrass	I	A B
Polypogon monspeliensis	annual rabbitsfoot grass	I (L[3])	A
Pennisetum sp. (landscape planting)	fountaingrass	I	P
Setaria pumila	yellow foxtail	I	A
Sorghum halepense	Johnsongrass	I	P
Triticum aestivum	common wheat	I	A
Vulpia bromoides	brome fescue	I	A
Vulpia myuros	rat-tail fescue	I (L[3])	A
Polygonaceae			
Polygonum aviculare ssp. *depressum* (*Polygonum arenastrum*)	oval-leaf knotweed	I	A P
Rumex crispus	curly dock	I (L[3])	P
Rumex pulcher	fiddle dock	I	P
Portulacaceae			
Calandrinia ciliata	fringed redmaids	N	A
Primulaceae			
Anagallis arvensis	scarlet pimpernel	I	A
Ranunculaceae			
Myosurus minimus[5]	tiny mousetail	N	A
Myosurus sessilis	vernal pool mousetail	N	A
Rosaceae			
Rosa sp. (landscape planting)	rose	I	S

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]
Salicaceae			
Populus nigra (planted landscape tree)	Lombardy poplar	I	T
Salix lasiolepis	arroyo willow	N	T
Scrophulariaceae			
Castilleja campestris	vernal pool Indian paintbrush	N	A
Triphysaria eriantha	johnny-tuck	N	A
Veronica peregrina	neckweed	N	A
Solanaceae			
Datura wrightii	sacred thorn-apple	N	A P
Solanum americanum	American Black Nightshade	N	A SS
Solanum elaeagnifolium	silverleaf nightshade	I	P
Typhaceae			
Typha latifolia	broadleaf cattail	N	P
Typha angustifolia	narrowleaf cattail	N	P
Urticaceae			
Urtica dioica	stinging nettle	N	P
Zygophyllaceae			
Tribulus terrestris	puncturevine	I	A

[1] Taxonomic name, origin and habitat based on the Jepson On-Line Interchange for California Floristics (August 2009).

[2]Common names are from the U.S. Department of Agriculture Natural Resource Conservation Service On-Line Plants Database (August 2009).

[3]California Invasive Plant Council Ratings On Line Inventory (August 2009)

H – High. These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

M – Moderate. These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

L – Limited. These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

TABLE D-1
List of Vascular Plants Observed During 2009 Botanical Survey fro the Mariposa Energy Center

Scientific Name[1]	Common Name[2]	Origin[1]	Habit[1]

[4]California Native Plant Society's Inventory of Rare and Endangered Plants of California (August 2009)

1B – List 1B. The plants that are rare, threatened or endangered throughout their range. Most are endemic to California and have declined significantly over the last century.

[5] California Native Plant Society includes *Myosurus minimus* ssp. *apus* as a list 3.1 plant (watch list) in the On-line Inventory of Rare and Endangered Plants of California (August 2009). This subspecies is not recognized in the Current Jepson Manual (Hickman 1993) and the taxonomy remains unresolved (Jepson On-Line Interchange, August 2009).

Origin
N Native
I Introduced

Habit
A Annual
B Biennial
P Perennial
SS Sub-Shrub
S Shrub
T Tree

Cultural Resources (24-49)

Background

The Application for Certification (AFC) states that agricultural and ranching activities have disturbed the surface soils of the proposed project site, and that the site was previously developed as a wind farm (p. 1-1). The pedestrian archaeological survey noted that concrete turbine pads are still present, and suggested that it is likely that buried electrical lines connecting the turbines are present as well (p. 5.3-12). Staff needs to know how deep this previous disturbance extends in order to assess the project's potential impacts on possible buried archaeological resources.

Data Requests

24. Please research the previous wind farm and provide information on the extent and depth of ground disturbance resulting from the construction of the wind farm.

25. Please provide a map showing the previous wind turbine locations and the routes of the underground electrical lines within the footprint of the MEP.

Response:

Mariposa Energy contacted the property owner on October 28, 2009 to obtain any available information on prior wind turbine foundation locations, foundation sizes, and underground utilities to determine the extent and depth of prior ground disturbance. The property owner does not have documentation or knowledge of the extent of ground disturbance from construction; however he did provide dimensions of remaining foundations. Based on the property owner's recent measurements, the wind turbine foundation pads were approximately 3 feet wide, 5 feet long, and 10 inches deep.

Additionally, CH2M HILL staff visited Alameda County Building and Planning Departments on November 3, 2009 to review any available records on file for the property. Files were requested for all associated addresses and parcel numbers (4901 Bruns Road, 14801 Kelso Road, APN 099B-7050-001-10, and APN 99B-7050-1-7). The only records available were related to development of the Byron Cogeneration Facility at 4901 Bruns Road.

The former wind turbine foundations and decommissioned wind turbines are visible in recent aerial photography of the project area. Figure DR25-1 presents approximate locations of the wind turbine foundations overlaid with the project site boundary. Underground utility routes and depths are not known, but presumably were in close proximity and parallel to the visible access roads and turbines.

Background

To assess the proposed project's potential impact on buried archaeological resources, staff needs information on the extent of ground disturbance associated with the installation of various project components.

Data Requests

26. In a table, please list all buildings and equipment whose foundations require excavation, and provide the dimensions and depths of holes that would be dug to construct these foundations.

Response:

A table including building and equipment foundation depths and dimensions as well as the maximum disturbance depth based on cut and fill depths at the location of each of these features is provided in Attachment DR26-1.

27. In a table, please list all linear facilities that entail trenching or the excavation of holes for footings, and provide, for both the on- and off-site segments of each, the total length of each facility, the trench dimensions (width and depth of excavation) required to install the pipelines, the diameter and depth of the holes for the transmission line footings/foundations, and the width of the off-site corridor of expected ground disturbance adjacent to the trenches or footings.

Response:

Table DR27-1 provides list of both on-and offsite linear facilities with expected ground disturbance and excavation dimensions.

TABLE DR27-1
On-and Offsite Linear Facility Ground Disturbance and Excavation Summary

	Approximate Linear Segment	Approximate Pipeline Trench Excavation		Approximate Transmission Line Footings/ Foundations		Approximate Offsite Corridor
	Length (feet)	Width (feet)	Depth (feet)	Diameter (width) (feet)	Depth (feet)	Width (feet)
Offsite Linear Facilities						
Transmission Line	3,660			10	4	100
Water Supply Pipeline	9,500	2	4			30
Natural Gas Pipeline	580	3	4.5			75
Onsite Linear Facilities						
Transmission Line	610			10	4	
Water Supply Pipeline	340	2	4			
Natural Gas Pipeline	1,600	3	4.5			
Stormwater Drain Pipeline	2,710	4	4			
Process Wastewater Pipeline	1,240	2	4			
Sanitary Sewer Waste Pipeline	290	2	4			
Fire Protection Pipeline	3,500	3	4			

Background

The AFC indicates that the natural gas pipeline would deliver gas to an on-site gas metering station that would include underground piping and possibly underground facilities for pigging (p. 4-1). From the metering station, gas would go to all of the combustion turbine generators (CTGs), so pipelines, presumably underground, would be necessary, running from the metering station to the four CTG units. But no figure was provided showing these pipelines, and their dimensions are not discussed in Sections 3.0 or 4.0. Staff needs to have route locations for these pipelines and dimension data for the metering station and pigging facilities to assess potential impacts to buried archaeological resources, unknown at this time but possibly present.

Data Requests

28. Please provide a map showing the on-site natural gas pipelines, the metering station, and the pigging facilities.

29. Please provide the horizontal and vertical dimensions of the natural gas metering station and of the pigging facilities.

Response:

A drawing showing the onsite natural gas pipelines, the metering station, and the pigging facilities is provided as Attachment DR28-1.

Schematics showing the horizontal and vertical dimensions of the natural gas metering station and of the pigging facilities are provided as Attachments DR29-1, DR29-2, and DR29-3. Please refer to Attachment DR28-1 for an overall map of the underground piping.

Background

The AFC states that the proposed project plans to get fresh water from Byron Bethany Irrigation District (BBID) Canal 45 via a 1.8-mile-long pipeline to be installed in an easement alongside Bruns Road (p. 5.3-12) or alongside the project's proposed new access road (p. 2-1). A new pump station, a laydown area for storing pipe, and 1,000 feet of the installed pipeline would be on the property of the new BBID facility on Bruns Road (pp. 2-1, 5.3-12–5.3-13). The pump station would be a "manhole wet well" (p. 2- 2). The laydown area would be located in a graded area in the southeast corner of the Pump Control Center and Maintenance Yard of the new BBID facility (p. 5.3-13). The 1,000 feet of proposed MEP pipeline would run through this property in a "recently disturbed corridor" where a pipeline to serve the BBID facility was already installed (p. 5.13-13). To assess the project's potential impact on possible buried archaeological resources, staff needs more detailed information on the proposed fresh water system.

Data Requests

30. Please provide a large-scale map showing the location of the water pipe laydown area, the location and dimensions (including depth) of the new water pump station, and the location and dimensions (including depth) of the trench for the part of the water pipeline that is on the BBID property.

Response:

A map of the water supply pipeline laydown area, pump station, and water supply pipeline route is provided as Figure DR30-1. A larger scale map of the intake turnout structure and pump station are provided in Figure DR30-2. Excavation associated with construction of the turnout structure at the bank of Canal 45 will be limited to 6 feet wide, by 6 feet long, by 6 feet deep, or less. The maximum size of the pump station facilities will be 8 feet by 8 feet square; depth of the wet well housed within the pump station will be approximately 6 feet or less. The water supply pipeline trench will be approximately 18 to 24 inches wide and 4 feet deep.

31. If any boring or directional drilling would be required, please provide the number, the dimensions, and the depth of the boring pits.

Response:

No boring or directional drilling will be required for the proposed 1.8-mile water supply pipeline construction.

32. Please provide a map showing all locations where the proposed project could use boring or directional drilling, with the bore pits shown to scale.

Response:

No boring or directional drilling will be required for construction of proposed project linear facilities.

Background

The AFC states that the new supports for the proposed overhead interconnection transmission line (gen-tie) would be eight steel monopoles, 84 to 95 feet tall (p. 3-1), presumably all located off-site. To assess the project's potential impact on possible buried archaeological resources, staff needs to know if the project would include additional gen-tie supports on-site. Staff also needs more detailed information on the ground disturbance associated with the installation of these monopoles and the installation of conductors on the poles.

Data Requests

33. If, in addition to the eight gen-tie supports discussed in the AFC, other transmission line supports would be installed on-site, how many would be needed, of what type, and of what height and diameter?

34. If the on-site transmission line supports differ from that illustrated in Figure 3.2-2, please provide an illustration showing the type that would be used.

35. Please provide a figure showing the on-site route of the gen-tie transmission line, with support locations indicated.

Response to DRs 33-35:

As depicted on Figures 2.3-1 and 3.2-1 of the AFC, the project transmission line includes two transmission poles located adjacent to the western site boundary and an additional six poles between the northeastern site boundary and the Kelso Substation. A revised typical monopole transmission tower profile was provide as Figure 3.2-2R with the Data Adequacy supplement and is included with this response for convenience as Figure DR34-1. This figure is representative of the 8 monopoles, although some will be less than 95 feet in height. The approximate diameter of the poles at the base will be 25 to 30 inches depending on the final design height for each pole. Additionally, a dead-end structure will be located on the MEP site. The plan and profile for this structure was provided as Figure DA3.0-1 with the Data Adequacy supplement and is included with this response for convenience as Figure DR34-2. The onsite route of the transmission line is provided in Figure DR35-1.

36. If installation of the off-site gen-tie supports and stringing of conductors would entail creating an access road, spur roads, and pull-sites, please provide a map showing the location of the access road, all spur roads, and all pull-sites.

37. Please provide the horizontal extent and depth of ground disturbance associated with the gen-tie access road, spur roads, and pull-sites.

Response:

No access roads, spur roads, or pull sites will be graded for the construction of the MEP gen-tie line. Construction vehicles will drive overland along the construction corridor from the MEP site or Kelso Road to access work areas. The construction corridor for vehicle access and work activities will be 100 feet wide along the centerline, with conductor pull site work areas of approximately 200 feet by 100 feet, within the same 100-ft corridor. Figure DR37-1 depicts the construction corridor and pull sites.

Background

The AFC states that the project would have a fire hydrant system (p. 2-35). The tank for the storage of water for fire suppression is discussed (p. 2-37), but no information on the fire hydrant system piping, presumably underground, is provided. To assess the project's potential impact on possible buried archaeological resources, staff needs more detailed information on possible ground disturbance associated with the fire hydrant system piping.

Data Requests

38. Please provide a map showing the layout of the fire hydrant system piping.

39. Please provide the total length of the fire hydrant system piping, the diameter of the pipes, and the width and depth of the installation trench for the fire hydrant system piping.

Response:

A drawing showing the layout of the fire hydrant system piping is provided as Attachment DR28-1.

The total length of the fire hydrant system piping and the diameter of the pipes for the fire hydrant system piping is provided on Attachment DR28-1. The fire hydrant system piping installation trenching dimensions are shown on Attachment DR39-1.

Background

The AFC identifies a septic tank and a leach field as the project's means of disposal of sanitary wastewater (pp. 2-24–2-25). To assess the project's potential impact on possible buried archaeological resources, staff needs more detailed information on possible ground disturbance associated with the septic tank and leach field.

Data Requests

40. Please provide a map showing the layout of the septic tank and leach field.

41. Please provide the total length of the dimensions of the area that would be disturbed by the installation of the septic tank and leach field.

Response:

The holding tank locations are shown on Attachment DR28-1. MEP will use two holding tanks rather than a septic tank and leach field system. A drawing depicting the estimated holding tank excavation size is provided in Attachment DR41-1. The estimated dimensions of the disturbance for each tank will be approximately 12 feet wide (at the surface), 19 feet long (at the surface), by 6 feet deep.

Background

The AFC states that process wastewater and stormwater runoff would be routed to sumps (p. 2-24), but no additional information on the subsequent disposition of this water is provided. AFC Figure 2.3-1 shows a "retention pond," and the Water Resources section mentions a "detention pond" (p. 5.15-17), which, presumably, would be the destination of the project's process wastewater and stormwater. The AFC does not mention pipelines or on-site swales, ditches, or culverts for conveying stormwater to the retention pond. To assess the project's potential impact on possible buried archaeological resources, staff needs more detailed information on possible ground disturbance associated with the retention pond.

Data Requests

42. Please provide the total length, the width, and the depth of the installation trench for the sumps and for any piping associated with site drainage.

Response:

The total length of the onsite stormwater drainage system sumps and piping, as well as the length of piping to convey stormwater to the onsite extended detention basin is approximately 2,710 feet. The primary method of the sump and pipeline construction includes excavation of an open trench up to approximately 4 feet deep and 16 inches to 48 inches wide, depending on depth and site-specific soil type.

43. Please provide the length, width, and depth of the retention pond, and discuss its method of construction, use, and maintenance.

Response:

Construction of the onsite extended detention basin will primarily use an open trench method and will not extend off of the project site. The primary method of basin construction includes excavation cuts via earthmoving equipment. The approximate cut volume of the basin is 2,974-cubic yards. The dimensions of the basin are approximately 220 feet in length, 5 feet in depth, and 73 feet in width. Once construction of the basin is complete, exposed soil will be re-vegetated. Ongoing maintenance will include annual vegetation mowing, structural inspections, debris removal, and sediment removal. The purpose of the extended detention basin is to detain storm water runoff from the site to allow particles and associated pollutants to settle.

Background

The preliminary Geotechnical Report recommends that the project site be "grubbed and cleared" of vegetation, topsoil, and construction debris, and the removed material disposed of off-site (AFC, Vol. 2, App. 2C, p. 11). The report also indicates that the project expects to make cuts of up to 32 feet along the eastern portion of the site and fills of up to 15 feet along the central and western portions of the site. The report additionally notes that the project expects to use 66,000 cubic yards of fill (AFC, Vol. 2, App. 2C, pp. 11, 12). Staff needs to know whether or not any non-licensed, noncommercial disposal or borrow sites that may be used by the proposed project have been surveyed for the presence of cultural resources.

Data Requests

44. If the proposed project would use any non-licensed, non-commercial soil borrow or disposal sites, please have a qualified archaeologist survey these sites and record on Department of Parks and Recreation (DPR) 523 forms any cultural resources that are identified.

45. Please submit to staff a report on the methods and results of these surveys, with recommendations for the treatment of any cultural resources identified in the surveys.

Response:

All required imported structural fill will be obtained from permitted commercial quarries. Local operating facilities that may be used as a source of engineered fill material meeting the project requirements include Brown Sand, Inc. in Lathrop and L.H. Voss Materials Inc. in Stockton.

Site soils that are unsuitable for reuse will be transported to licensed operating landfill for use as daily cover material, in accordance with applicable regulatory and facility acceptance requirements. Of the three local landfills that were identified in Table 5.14-3 of the AFC, both Vasco Road Landfill in Livermore and Altamont Landfill in Livermore accept soil for daily cover material.

Because the project will not use any non-licensed, non-commercial soil borrow for fill sites, no cultural resources surveys will be required for this purpose.

Background

The construction of the MEP would entail ground disturbance at the ~~103~~10-acre project site and project linear facilities. The AFC Geology section identifies Quaternary alluvial fan deposits on the project site (p. 5.4-2). Figure 5.4-1 shows the proposed natural gas pipeline traversing siltstone exposed on the surface. The undifferentiated Quaternary alluvial deposits at the project site and at the location of the new fresh water pumphouse could obscure archaeological sites. Staff assumes that agriculture may have disturbed the project site to a depth of 3 feet, and the wind farm construction may have resulted in deeper disturbance, but it is likely that the construction of a number of project components would entail deeper project ground disturbance than either of these previous uses. In these Data Requests, staff is asking for the maximum depths for project components, but the AFC states that the natural gas pipeline would be installed in a trench at least 4.5 feet below grade (p. 4-1). Staff estimates that the ground disturbance resulting from the construction of major equipment installations at the plant site would be likely to extend as deep as 12 feet below the surface.

The Cultural Resources section of the AFC acknowledges that buried archaeological deposits could be encountered during construction activities (p. 5.3-12). Such deposits may be too deep to present surface manifestations, but may be within reach of construction impacts. Staff needs information of a finer resolution on the age, the structure, and the character of the geologic units beneath the surface of the project area to evaluate the project's potential to substantially and adversely change the California Register of Historic Resource eligibility of archaeological deposits that may lie buried in the areas where MEP construction could impact them.

Data Requests

46. Please obtain the services of a professional in geoarchaeology: a person who, at a minimum, meets the U.S. Secretary of Interior's Professional Qualifications Standards for prehistoric archaeology, as published in Title 36,

Code of Federal Regulations, part 61, and demonstrates the completion of graduate-level coursework in geoarchaeology, physical geography, geomorphology, or Quaternary science, or education and experience acceptable to cultural resources staff. Please submit the resume of the proposed geoarchaeologist for staff review and approval.

47. Please have the approved geoarchaeologist provide a discussion, based on the available Quaternary science and geoarchaeological literature, of the historical geomorphology of the project areas. The discussion should describe the development of the landforms on which the project areas are proposed, with a focus on the character of the depositional regime of each landform since the Late Pleistocene epoch. The discussion should include data on the geomorphology, sedimentology, pedology, hydrology, and stratigraphy of the project areas, and the near vicinity. The discussion should relate landform development to the potential in the project areas for buried archaeological deposits. The discussion should include maps overlaying the above data on the project areas.

48. In the absence of sufficient extant Quaternary science and/or geoarchaeological literature pertinent to the reconstruction of the historical geomorphology of the project area, please have the approved geoarchaeologist design a primary geoarchaeological field study of the project areas, submit a research plan for staff approval, and conduct the approved research. The purpose of the study is to facilitate staff's assessment of the likelihood of the presence of archaeological deposits buried deeper than 3 feet in the project areas. The primary study should, at a minimum, include the following elements:

    a. A map of the present landforms in the project area at a scale of not less than 1:24,000; the data sources for the map may be any combination of published maps, satellite or aerial imagery that has been subject to field verification, and the result of field mapping efforts;

    b. A sampling strategy to document the stratigraphy of the portions of the landforms in the project areas where the construction of the proposed project will involve disturbance at depths greater than 3 feet;

    c. Data collection necessary for determinations of the physical character, the ages, and the depositional rates of the various sedimentary deposits and paleosols that may be beneath the surface of the project areas to the proposed maximum depth of ground disturbance. Data collection at each sampling locale should include a measured profile drawing and a profile photograph with a metric scale, and the screening of a small sample (3 5- gallon buckets) of sediment from the major sedimentary deposits in each profile through 1/4- inch hardware cloth. Data collection should also include the collection and assaying of enough soil humate samples to reliably radiocarbon date a master stratigraphic column for each sampled landform; and

d. An analysis of the collected field data and an assessment, based on those data, of the likelihood of the presence of buried archaeological deposits in the project areas, and, to the extent possible, the likely age and character of such deposits.

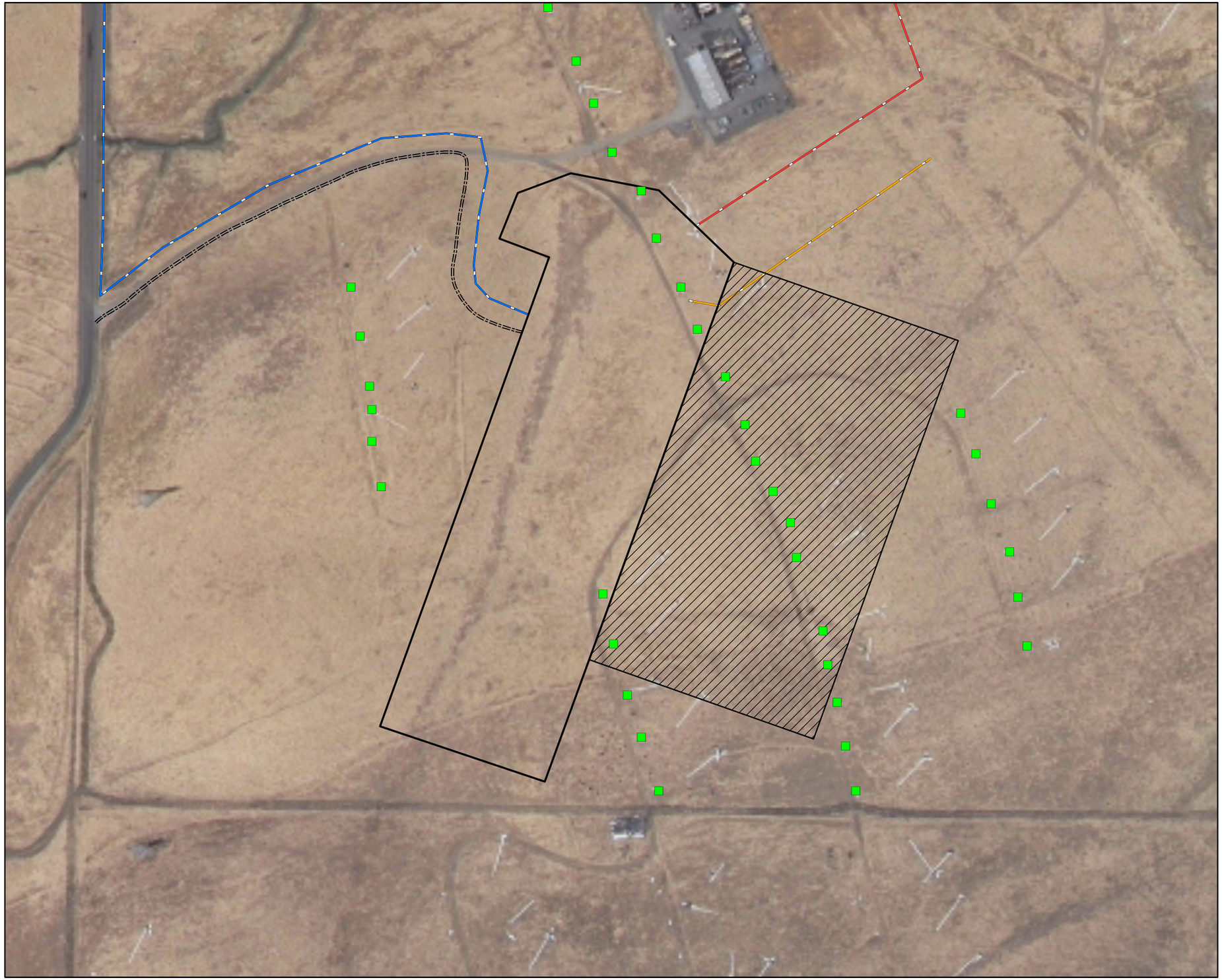
49. Please have the approved geoarchaeologist prepare a report of the primary field study and submit it to staff under confidential cover.

Response:

Mariposa Energy has contracted with Far Western Anthropological Research Group, Inc. (Far Western) to conduct a geoarchaeological assessment study for the project. Far Western Senior Geoarchaeologist, Jack Meyer, is performing the assessment. Mr. Meyer meets or exceeds the U.S. Secretary of Interior's Professional Qualifications Standards for prehistoric archaeology as he holds a graduate degree (M.A.) in Cultural Resources Management from Sonoma State University, and has practiced geoarchaeology as a professional in California for more than 15 years. His resume is included as Attachment DR46-1.

The discussion of the historical geomorphology of the project areas (Data Request 47) has been prepared and is provided as Attachment DR47-1.

Based on the findings of this assessment, Mariposa Energy proposes to conduct a geoarchaeological field study in accordance with Data Request 48. A research plan will be developed and submitted for Staff approval in December 2009 prior to performing the investigation; the final report will be submitted for Staff review by January 30, 2010.



LEGEND

- WIND TURBINE FOUNDATIONS (APPROXIMATE LOCATIONS)
- ACCESS ROAD
- NATURAL GAS PIPELINE ROUTE
- TRANSMISSION LINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE

N

0 100 200
Feet

FIGURE DR25-1
WIND TURBINE FOUNDATIONS IN PROJECT AREA
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

FIGURE DR30-1
PUMP STATION, TURNOUT AND WATER SUPPLY PIPELINE LAYDOWN AREA LOCATIONS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

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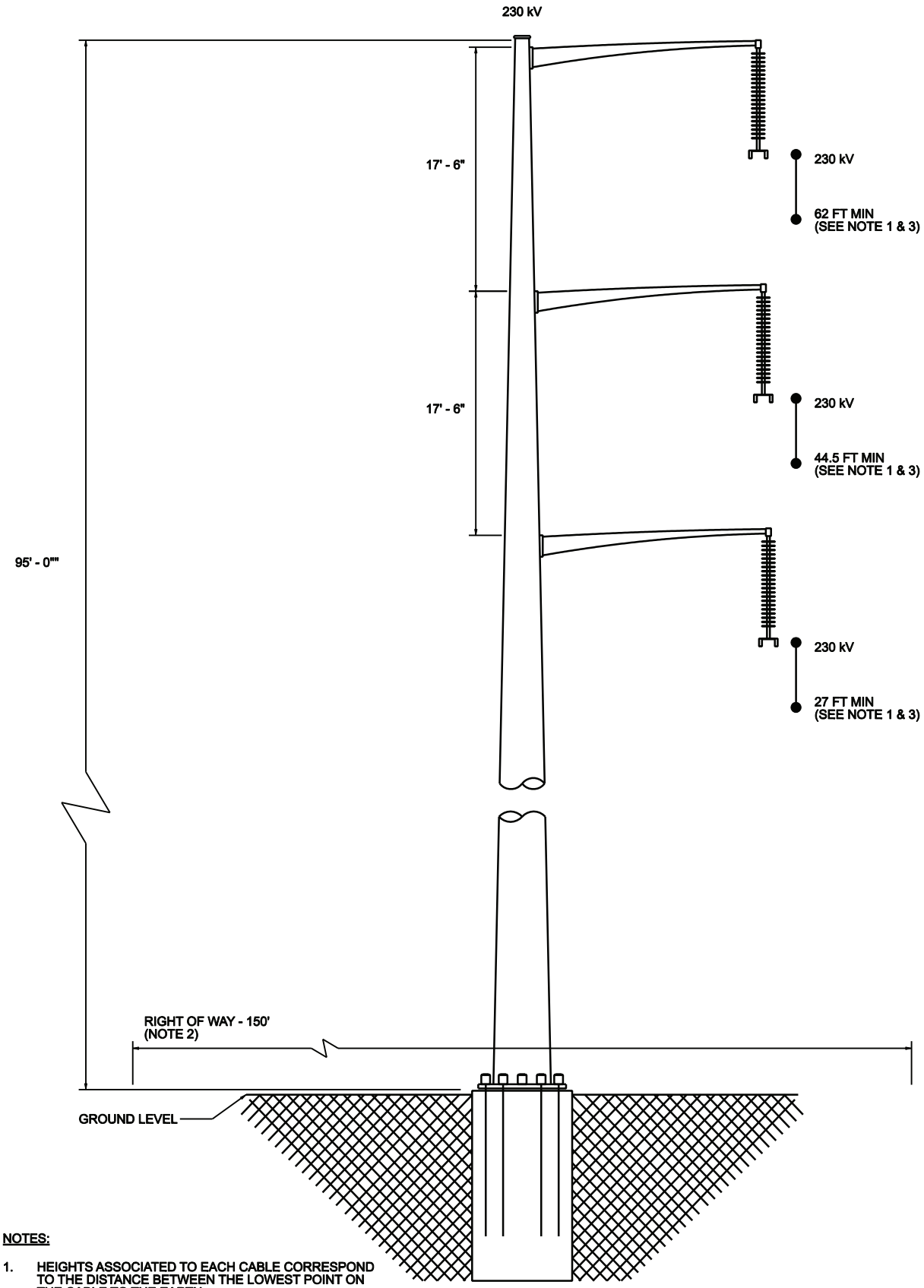
FIGURE DR30-2
PUMP STATION SITE PLAN
Mariposa Energy Project
Alameda County, California

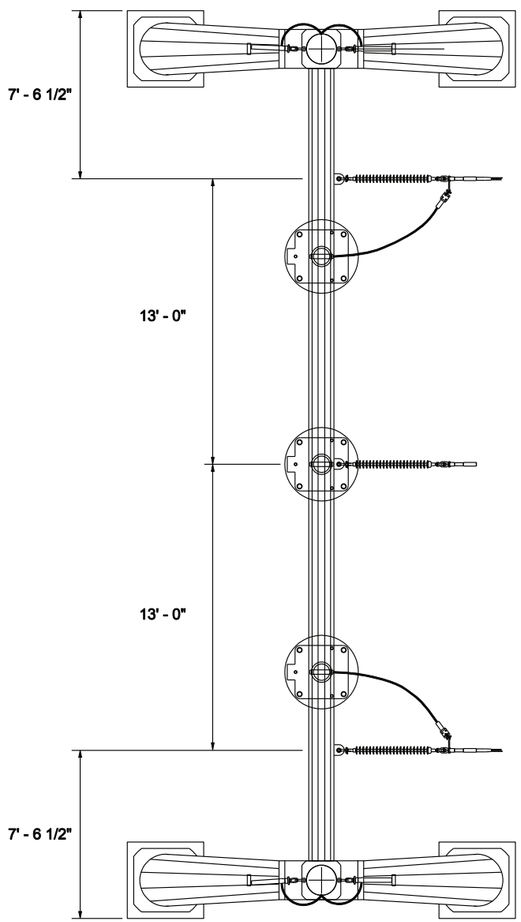


NOTES:

1. HEIGHTS ASSOCIATED TO EACH CABLE CORRESPOND TO THE DISTANCE BETWEEN THE LOWEST POINT ON THE CABLE TO THE EARTH.
2. RIGHT OF WAY WILL TYPICALLY BE 150 FEET WIDE. RIGHT OF WAY REQUIREMENTS MAY VARY FROM THE 150 FOOT WIDTH DEPENDING ON EXISTING FACILITIES OR OTHER CO-LOCATION OPPORTUNITIES.
3. CONDUCTOR SHALL BE: ACSR, DRAKE, 795 KCMILS WITH A CAPACITY OF 922A.

FIGURE DR34-1
TYPICAL MONOPOLE TRANSMISSION TOWER
Mariposa Energy Project
Alameda County, California

Source: Diamond Generating Corporation, Dwg. No. E-000-0-0001-SKE Rev. B



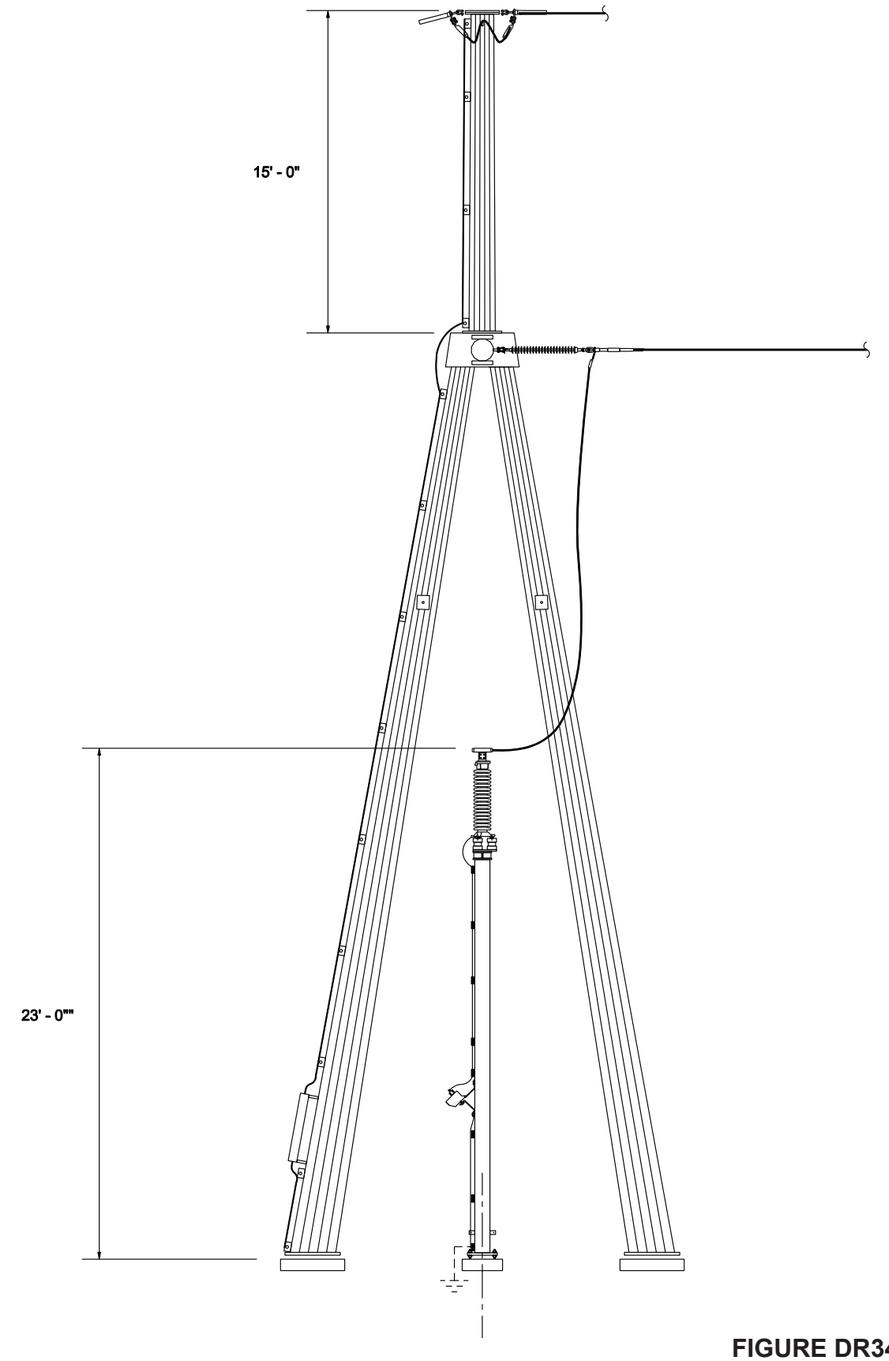
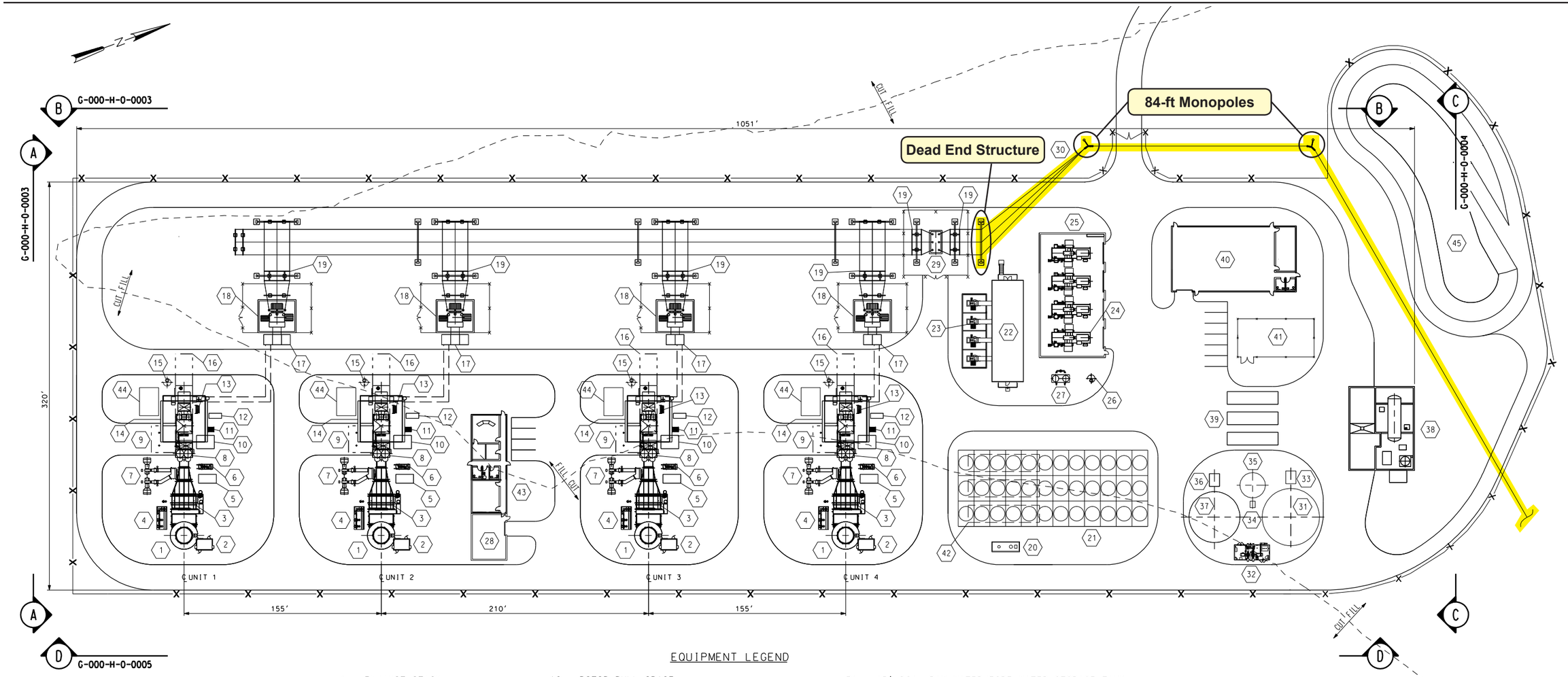


FIGURE DR34-2
DEAD END STRUCTURE
Mariposa Energy Project
Alameda County, California

Source: Diamond Generating Corporation, Dwg. No. E-000-0-0002-SKE Rev. A



EQUIPMENT LEGEND

1. EXHAUST STACK
2. CEMS STATION
3. SCR/CO CATALYST
4. AMMONIA INJECTION SKID
5. LUBE OIL FIN FAN COOLER
6. WATER INJECTION SKID
7. TEMPERING AIR FANS
8. GAS TURBINE GENERATOR (CTG)
9. TURBINE REMOVAL AREA
10. AUXILIARY SKID
11. SPRINT SKID
12. FINAL GAS FUEL FILTER
13. CO2 BOTTLE STORAGE
14. CTG INLET AIR FILTER
15. WATER WASH DRAINS TANK
16. ROTOR PULL SPACE
17. SWGR. GENERATOR BREAKER (TYP OF 2 UNITS)
18. GENERATOR STEP-UP TRANSFORMER (GSU)
19. DISCONNECT
20. OIL/WATER SEPARATOR
21. CHILLER/AIR COOLED RADIATOR SYSTEM
22. POWER DISTRIBUTION CENTER (PDC)
23. AUX TRANSFORMERS
24. FUEL GAS COMPRESSORS
25. FUEL GAS COMPRESSOR ENCLOSURE
26. FUEL GAS WASTE SUMP
27. FUEL GAS COALESCING FILTERS
28. AIR COMPR/DRYER/RECEIVER ENCLOSURE
29. CIRCUIT BREAKER
30. OVERHEAD POWER LINES
31. 45' DIA. RAW WATER/FIRE WATER STORAGE TANK
32. FIRE PROTECTION WATER PUMPS
33. RAW WATER TRANSFER PUMPS
34. WASTE WATER TRANSFER PUMPS
35. 25' DIA. WASTE WATER STORAGE TANK
36. DEMIN WATER TRANSFER PUMPS
37. 40' DIA. DEMIN WATER STORAGE TANK
38. AQUEOUS AMMONIA UNLOADING/STORAGE AREA
39. DEMIN WATER TRAILERS
40. WAREHOUSE & MAINT. BUILDING
41. GAS METERING STATION
42. CHILLER SKIDS (3)
43. CONTROL/ADMIN. BUILDING
44. CTG ELECT. MODULE
45. RETENTION POND

NOTE:
FINISHED GRADE EL. 125'-6"
T.O. CONC. EL. 126'-0"

40 0 40 80
Scale: 1 INCH = 40 FEET

FIGURE DR35-1
ON-SITE ROUTE OF GEN-TIE TRANSMISSION LINE
Mariposa Energy Project
Alameda County, California

CH2MHILL

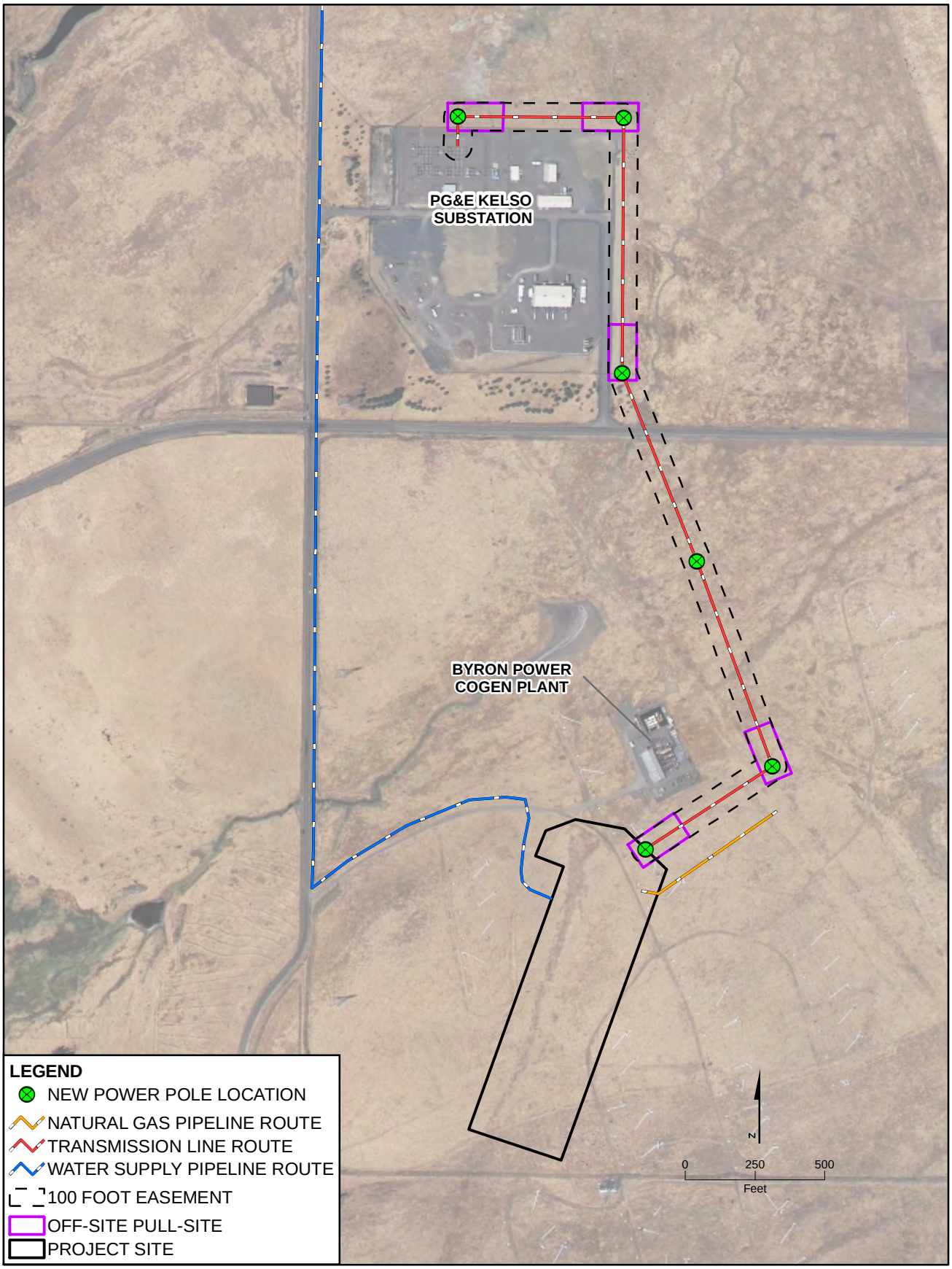


FIGURE DR37-1
TRANSMISSION LINE CONSTRUCTION CORRIDOR
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

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Attachment DR 26-1
Building and Equipment Foundation Depths

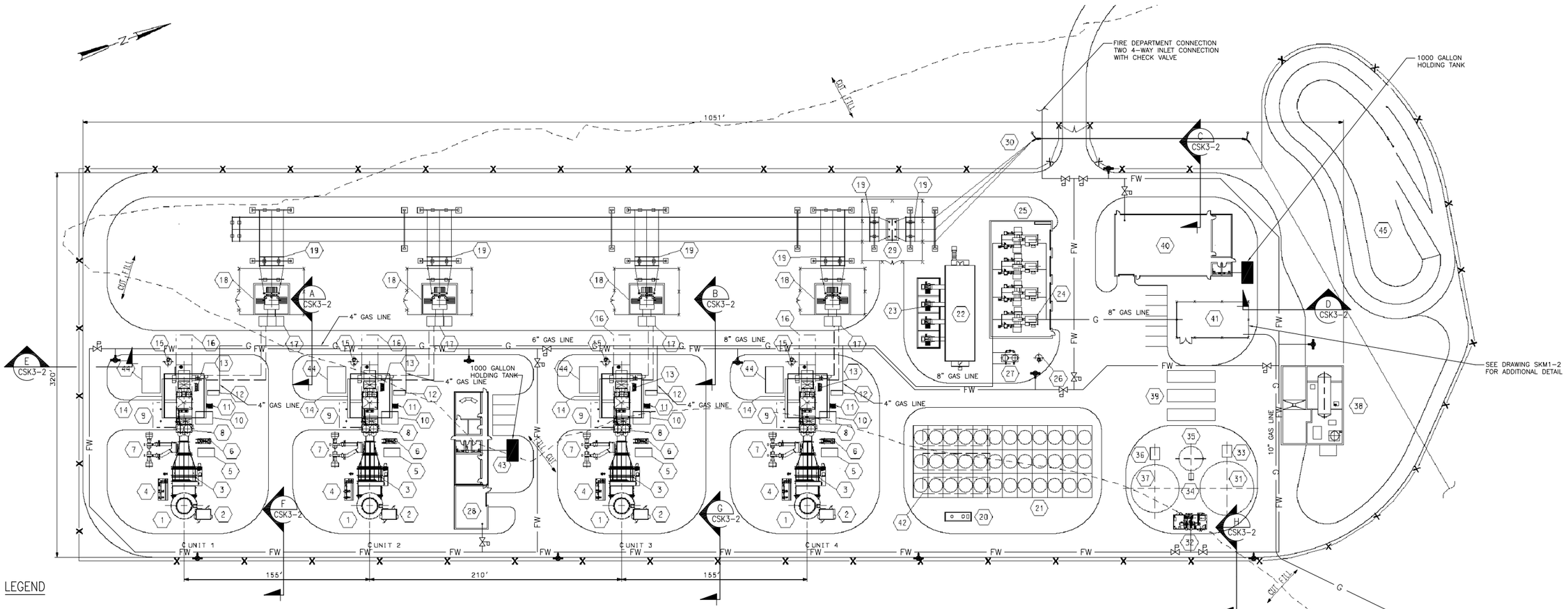
MARIPOSA FOUNDATION DEPTHS

	Sitework			Foundation						Depth	Size	
Location - Corner	Existing Grade Elev. (ft)	Finished Grade Elev. (ft)	Cut/Fill (ft)	TOC (ft)	Mat Thk. (ft)	BOC (ft)	Over-Excav. (ft)	Excav Elev (ft)	Depth From Fdn. (ft)	Total Depth Into Existing (ft)	Width (ft)	Length (ft)
Unit 1 - NE	146.2	125.5	20.7	126	4.5	121.5	2	119.5	6	26.7	35.5	154
Unit 1 - NW	131.9	125.5	6.4	126	4.5	121.5	2	119.5	6	12.4		
Unit 1 - SE	148.2	125.5	22.7	126	4.5	121.5	2	119.5	6	28.7		
Unit 1 - SW	130.9	125.5	5.4	126	4.5	121.5	2	119.5	6	11.4		
Unit 2 - NE	136.25	125.5	10.75	126	4.5	121.5	2	119.5	6	16.75	35.5	154
Unit 2 - NW	124.8	125.5	-0.7	126	4.5	121.5	2	119.5	6	5.3		
Unit 2 - SE	138.9	125.5	13.4	126	4.5	121.5	2	119.5	6	19.4		
Unit 2 - SW	125.9	125.5	0.4	126	4.5	121.5	2	119.5	6	6.4		
Unit 3 - NE	136	125.5	10.5	126	4.5	121.5	2	119.5	6	16.5	35.5	154
Unit 3 - NW	122.6	125.5	-2.9	126	4.5	121.5	2	119.5	6	3.1		
Unit 3 - SE	133.1	125.5	7.6	126	4.5	121.5	2	119.5	6	13.6		
Unit 3 - SW	121.7	125.5	-3.8	126	4.5	121.5	2	119.5	6	2.2		
Unit 4 - NE	134.6	125.5	9.1	126	4.5	121.5	2	119.5	6	15.1	35.5	154
Unit 4 - NW	121.1	125.5	-4.4	126	4.5	121.5	2	119.5	6	1.6		
Unit 4 - SE	136.3	125.5	10.8	126	4.5	121.5	2	119.5	6	16.8		
Unit 4 - SW	121.8	125.5	-3.7	126	4.5	121.5	2	119.5	6	2.3		
A/C Condenser - NE	127.5	125.5	2	126	2	124	2	122	3.5	5.5	70	155
A/C Condenser - SE	130.2	125.5	4.7	126	2	124	2	122	3.5	8.2		
A/C Condenser - NW	120.7	125.5	-4.8	126	2	124	2	122	3.5	-1.3		
A/C Condenser - SW	123.5	125.5	-2	126	2	124	2	122	3.5	1.5		
GSU 1 - NE	124.1	125.5	-1.4	126	5	121	2	119	6.5	5.1	35	40
GSU 1 - NW	123.3	125.5	-2.2	126	5	121	2	119	6.5	4.3		
GSU 1 - SE	124.7	125.5	-0.8	126	5	121	2	119	6.5	5.7		
GSU 1 - SW	123.7	125.5	-1.8	126	5	121	2	119	6.5	4.7		
GSU 2 - NE	121	125.5	-4.5	126	5	121	2	119	6.5	2	35	40
GSU 2 - NW	120.4	125.5	-5.1	126	5	121	2	119	6.5	1.4		
GSU 2 - SE	121.8	125.5	-3.7	126	5	121	2	119	6.5	2.8		
GSU 2 - SW	120.9	125.5	-4.6	126	5	121	2	119	6.5	1.9		

MARIPOSA FOUNDATION DEPTHS

	Sitework			Foundation						Depth	Size	
Location - Corner	Existing Grade Elev. (ft)	Finished Grade Elev. (ft)	Cut/Fill (ft)	TOC (ft)	Mat Thk. (ft)	BOC (ft)	Over-Excav. (ft)	Excav Elev (ft)	Depth From Fdn. (ft)	Total Depth Into Existing (ft)	Width (ft)	Length (ft)
GSU 3 - NE	119.1	125.5	-6.4	126	5	121	2	119	6.5	0.1	35	40
GSU 3 - NW	117.9	125.5	-7.6	126	5	121	2	119	6.5	-1.1		
GSU 3 - SE	119.4	125.5	-6.1	126	5	121	2	119	6.5	0.4		
GSU 3 - SW	118.3	125.5	-7.2	126	5	121	2	119	6.5	-0.7		
Demin Water - NE	125.7	125.5	0.2	126	3	123	2	121	4.5	4.7	55	55
Demin Water - NW	121.6	125.5	-3.9	126	3	123	2	121	4.5	0.6		
Demin Water - SE	127.5	125.5	2	126	3	123	2	121	4.5	6.5		
Demin Water - SW	123.5	125.5	-2	126	3	123	2	121	4.5	2.5		
Raw Water - NE	122.5	125.5	-3	126	3	123	2	121	4.5	1.5		
Raw Water - NW	118.5	125.5	-7	126	3	123	2	121	4.5	-2.5	60	60
Raw Water - SE	125	125.5	-0.5	126	3	123	2	121	4.5	4		
Raw Water - SW	120.5	125.5	-5	126	3	123	2	121	4.5	-0.5		
Waste Water - NE	121.5	125.5	-4	126	3	123	2	121	4.5	0.5	40	40
Waste Water - NW	119.1	125.5	-6.4	126	3	123	2	121	4.5	-1.9		
Waste Water - SE	122	125.5	-3.5	126	3	123	2	121	4.5	1		
Waste Water - SW	120.2	125.5	-5.3	126	3	123	2	121	4.5	-0.8		
Admin Bldg.- NE	127.4	125.5	1.9	126	2	124	2	122	3.5	5.4	40	85
Admin Bldg.- NW	122.9	125.5	-2.6	126	2	124	2	122	3.5	0.9		
Admin Bldg.- SE	129	125.5	3.5	126	2	124	2	122	3.5	7		
Admin Bldg.- SW	124	125.5	-1.5	126	2	124	2	122	3.5	2		
Rec. Enclosure - NE	131	125.5	5.5	126	2	124	2	122	3.5	9	40	45
Rec. Enclosure - NW	128.4	125.5	2.9	126	2	124	2	122	3.5	6.4		
Rec. Enclosure - SE	131.5	125.5	6	126	2	124	2	122	3.5	9.5		
Rec. Enclosure - SW	129	125.5	3.5	126	2	124	2	122	3.5	7		

Attachment DR28-1
Underground Piping Plan



LEGEND

—— FW ——	FIRE WATER LINE 10" DIAMETER 3350-LF
—— FW ——	FIRE WATER LINE 6" DIAMETER 150' LF
—— G ——	GAS LINE 1600-LF
	FIRE HYDRANT (10) EACH
	POST INDICATOR VALVE (12) EACH

EQUIPMENT LEGEND

1. EXHAUST STACK
2. CEMS STATION
3. SCR/CO CATALYST
4. AMMONIA INJECTION SKID
5. LUBE OIL FIN FAN COOLER
6. WATER INJECTION SKID
7. TEMPERING AIR FANS
8. GAS TURBINE GENERATOR (CTG)
9. TURBINE REMOVAL AREA
10. AUXILIARY SKID
11. SPRINT SKID
12. FINAL GAS FUEL FILTER
13. CO2 BOTTLE STORAGE
14. CTG INLET AIR FILTER
15. WATER WASH DRAINS TANK
16. ROTOR PULL SPACE
17. SWGR. GENERATOR BREAKER (TYP OF 2 UNITS)
18. GENERATOR STEP-UP TRANSFORMER (GSU)
19. DISCONNECT
20. OIL/WATER SEPARATOR
21. CHILLER/AIR COOLED RADIATOR SYSTEM
22. POWER DISTRIBUTION CENTER (PDC)
23. AUX TRANSFORMERS
24. FUEL GAS COMPRESSORS
25. FUEL GAS COMPRESSOR ENCLOSURE
26. FUEL GAS WASTE SUMP
27. FUEL GAS COALESCING FILTERS
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34. WASTE WATER TRANSFER PUMPS
35. 25' DIA. WASTE WATER STORAGE TANK
36. DEMIN WATER TRANSFER PUMPS
37. 40' DIA. DEMIN WATER STORAGE TANK
38. AQUEOUS AMMONIA UNLOADING/STORAGE AREA
39. DEMIN WATER TRAILERS
40. WAREHOUSE & MAINT. BUILDING
41. GAS METERING STATION
42. CHILLER SKIDS (3)
43. CONTROL/ADMIN. BUILDING
44. CTG ELECT. MODULE
45. RETENTION POND

NOTE:
FINISHED GRADE EL. 125'-6"
T.O. CONC. EL. 126'-0"

40 0 40 80
Scale: 1 INCH = 40 FEET

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CSK3-1.dwg

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
B	RE-ISSUED FOR REVIEW	11/19/09	DPB	MJH	DEC	DEC
A	ISSUED FOR REVIEW	11/04/09	MJH	MJH	DEC	DEC

REFERENCE DRAWINGS

DSGN	MJH	10/28/09
DRN	MJH	10/28/09
CKD	DEC	10/28/09

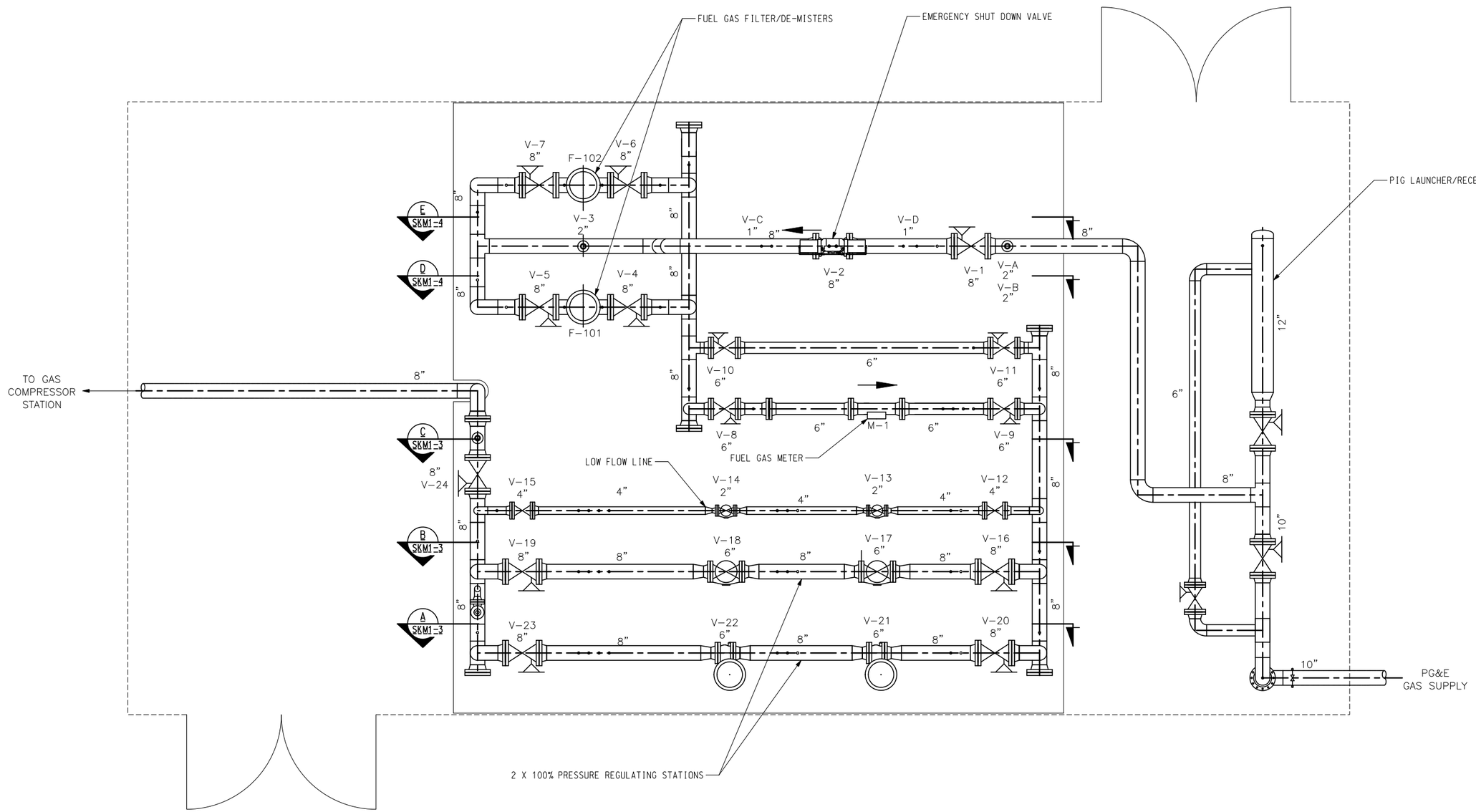
SCALE: 1" = 40'
FOR 22x34 DWG ONLY

POWER ENGINEERS
www.powereng.com

DIAMOND GENERATING CORPORATION
MARIPOSA ENERGY PROJECT
UNDERGROUND PIPING PLAN

JOB NUMBER 114677
REV B
DRAWING NUMBER CSK3-1

Attachment DR29-1
Piping Plan View Metering, Regulating, Pigging Station



THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR INFORMATION	11/4/09	DPB	BDH	KPR	GH

REFERENCE DRAWINGS

DSGN	BDH	11/02/09
DRN	DPB	11/02/09
CKD	KPR	11/02/09

SCALE: 3/8" = 1'-0"

FOR 22x34 DWG ONLY

POWER ENGINEERS
www.powereng.com

DIAMOND GENERATING CORPORATION

MARIPOSA ENERGY PROJECT

PIPING PLAN VIEW
METERING, REGULATING, PIGGING STATION

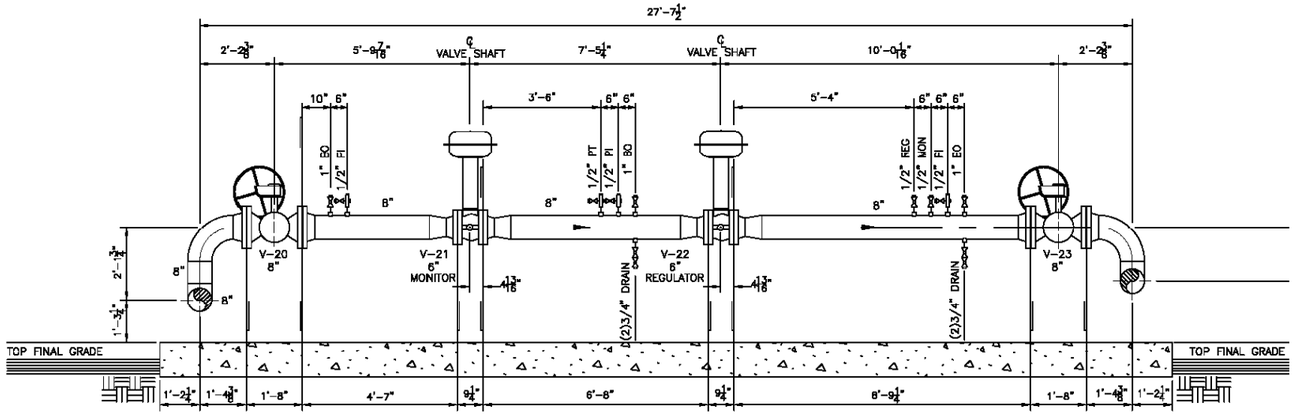
JOB NUMBER 114677

REV A

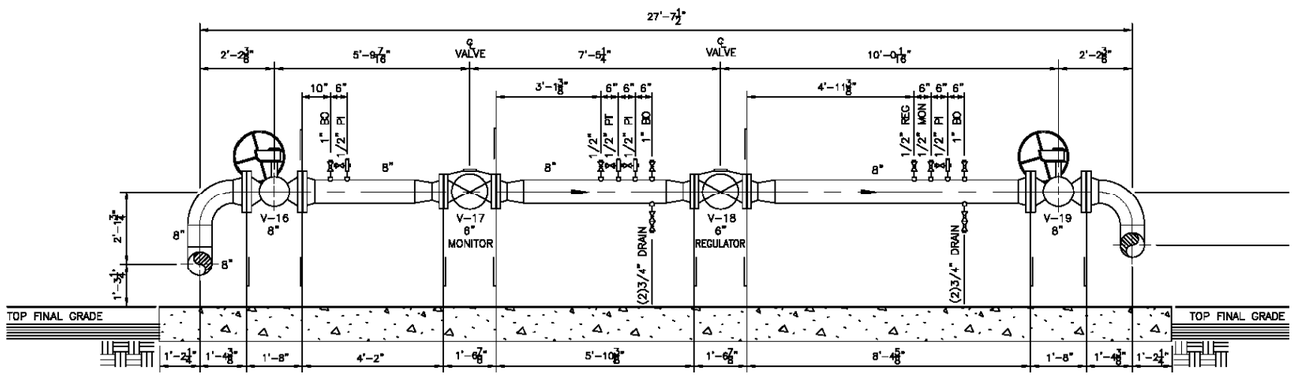
DRAWING NUMBER SKM1-2

P:\114677\DD\CAD\dwg\mech\SKM1-2.dgn 11/5/2009 dbiades

Attachment DR29-2
Piping Plan View Metering, Regulating, Pigging Station



SECTION A



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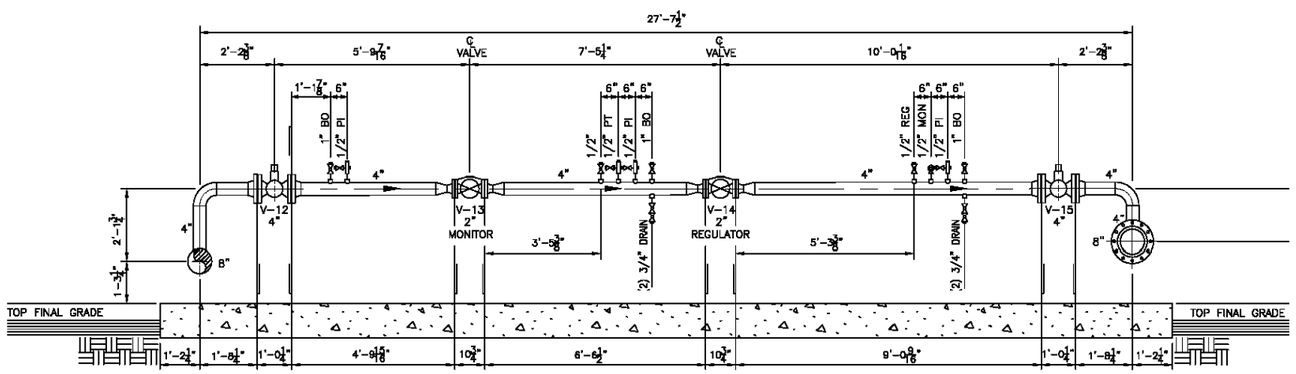

SECTION C

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REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR INFORMATION	11/4/09	DPB	BDH	KPR	GH

REFERENCE DRAWINGS

DSGN	BDH	11/02/09
DRN	DPB	11/02/09
CKD	KPR	11/02/09
SCALE:	NTS	

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DIAMOND GENERATING CORPORATION

MARIPOSA ENERGY PROJECT

PIPING SECTION VIEWS
METERING, REGULATING, PIGGING STATION

JOB NUMBER 114677

REV A

DRAWING NUMBER SKM1-3

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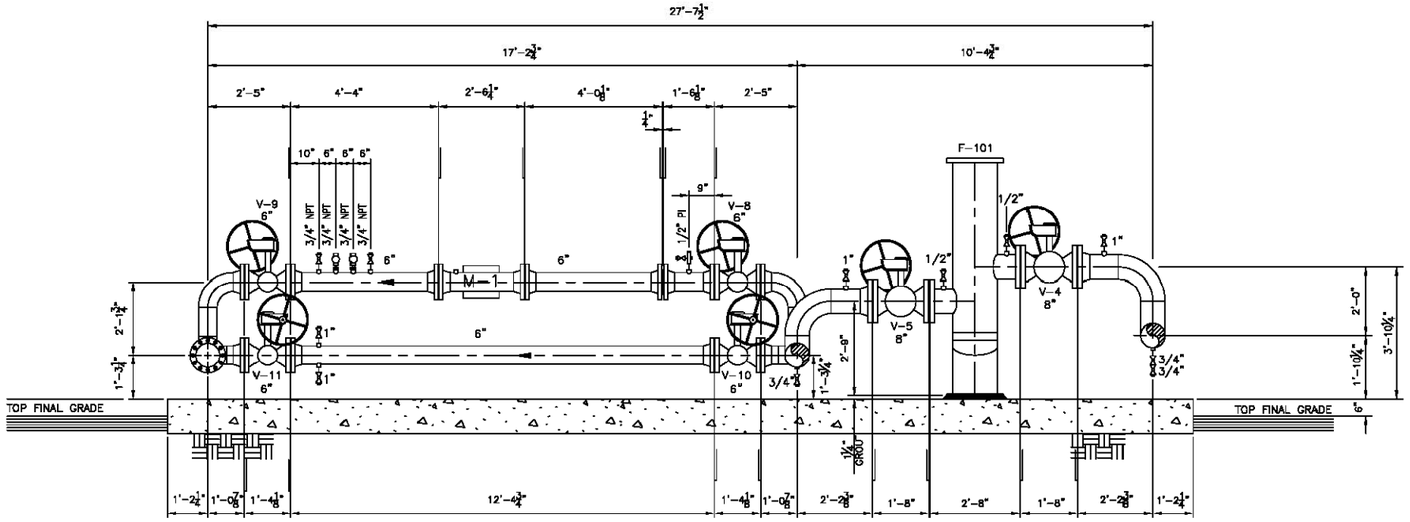
Attachment DR29-3
Piping Plan View Metering, Regulating, Pigging Station



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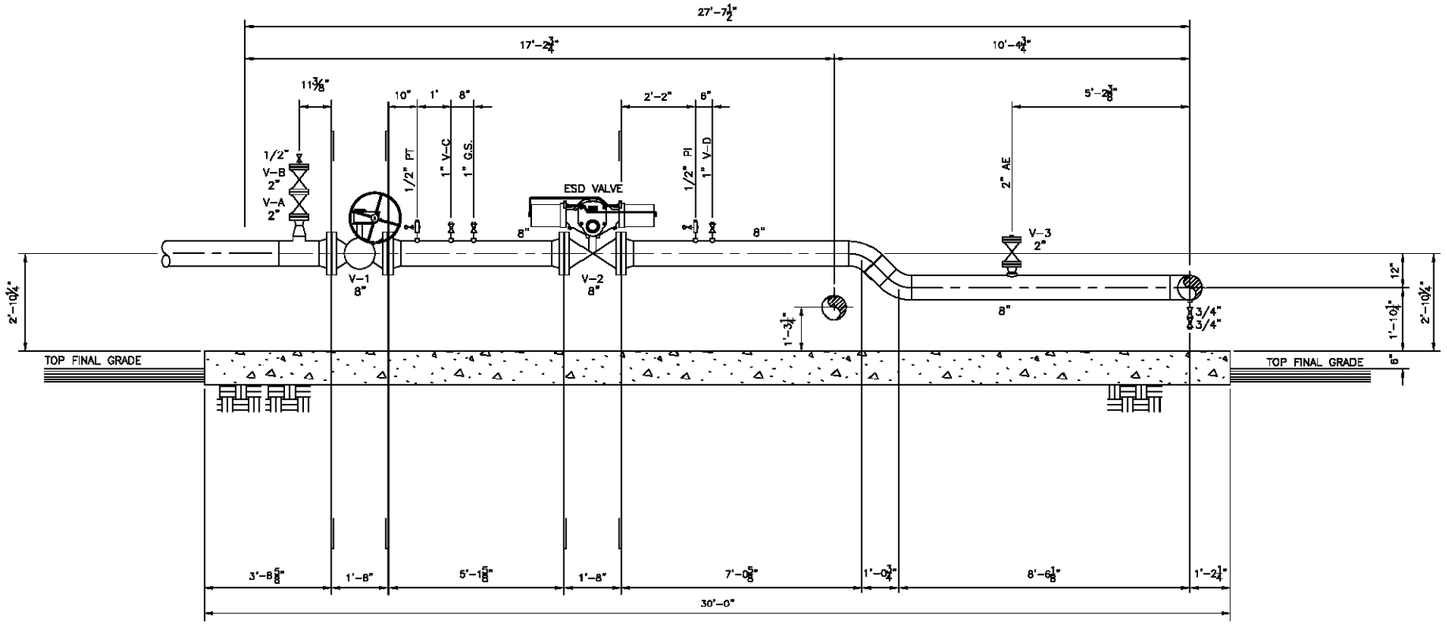

SECTION E

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR INFORMATION	11/4/09	DPB	BDH	KPR	GH

REFERENCE DRAWINGS

DSGN	BDH	11/02/09
DRN	DPB	11/02/09
CKD	GH	11/02/09

SCALE: NTS

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MARIPOSA ENERGY PROJECT

PIPING SECTION VIEWS
METERING, REGULATING, PIGGING STATION

JOB NUMBER 114677

REV A

DRAWING NUMBER SKM1-4

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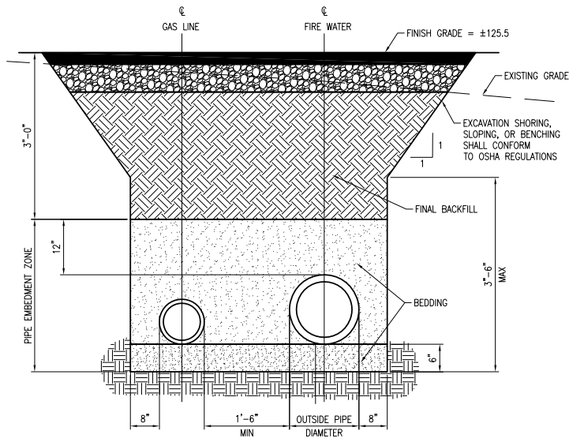
Attachment DR39-1
Underground Piping Sections



SECTION A 110-01
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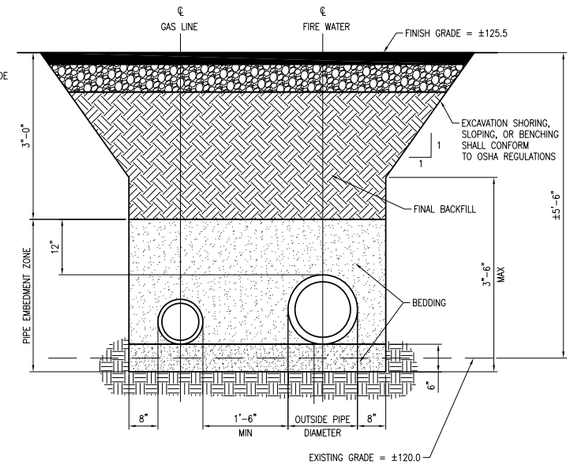

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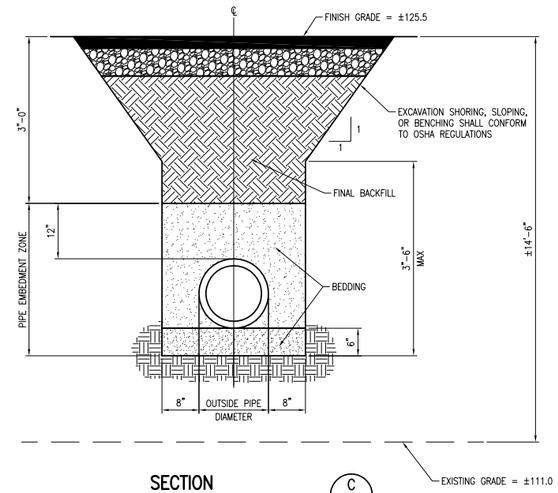

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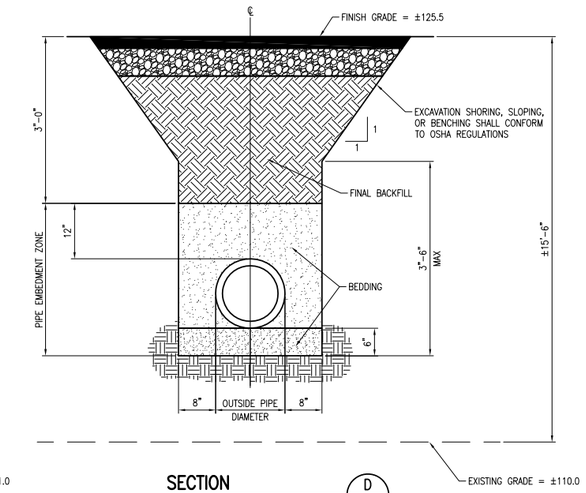

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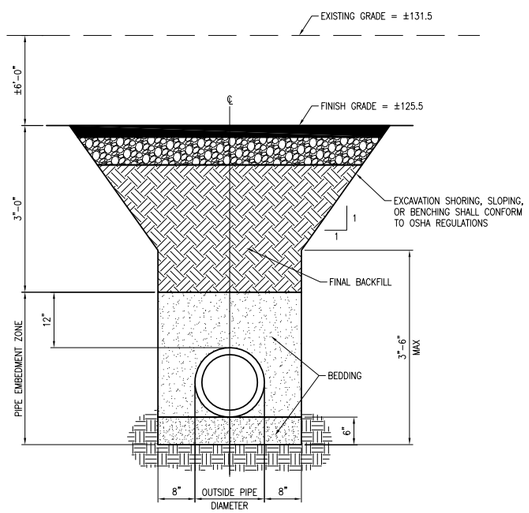

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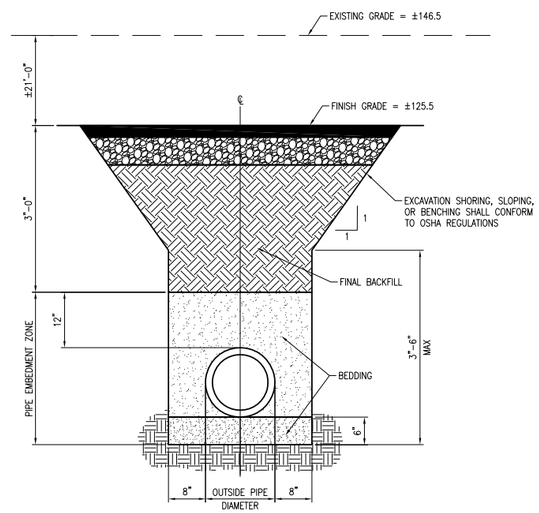

SECTION F 110-01
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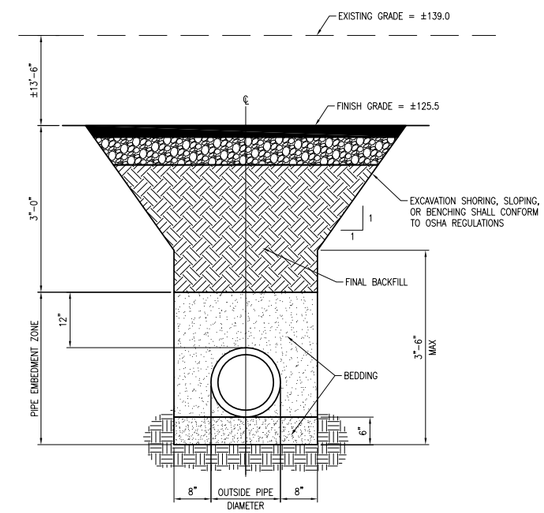

SECTION G 110-01
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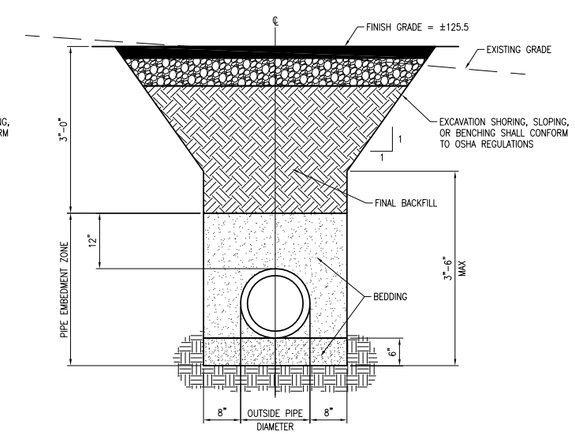

SECTION H 110-01
NTS

CSK3-2.dwg

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REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	11/04/09	MJH	MJH	DEC	DEC

REFERENCE DRAWINGS

DSGN	MJH	10/28/09
DRN	MJH	10/28/09
CKD	DEC	10/28/09
SCALE:	1" = 40'	

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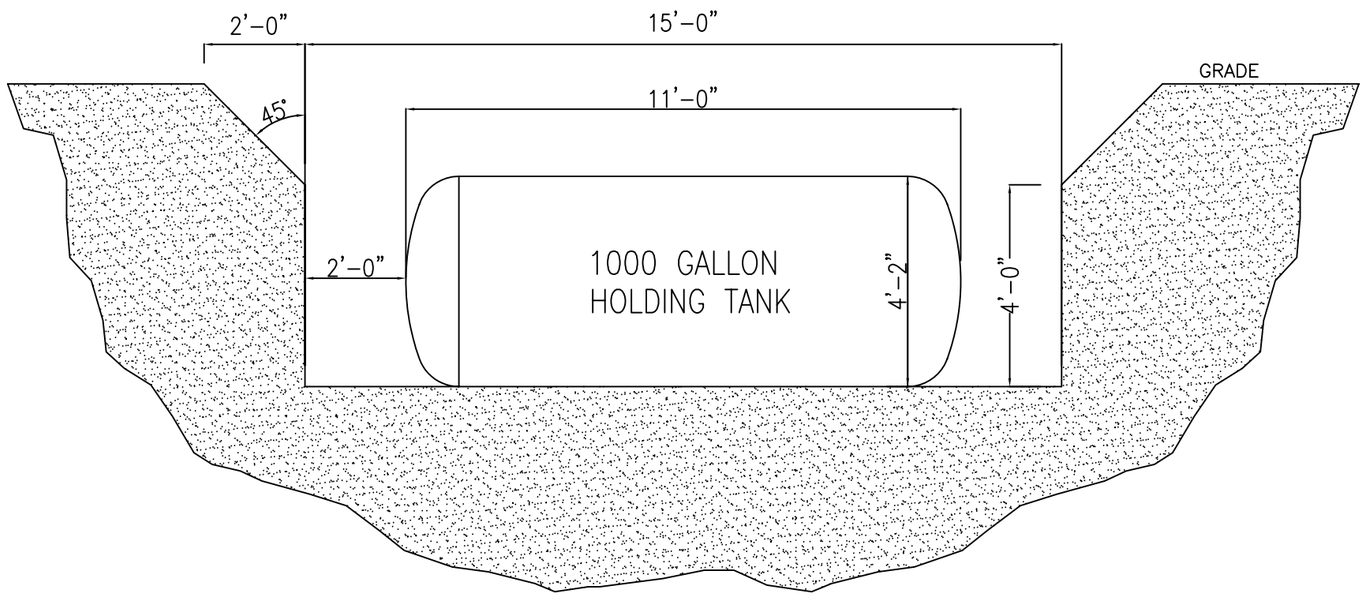
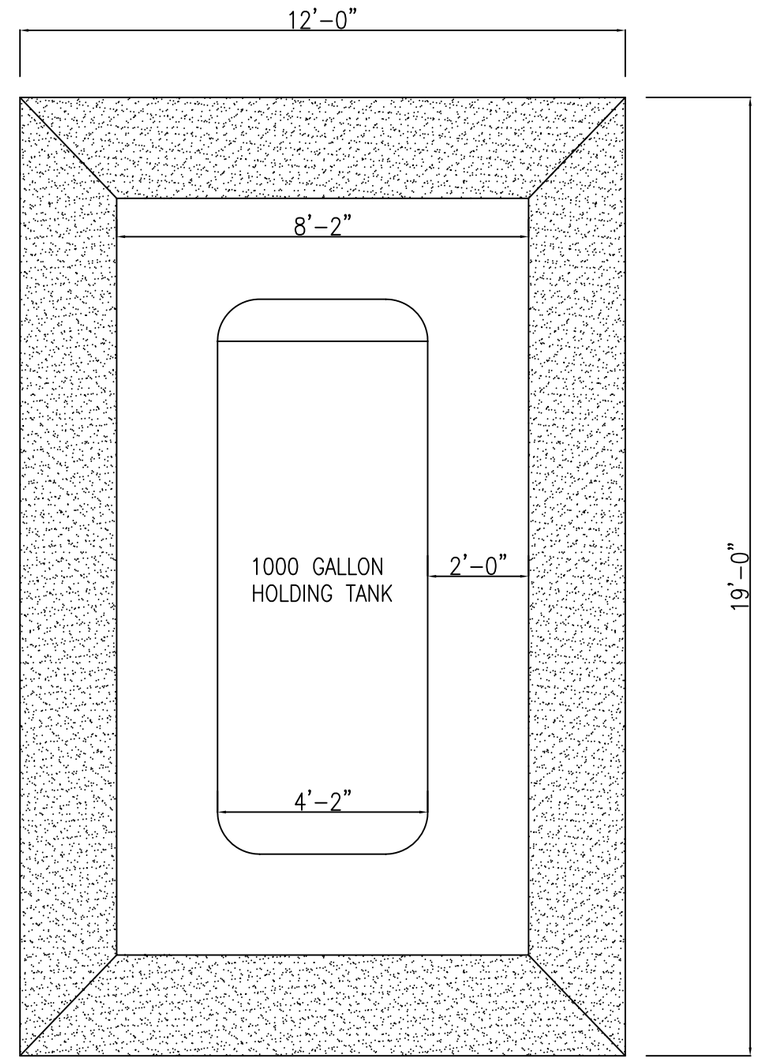
DIAMOND GENERATING CORPORATION
MARIPOSA ENERGY PROJECT
UNDERGROUND PIPING SECTIONS

JOB NUMBER 114677
REV A
DRAWING NUMBER CSK3-2

Attachment DR41-1
Holding Tank Excavation Plan and Profile



PROFILE VIEW



PLAN VIEW

Attachment DR46-1
Geoarchaeologist Qualifications

Jack Meyer

CURRENT POSITION

2006–Present *Principal Geoarchaeologist*, Far Western Anthropological Research Group, Inc.

EDUCATION

1996 M.A. in Cultural Resource Management, Sonoma State University, Rohnert Park, California.

- 1993–1994 Sonoma State University Presidential Scholar.
- Thesis: Geoarchaeological Implications of Holocene Landscape Evolution in the Los Vaqueros Area of Eastern Contra Costa County, California.

1987 B.S. in Sociology and Anthropology (Double Major). Emporia State University, Emporia, Kansas

- Graduated with Distinction
- 1987 National Deans List

SUMMARY OF EXPERIENCE

- More than 15 years of professional experience in California geoarchaeology, prehistoric archaeology, and cultural resources management, including archival research, project coordination, sensitivity assessments, surface survey, subsurface exploration, geochronology, landscape evolution, archaeological excavation and data recovery, artifact analysis, technical reports, and professional publications.
- Conducted studies in Alameda, Amador, Butte, Calaveras, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Inyo, Kern, Lake, Lassen, Los Angeles, Mendocino, Merced, Modoc, Mono, Nevada, Placer, Plumas, Sacramento, Santa Barbara, San Benito, San Bernardino, Santa Barbara, Santa Clara, Santa Cruz, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Shasta, Sierra, Siskiyou, Solano, Sonoma, Tehama, Tulare, Tuolumne, Yolo and Yuba counties.

PROFESSIONAL MEMBERSHIPS

- Register of Professional Archaeologists (RPA #670999-00) since April 1998.
- Society for American Archaeology.
- Geological Society of America - Archaeological Geology Division.
- Society for California Archaeology.

PROFESSIONAL EXPERIENCE

2002–2006 *Geoarchaeology Program Manager* Anthropological Studies Center, Sonoma State University

- Developed, implemented, and administered contracts and supervised personnel for the geoarchaeology program.
- Tracked budgets, developed and drafted research designs, directed and conducted field investigations and laboratory analyses, and wrote and produced technical and management reports.

1997–2002 *Staff Geoarchaeologist and Prehistorian* Anthropological Studies Center, Sonoma State University

- Planned, directed, and conducted archaeological fieldwork and laboratory analyses.
- Wrote archaeological research designs, prehistoric overviews, technical, and management reports.

1995–1997 *Project Coordinator-Geoarchaeologist* Los Vaqueros Prehistoric Archaeological Project, Contra Costa, California.

- Coordinated archaeological field investigations and geoarchaeological laboratory analysis.
- Co-authored data recovery and management reports.

1992–1995 *Project Coordinator Trainee and Research Assistant* Anthropological Studies Center, Sonoma State University

- Conducted archaeological research, field investigations, data recovery, laboratory analysis, and report writing for sites located throughout California.

1993–1994 *Researcher*. Northwest Information Center of the California Historical Resources Information System, Sonoma State University

- Reviewed cultural resource records for project planning, development, and scientific research.

PROFESSIONAL PUBLICATIONS

Meyer, Jack

2004 *Featured Research: Recent Developments in California Geoarchaeology*. The Geological Society of America Newsletter of the Archaeological Geology Division, Volume 26(2):5).

2002 Sections for public interpretive document: *Life along the Guadalupe River - an Archaeological and Historical journey*, edited Rebecca Allen and Mark Hylkema.

2000 Soils and Stratigraphy sections. *In Cross Creek: An Early Holocene/Millingstone Site*, by Richard T. Fitzgerald, pp. 41-45. California State Water Project, Coastal Branch Series Paper Number 12, San Luis Obispo County Archaeological Society.

Rosenthal, Jeffrey S., and Jack Meyer

2004 *Landscape Evolution and the Archaeological Record: A Geoarchaeological Study of the Southern Santa Clara Valley and Surrounding Regions*. Center for Archaeological Research at Davis, Publication, Number 14. University of California, Davis.

TECHNICAL REPORTS (PARTIAL LIST)

Meyer, Jack

2008 *The Prehistory of the Sonora Region: Archaeological and Geoarchaeological Investigations for Stage 1 of the East Sonora Bypass Project, State Route 108, Tuolumne County, California* Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for California Department of Transportation, District 10, Stockton.

2008 *The Potential for Buried Archaeological Resources along Part of State Route 99, Tehama County, California*. Prepared with Far Western Anthropological Research Group for the California Department of Transportation, District 2, Redding, California.

2008 *Geoarchaeological Assessment and Extended Phase I Investigations for the I-280/Winchester Boulevard and I-880/Stevens Creek Boulevard Improvement Project, Santa Clara County, California*. Prepared with Far Western Anthropological Research Group for David Powers & Associates, San Jose, California.

2008 *Extended Phase I Geoarchaeological Studies for the PG&E Line 108 Replacement Project, Sacramento and San Joaquin County, California*. Prepared with Far Western Anthropological Research Group for Pacific Gas & Electric Company, Sacramento California.

2008 *Extended Phase I Archaeological and Geoarchaeological Studies for Site CA-CCO-18/H for the PG&E Line 131 Replacement Project, Eastern Contra Costa County, California*. Prepared with Far Western Anthropological Research Group for Pacific Gas & Electric Company, Sacramento California.

2008 *A Geoarchaeological Overview and Assessment of Caltrans District 3—Cultural Resources Inventory of Caltrans District 3 Rural Conventional Highways*. Prepared with Far Western Anthropological Research Group for the California Department of Transportation, District 3, North Region, Marysville, California.

2007 *Subsurface Geoarchaeological Study for the Proposed Angels Camp Bypass Project Area, State Route 4, Calaveras County, California*. Prepared with Far Western Anthropological Research Group for the California Department of Transportation, District 6, Fresno, California.

2005 *Geoarchaeological Study of Big Lagoon, Lower Redwood Creek, Marin County, California*. Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared with Anthropological Studies Center for National Park Service, San Francisco, California.

2004 Chapters 2 and 3 (Geoarchaeology). In *SF-80 Bayshore Viaduct Seismic Retrofit Projects Report on Construction Monitoring, Geoarchaeology, and Technical and Interpretive Studies for Historical Archaeology*, edited by Mary Praetzellis, pp. 9-24. Prepared with Anthropological Studies Center for California Department of Transportation, District 4, Oakland, California.

2003 *Preliminary Findings of the Big Lagoon Geoarchaeological Coring Program, Lower Redwood Creek, Marin County, California*. Prepared with Anthropological Studies Center for National Park Service, San Francisco, California.

2003 *Savage Way Geoarchaeological Study, State Route 26, Calaveras County, California*. Prepared with Pacific Legacy, Inc. Cameron Park, California, for Caltrans District 10, Stockton, California.

TECHNICAL REPORTS (CONTINUED)

2002 *Geoarchaeological Study for Portions of Lassen Volcanic National Park, Lassen and Shasta Counties, California*. Edited by Greg White, California State University at Chico.

2002 *Phase II Investigations at CA-AMA-56 and Phase 1.5 Investigations at CA-AMA-160 for the Jackson Creek Bridge Project on State Route 88, Amador County*. Prepared with Far Western Research Group for the California Department of Transportation, Central Sierra Environmental Branch, Stockton, California. Eric Wohlgemuth co-author.

2002 Regional Landscape Evolution, Little Lake Valley Landscape History, and Landscape Research Issues. In *General Research design for Archaeological Studies in Little Lake Valley, Mendocino County, California for the Willits Bypass Project*. Prepared with Pacific Legacy for the California Department of Transportation, Marysville, California

2002 *Supplemental Archaeological Survey, Historical Study, and Extended Phase I Report, High Street Overhead Seismic Retrofit Project, in the City of Oakland, Alameda County, California*. Prepared with Anthropological Studies Center Report for the California Department of Transportation (District 4), Oakland, California. Co-authored with Jack McIlroy, Elaine-Maryse Solari, Heidi Koenig, and Maria Ribeiro

2001 *Broadway/Jackson Street Interchange Improvement Project: Archaeological Survey Report, in the Cities of Oakland and Alameda, Alameda County, California*. Prepared with Anthropological Studies Center Report for the California Department of Transportation (District 4), Oakland, California. Co-authored with Heidi Koenig and Jack Mc llroy

2001 *Geoarchaeological and Archaeological Investigations for the Central Freeway Seismic Retrofit Project*. Prepared with Anthropological Studies Center Report for the California Department of Transportation (District 4), Oakland, California. Co-authored with Jack Me Ilroy and Adrian Praetzellis

2001 A Geoarchaeological Study for the Proposed Alameda Highway 238 Widening Project, Alameda County, California. In *Extended Phase I Assessment of Prehistoric Archaeological Site, CA-ALA-586, for the Highway 238 Widening Project*, by Shelly Tiley, Appendix A. Prepared by Archaeological Research Center, California State University, Sacramento for the California Department of Transportation (District 4), Oakland, California.

2001 *Historic Study Report/Phase II Archaeological Evaluation of the Breen Road Site (P-35-000293), San Benito County, California*. Prepared with Anthropological Studies Center Report for the California Department of Transportation (District 5), San Luis Obispo, California. Co-authored with Mark Selverston, Julia G. Costello, and Stephen R. Wee

2000 *A Geoarchaeological Study of the Guadalupe Parkway corridor, State Route 87, San Jose, Santa Clara County, California*. Report prepared for the California Department of Transportation, Oakland, California and KEA Environmental, Inc., San Diego, California.

2000 *An Archaeological Evaluation of CA-CCO-320/H, with Updates for CA-CCO-397 and CA-CCO-544, Los Vaqueros Area, Contra Costa County, California*. Anthropological Studies Center, Sonoma State University, Rohnert Park, California, Prepared for the Contra Costa Water District, Concord, California.

TECHNICAL REPORTS (CONTINUED)

2000 Environmental History, Landscape Evolution, Prehistoric Site Reports, and NRHP Evaluation sections. In *Phase II Archaeological Investigation of CA-CAL-636H, -789, -1679/H, -1679 State Route 4, Calaveras County, California*. Co-authored with Michael D. Meyer, and Suzanne B. Stewart.

2000 Environmental Setting and Geoarchaeological Study sections. In *Phase II Archaeological Test Excavations at CA-SCR-313, Highway 17, Santa Cruz County, California*. Co-authored with Deborah A. Jones and Jeffrey S. Rosenthal of Far Western Research Group, Davis, CA.

2000 Portions of Theoretical and Methodological Context, Site Reports, Project Chronology and Components, and Synthesis sections. In *Final Report of the Anderson Flat Project, Lower Lake, Lake County, California: Volume I*. Prepared by Greg White for the California Department of Transportation, District 1, Eureka, California

1999 *Preliminary Geoarchaeological Study at Green Valley Creek, Solano County, California*. William Lettis and Associates, Walnut Creek, California. Co-authored with John N. Baldwin (Paleoseismology study)

1999 *Report on Phase II Geoarchaeological Investigation ofCA-YUB-1157, Beak Air Force Base, California* (Preliminary Draft). Pacific Legacy, Aptos, California. Prepared for United States Air Force, Air Combat Command, Beak Air Force Base, California. Co-authored with Janet P. Eidsness.

1998 *Results of Archaeological Investigations for the Proposed Trancas Street Interchange Drainpipe Project, Napa County, California*. Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for Caltrans District 4, Oakland, California. Co-authored with Todd Jaffke.

1998 Geoarchaeological Investigation of Portion of the Proposed Hayward Bypass Corridor, Alameda County, California. In *Results of Archaeological Test Excavations at CA-ALA-566 for the Proposed Route 238 Hayward Bypass Project*, edited by Glenn Gmoser, pp. 67-99. Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for Caltrans District 4, Oakland, California.

1996 *Results of Subsurface Archaeological Survey of the Los Vaqueros and Transfer Pipeline Routes, Los Vaqueros Project, Contra Costa County, California*. Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for the Contra Costa Water District, Concord, California.

Meyer, Jack, and Graham Dalldorf

2005 *The Potential for Buried Archaeological Resources in the Lake Oroville Facilities Relicensing Area, Butte County, California*. (DRAFT) Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for California Department of Water Resources.

2004 *Geoarchaeological Investigation in the Parks Reserve Forces Training Area, Alameda and Contra Costa Counties, California*. Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for U.S. Army West Coast Garrison.

TECHNICAL REPORTS (CONTINUED)

Meyer, Jack, and Graham Dalldorf (continued)

2004 *Geoarchaeological Investigations for Stage 2 of the East Sonora Bypass Project, State Route 108, Tuolumne County, California*. Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for California Department of Transportation, District 10, Stockton.

Meyer, Jack, and Jeffrey S. Rosenthal

1997 *Archaeological and Geoarchaeological Investigations at Eight Prehistoric Sites in the Los Vaqueros Reservoir Area, Contra Costa County. In Los Vaqueros Project Final Report,* Prepared by the Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Submitted to the Contra Costa Water District, Concord. Report on file, Northwest Information Center, Sonoma State University, Rohnert Park, California.

1998 *An Archaeological Investigation of Artifacts and Human Remains from CA-CCO-637, Los Vaqueros Project Area, Contra Costa County, California*. Anthropological Studies Center, Sonoma State Academic Foundation, Inc., Rohnert Park, California. Submitted to Contra Costa Water District, Concord, California, Rohnert Park, California.

2007 *A Geoarchaeological Overview for the Nine Bay Area Counties of Caltrans District 4. Far Western Anthropological Research Group, Davis, California*. Prepared for California Department of Transportation, District 4, Oakland, California.

Rosenthal, Jeffrey, and Jack Meyer

2004c Bodie Hills Obsidian Hydration Rates. In Middle Holocene Adaptations in the Central Sierra Nevada Foothills: Data Recovery Excavations at the Black Creek Site, CA-CAL-789. Far Western Anthropological Research Group, Inc., Davis, California. Submitted to California Department of Transportation, District 06, Fresno.

2004 *Cultural Resources Inventory of Caltrans District 10 Rural Conventional Highways, Volume III: Geoarchaeological Study, Landscape Evolution and the Archaeological Record of Central California*. Far Western Anthropological Research Group, Davis, California. Prepared for California Department of Transportation, District 10, Stockton.

Rosenthal, Jeffrey S., Jack Meyer, Jim Nelson, Denise Furlong, Tim Carpenter, and Eric Wohlgemuth

2006 *Results of Limited Geoarchaeological and Archaeological Study of CA-CCO-18/548, John Marsh Historic Park, Brentwood, California*. Far Western Anthropological Research Group, Inc., Davis, California. Prepared for California Department of Parks and Recreation.

PROFESSIONAL PRESENTATIONS

1993 Society for California Archaeology Annual Meeting, Asilomar, California.

- Paper title: *Geoarchaeological Investigations at Anderson Flat*.

1994 Society for California Archaeology Annual Meeting, Ventura, California.

- Paper title: *The Depositional History of Late Quaternary Alluvial Basins and the Visibility of the Archaeological Record*

1996 Society for California Archaeology Annual Meeting, Bakersfield, California.

- Paper title: Seeing is believing: The Problem and Promise of Subsurface Sites.

1997 Society for California Archaeology Annual Meeting, Rohnert Park, California.

- Organized Symposium title: *The Los Vaqueros Project: Prehistory and Ethnohistory in the Shadow of Diablo*.
- Paper title: *Geoarchaeology in the Design and Construction of the Los Vaqueros Project.*
- Paper title: *The Natural Evolution of Composite Cultural Landscapes.*
- Paper title: *Archaeological Landscape Evolution in the Los Vaqueros Area.*

2000 Conference title: Beneath Our Feet: A 10,000 Year Human and Natural Legacy in the East Bay, at the Oakland Museum of California, 18 November 2001.

- Presentation title: *More Than 9,000 Years Ago.*

2001 Society for California Archaeology Annual Meeting, Modesto, California.

- Plenary Session title: *A Space Odyssey - Escaping the Gravity of Earth*.
- Paper titled: *Needles, Haystacks, and Old Dirt: A Geoarchaeological View of Buried Archaeological Landscapes.*

2003 Joint Session of the Pacific Soil Scientists Association of California (PSSAC) and the Society for California Archaeology (SCA) Annual Meeting, Sacramento, California, March 2003.

- Session title: *PSSAC/SCA Soils and Archeology.*
- Symposium Paper title: *Talking Dirt: Uses and Past Abuses of Soil and Geologic Studies in California Archaeology.*

2007 Society for California Archaeology (SCA) Annual Meeting, San Jose, California, March 2007.

- Plenary Session: *What Lies Beneath San Jose?*

Attachment DR47-1
Geoarchaeological Assessment

GEOARCHAEOLOGICAL ASSESSMENT OF BURIED SITE POTENTIAL FOR THE MARIPOSA ENERGY PROJECT

Jack Meyer MA, RPA
Senior Geoarchaeologist
Far Western Anthropological Research Group, Inc.
Davis, California

November 2009

INTRODUCTION AND BACKGROUND

As requested by CH2M Hill and the Diamond Generating Corporation (Subsidiary of Mitsubishi Corporation), Far Western Anthropological Research Group, Inc developed this geoarchaeological assessment of the proposed Mariposa Energy Project (MEP). The assessment was prompted in part by concerns that some project-related construction activities (i.e., earth disturbances) may have the potential to encounter and impact previously unidentified buried archaeological deposits that are "too deep to present surface manifestations," based on a formal data request from the California Energy Commission (CEC). Given this, the CEC requested additional information regarding "the age, the structure, and the character of the geologic units beneath the surface of the project area to evaluate the project's potential to substantially and adversely change the California Register of Historic Resource eligibility of archaeological deposits that may lie buried in the areas where MEP construction could impact them."

Recognizing these issues, this study, (1) explicitly outlines a research approach designed to distinguish landforms that may contain buried sites from those that may not, (2) provides information about landscape evolution and known buried sites in the region, (3) assesses the potential for buried sites in specific segments of the project area, and (4) offers recommendations about the need for further work.

Research Approach

Among the many issues that challenge archaeologists and cultural resources managers is the problem of locating buried archaeological sites, such as those covered by naturally deposited sediments or deposits of artificial fill. While some parts of the landscape have remained relatively stable over the span of human occupation (~13,000 years), many other portions were either removed by erosion (mainly uplands), or buried by the deposition of sediments (mainly lowlands). Many former land surfaces once used and occupied by prehistoric people have been buried, disturbed, or destroyed by these processes, along with any associated archaeological deposits. Consequently, the present landscape is at best an indirect and imperfect reflection of the environment used by people during the prehistoric and even historical eras. Since it is the responsibility of archaeologists to account for the entire archaeological record, it is important to assess both the large- and small-scale effects of landscape evolution to help insure that buried sites are identified and appropriately sampled.

Simply stated, there is an inverse relationship between landform-age and the potential for buried archaeological deposits. This is based on the principal that archaeological deposits cannot be buried within landforms that developed prior to human colonization of North America (Rosenthal and Meyer 2004a, 2004b), nor can they be buried in landforms that were non-depositional or subject to net erosion over the past 13,500 years. Thus, as a first step, landforms with the potential to contain buried sites must be distinguished from those that are either too old or too young to contain them. While this basic distinction addresses the <u>possibility</u> for buried sites, the relative <u>potential</u> or <u>probability</u> for buried sites depends largely on the age different landforms.

For example, early Holocene surface landforms probably have a low potential for buried sites, not because such sites are absent, but simply because they can only contain sites that were buried during the latest Pleistocene or earliest Holocene over a relatively short 2,000- or 3,000-year interval of time (i.e.,

the Paleo-Indian and Paleo-Archaic periods). In addition, the likelihood that people occupied any one spot on the landscape was limited by the density of human populations, which are thought to have been comparatively low at that time. Thus, only a small number of sites were created by the region's first inhabitants over a relatively brief time. Consequently, the probability of finding one of these sites within or below an early Holocene surface landform is drastically reduced by these factors.

The same logic applies to the sensitivity of all subsequent Holocene-age depositional landforms. The buried potential of younger surface landforms is elevated by three main factors: (1) archaeological deposits from later time periods are more common because the density of human populations increased over time; (2) Holocene-age depositional landforms commonly overlie older land surfaces (i.e., buried soils) that were exposed for a greater amount of archaeological time than those buried by older landforms; and (3) young depositional landforms can contain multiple Holocene-age buried soils that represent periods when they were available for human use. From this perspective, the longer that a landform remained at the surface, the greater the chance that it was occupied by people. It follows then that the chance for buried archaeological materials is elevated when landforms are buried later in time.

Because buried sites typically lack visible or obtrusive features that would indicate their presence to an observer in the field, most are not found by conventional pedestrian surface surveys (Bettis 1992:120). If it is accepted that buried sites "are probably always underrepresented in survey samples" (Nance 1983:349), then the difficulty of locating these sites can be treated as a fundamental sampling problem to be addressed at the inventory and research design phases (McManamon 1984).

Regional Landscape Evolution

As described by Meyer (1996) and Meyer and Rosenthal (1997, 2007), the landscape in eastern Contra Costa and Alameda Counties has been altered and shaped by a complex sequence of region-wide environmental changes. Over the past 15,000 years, central California has experienced the widespread effects of sea level rise, substantial climatic fluctuations, repeated flooding, and erosion of the uplands and deposition in the lowlands. Relatively short episodes of landform instability (i.e., erosion/deposition) and longer periods of landform stability (i.e., soil formation), were accompanied by localized changes in the size and position of streams and other water sources, and presumably in the types and distributions of associated plant and animal habitats and human settlements. Specifically, several geoarchaeological studies along the nearby Kellogg Creek in the Los Vaqueros Reservoir area and Marsh Creek suggest that major episodes of alluvial deposition occurred in the eastern Diablo Range sometime between about 15,000 and 9500 cal BP, 9500 and 4000 cal BP, and again after 1500 cal BP, separated by prolonged periods of landform stability (Rosenthal and Meyer 2009). Consequently, if sites more than 1,500 years old are located in the project area they may be buried by one or more episodes of deposition within the floodplains that comprise the lowland areas.

Since the last major pulse of deposition occurred in the latest Holocene, the current landscape reflects a significant "geologic bias" where younger sites tend to occur at or near the present surface, and older (>1500 cal BP) sites tend to be buried, especially within the valleys of the region. The timing and widespread extent of these recent landscape changes has severely limited the ability of archaeologists to identify and sample a substantial and conceivably important part of the archaeological record (e.g., Meyer and Rosenthal 2007, 2008; Rosenthal and Meyer 2004a, 2004b); a problem further exacerbated by artificial landscape modifications in some areas. These processes either promoted or discouraged the burial of once habitable land surfaces, and the preservation or destruction of any associated archaeological materials.

Because of this, buried archaeological deposits are not distributed randomly, but are confined to those portions of the landscape where sediments were deposited during the span of human occupation (i.e., during the latest Pleistocene and Holocene). With this basic understanding, the search for buried sites can generally be narrowed to Holocene-age depositional landforms, allowing the older portions of the landscape to be confidently excluded from consideration.

Buried Sites in the Northern Diablo Ranges

Numerous buried sites and site components have been identified in the interior valleys of the northern Diablo Range. In the San Ramon Valley, buried components have been found at both CCO-30 and CCO-308 in association with middle-to-late Holocene paleosols (Fredrickson 1966, 1968). The same sequence of buried soils was found at CCO-431, a subsurface site along Walnut Creek (Banks et al. 1984). Probably the most famous buried archaeological site in the Walnut Creek-San Ramon drainage is that of "Concord Man" (CCO-147). This site produced several deeply buried human graves originally thought to have great antiquity. Although it was originally thought to be associated with an old soil, artifacts from the site suggest the burials were emplaced no more than about 2,500 years ago (cf. Bennyhoff and Fredrickson 1994; Heizer 1950; Jones 1992). More recently deeply buried and stratigraphically separate middle and late Holocene components were discovered at CCO-309, where a very late site deposit was known to occur at the surface (Price et al. 2006).

Not far west of the project area, in the Amador-Livermore Valley, buried sites have been recorded at 11 locations on the western end of the floodplain near Arroyo de la Laguna and Arroyo las Positas Creek. Buried components at these sites range in age between 6,100 and 600 years (Rosenthal and Byrd 2006). Just northeast of the Amador-Livermore Valley, the Los Vaqueros Reservoir locality contains the longest documented sequence of human occupation in the San Francisco Bay Area. In this drainage basin, buried archaeological deposits ranging between 9,900 and 700 years old are contained in both early and middle Holocene-age paleosols that formed in alluvial fan and floodplain deposits along Kellogg Creek (Meyer and Rosenthal 1997).

Closer to the project area near the western margin of the Central Valley, buried early and middle Holocene-age soils and cultural deposits have been identified in the Marsh Creek floodplain (Rosenthal and Meyer 2009; with those at the John Marsh House site (CCO-18/548) being the most substantial (Meyer and Rosenthal 2008b; Rosenthal et al. 2006). Farther east, buried site components are recorded at CCO-146, -147 and -368. All of these sites appear to be late Holocene in age and are associated with buried soils that formed on or adjacent to sand mounds around the margins of the Sacramento-San Joaquin Delta (Cook and Elsasser 1956; Holson et al. 1993; Waechter et al. 1995).

This brief review of buried sites in the East Bay Area demonstrates the potential for such deposits in virtually all of the lowland valleys of this region. As many of these constitute the oldest known archaeological deposits in the Bay Area, their research potential is quite high, and therefore these sites tend to have elevated levels of significance with respect to National Register of Historic Places eligibility criteria. The presence of human remains at most of these sites also has implications for Native American heritage and further emphasizes the need to identify such resources early in the planning process.

GEOARCHAEOLOGICAL ASSESSMENT

Since it is necessary to know something about the age and nature of the landforms exposed at the proposed project area, this section provides information about the geology, geomorphology, and soils in the project area that are relevant for estimating buried site potential.

Project Area Geology, Geomorphology, and Hydrology

The project area is located in the northeast corner of Alameda County and the southeast corner of Contra Costa County about 7 miles northwest of Tracy, California. This area is situated at the interface between the rolling hills of Northern Diablo Range to the west, composed of Cretaceous-age sedimentary rocks of the Great Valley sequence, and the lowlands of the San Joaquin Valley and Delta region to the east (Figure 1), composed of alluvial deposits that are Quaternary in age (Graymer et al. 1996). The hills are drained by several small unnamed streams that intermittently flow eastward to the valley. Due to the rain shadow (orographic) effect created by Mount Diablo, the project area receives

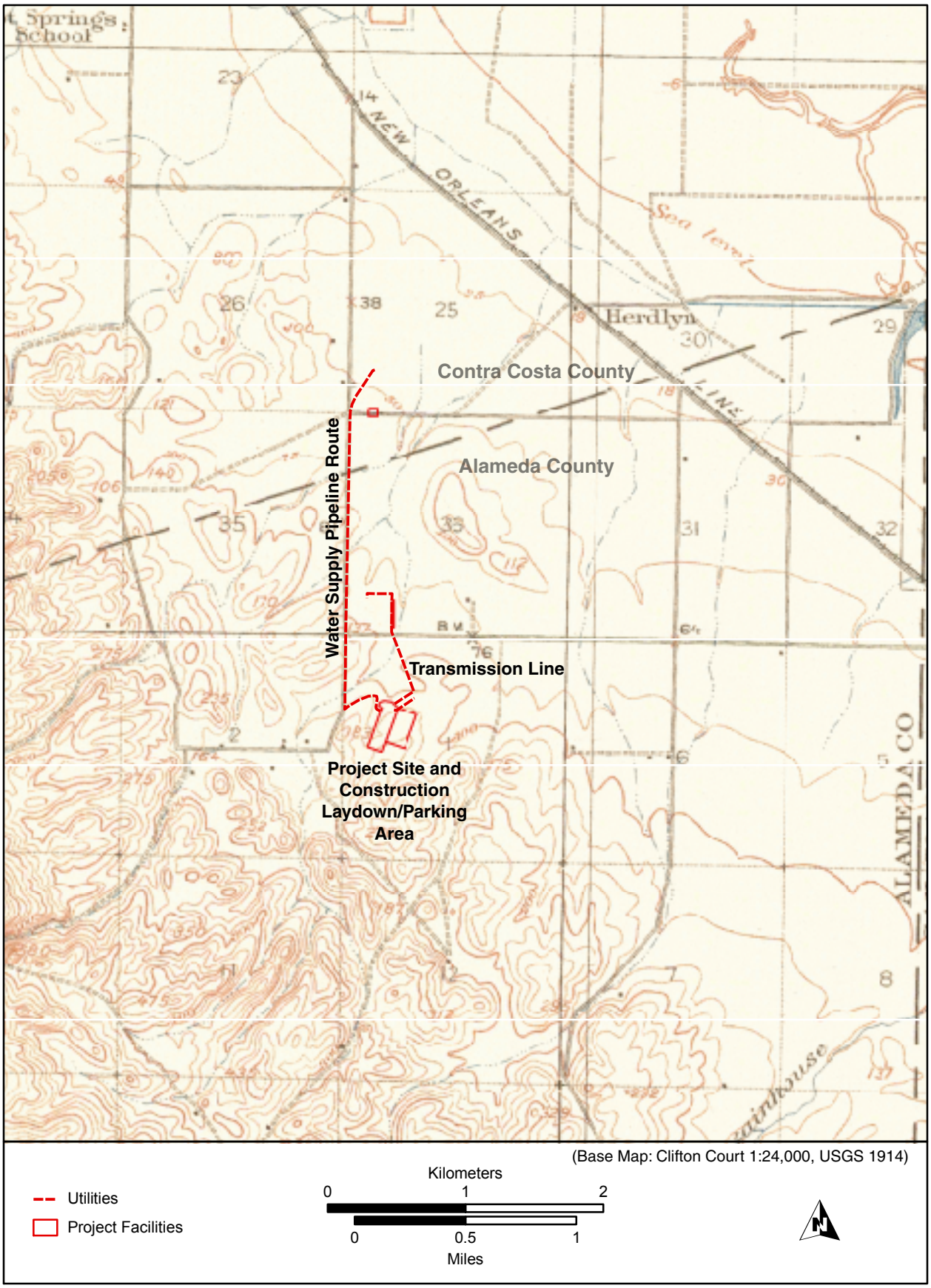


Figure 1. Location of Mariposa Energy Project Area and 1914 Topography.

only 10 to 20 inches of average annual precipitation. Since the summers tend to be hot and dry, annual evaporation rates normally exceed annual rainfall amounts. Consequently, there are no permanent or semi-permanent watercourses in or near project area because very little surface run-off reaches the local drainages. As discussed below, the lack of substantial Holocene-age alluvial deposits within the area's drainages is a further reflection of this semi-arid climatic pattern.

As shown in Figure 2 the proposed project area crosses a large area mapped as latest Pleistocene alluvial fan deposits (Qpf), and one much smaller area mapped as early to late Pleistocene pediment deposits (Qop?) for which the identification is uncertain (Knudsen et al. 2000). It should be noted that the ages of these units is based mainly on their relative geomorphic position and soil development, and not on absolute dating techniques such as radiocarbon. The lack of temporal resolution is problematic for studies that need to understand how the nature and timing of landscape changes may have affected the structure and visibility of the archaeological record. Thus, the following section addresses this need by providing empirical data about the actual age of particular soils and landforms.

Project Area Soils

A depositional landform map was created using the Soil Survey Geographic (SSURGO) digital soil database from the Natural Resource Conservation Service (2008). The SSURGO-data are an exact duplication of the original soil surveys mapped at a 1:24,000 Though designed primarily for natural resource planning and management, SSURGO-level data have previously been used to develop reasonably detailed maps of depositional landforms, including those created for geoarchaeological sensitivity studies elsewhere in central California (Meyer and Rosenthal 2008a; Rosenthal and Meyer 2004a, 2004b) and other states (Monaghan and Lovis 2005).

Based on the SSURGO-data, five different soil series have been mapped at the surface of the proposed project area, with the Altamont and Linne series found in upland areas underlain by pre-Quaternary bedrock, and the San Ysidro, Solano, and Rincon series found in the lowland areas (Figure 3). The Altamont series, which underlies portions of the Project Site, are well-developed upland soils formed on bedrock. The central and southern portions of the project area are mapped as the Linne soil series, which are formed on bedrock in upland and foothill settings. Since both are associated with pre-Quaternary-age bedrock, these soil bodies have virtually no potential for buried sites because they formed on erosional landforms that pre-date the arrival of people to the continent.

Soils of the San Ysidro series occur at the surface in the southern and northern portions of the project area and a large portion of lowlands along the northern portions (Figure 3). This well-developed soil formed on older fans and low terraces that are at least latest Pleistocene in age. The Solano-series soil occurs on nearly level low terraces and hummocky surfaces in the lowland portions of the project area. The landscape position and well developed nature of this soil suggest that it is at least latest Pleistocene in age. While these soils are associated with depositional landforms, their potential to contain buried sites is very low because they were deposited before people arrived in the region.

Soils of the Rincon series occur in a bedrock swale or small valley in part of the Project Site (Figure 3). These moderately well-developed soils are formed mainly on alluvial fans. The maximum age of this series is constrained by a radiocarbon date of 10,490 ±60 BP, or 12,480 cal BP (Beta-261296) from a buried soil along Bird Creek in Yolo County (Kaijankoski and Meyer 2009), and by a date of 10,010 ±70 BP, or 11,180 cal BP (Beta-85996) from a buried soil along nearby Kellogg Creek in southeast Contra Costa County (Meyer and Rosenthal 1997). Thus, Rincon-series soils are not latest Pleistocene-age as suggested by the mapping of Knudsen et al. (2000), but are early Holocene-age instead. Since landforms with these soils were deposited soon after people entered the region, their potential to contain buried sites is estimated to be low.

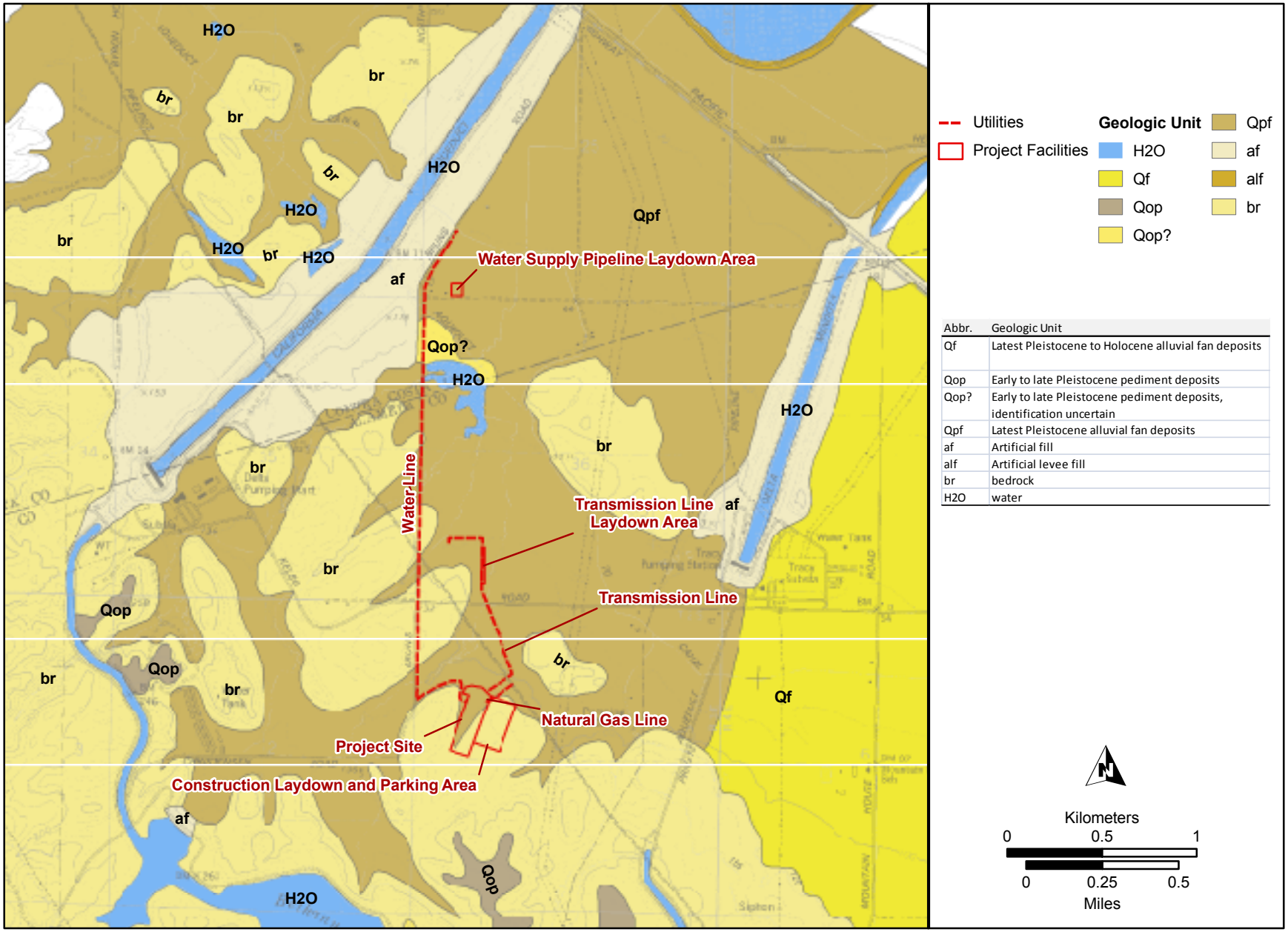
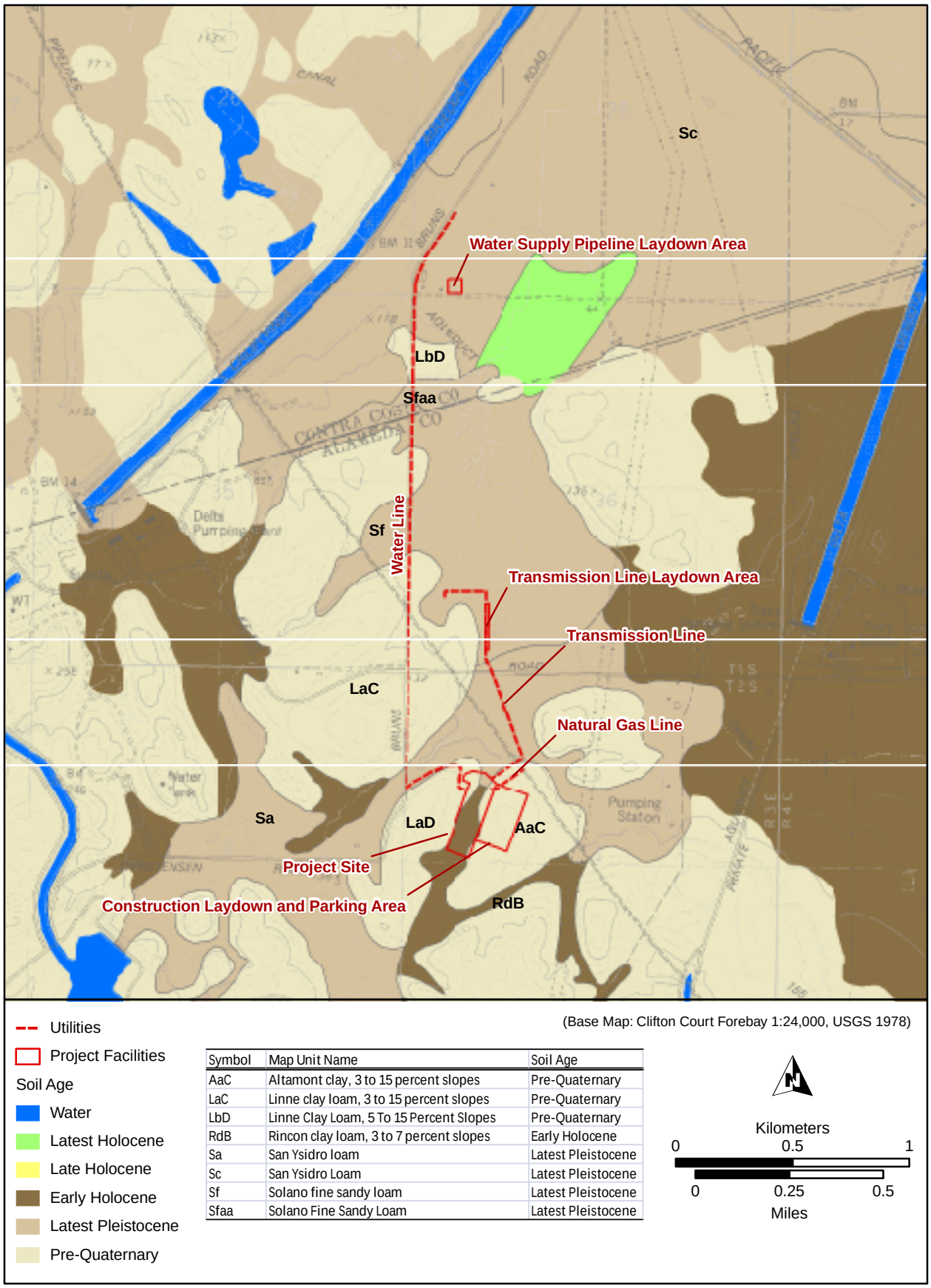


Figure 2. Distribution and Age of Quaternary Surface Deposits in the Mariposa Energy Project Area (adapted from Knudsen et al. 2000)



Symbol	Map Unit Name	Soil Age
AaC	Altamont clay, 3 to 15 percent slopes	Pre-Quaternary
LaC	Linne clay loam, 3 to 15 percent slopes	Pre-Quaternary
LbD	Linne Clay Loam, 5 To 15 Percent Slopes	Pre-Quaternary
RdB	Rincon clay loam, 3 to 7 percent slopes	Early Holocene
Sa	San Ysidro loam	Latest Pleistocene
Sc	San Ysidro Loam	Latest Pleistocene
Sf	Solano fine sandy loam	Latest Pleistocene
Sfaa	Solano Fine Sandy Loam	Latest Pleistocene

Figure 3. Estimated Landform-Ages Based on Surface Soil Types in the Mariposa Energy Project Area

A small area of Brentwood-series soils occur at the surface series approximately 1000 feet east/south of the northern portion of the Water Supply Pipeline Route (Figure 3). This soil has been shown to be latest Holocene in age based on radiocarbon dates from the Kellogg Creek floodplain in southeast Contra Costa County (Meyer and Rosenthal 1997). Thus, the only known Holocene-age depositional landform in the project area is the small area of Rincon soils found at the Project Site. The significance of the soil-landform relationships for specific project components is discussed below.

Buried Site Potential of Project Components

Water Supply Pipeline Route

A proposed water supply pipeline extends north along Bruns Road for approximately 1.6 miles from the Project Site. Since the pipeline crosses landforms that are either pre-Quaternary or latest Pleistocene in age (Table 1), there is a very low potential that any buried sites will be impacted by the excavation of the pipeline trench. While it is possible that some small areas of unidentified Holocene-age alluvium may occur within one or more of the several unnamed, ephemeral watercourses crossed by the pipeline, such deposits will likely occur as inset terraces that are restricted to channels down cut (eroded) into the older landforms. Thus, it is probable that erosive activity within the channel either removed and/or redeposited any prehistoric archaeological deposits that may have been located in these settings.

Transmission Line and Lay down Area

This transmission line extends from the Project Site for approximately 0.6 miles to the north following an irregular route. This line crosses only pre-Quaternary and latest Pleistocene-age deposits, indicating there is a very low potential to impact buried archaeological sites in these areas (Table 1). The transmission line also crosses an unnamed, ephemeral drainage where isolated pockets of Holocene-age alluvium, but as discussed above, the potential for intact buried archaeological materials is very low in these deposits.

Table 1. Landform Age, Extent, and Buried Site Potential of Project Components.

PROJECT COMPONENT	PRE-QUATERNARY	LATEST PLEISTOCENE	EARLY HOLOCENE	TOTAL ACRES	% OF TOTAL ACRES
BURIED SITE POTENTIAL	*VERY LOW*	*VERY LOW*	*LOW*		
Project Site	3.34	0.57	5.78	9.69	31.3%
Construction Laydown/Parking	9.19	-	0.06	9.25	29.9%
Natural Gas Pipeline Route	0.45	-	-	0.45	1.5%
Transmission Line Laydown Area	-	0.60	-	0.60	1.9%
Transmission Line Route	0.26	2.51	-	2.77	9.0%
Water Supply Laydown Area	-	1.00	-	1.00	3.2%
Water Supply Pipeline Route	3.70	3.48	-	7.18	23.2%
Grand Total	16.94	8.15	5.84	30.93	100.0%
% of Total Acres	54.8%	26.4%	18.9%	100.0%	

Notes: Area based on actual extent of project component polygons, with a 5-meter (15 feet) buffer added to linear components.

Project Site and Construction Lay down/Parking Area

The majority of the Project Site is to be situated on part of a small swale/valley that contains the early Holocene deposits associated with the Rincon-soil series (Figure 3). A small area of latest Pleistocene-age deposits associated with the Solano-soils series is located at the northeast end of the swale and Project Site. The alluvial deposits within the swale/valley are flanked by pre-Quaternary upland soils associated with soils of the Altamont and Linne series. The construction lay down/parking

area and portion of the natural gas pipeline are located entirely within the pre-Quaternary deposits in the uplands southeast of the Project Site.

The evidence at hand suggests there is a possibility that archaeological deposits could be buried within the area of early Holocene-age Rincon soils, but not elsewhere at the Project Site or within the construction laydown/parking areas. However, the likelihood that a site is actually buried in the swale/valley is considered to be low because, (1) the early Holocene sediments were deposited only a few thousand years after the region was first occupied by people, and (2) there is no viable water source (e.g., spring or stream channel) located within the swale/valley, nor does there appear to have been one in the past. Furthermore, preliminary grading and drainage plans indicate that construction activities will not fully remove the deposits from the swale/valley, but that only small segments will be cut, grubbed, or graded before the swale/valley is filled to an elevation of approximately 125 feet with materials removed from the pre-Quaternary hillside east of the site. The grading and drainage plans also show that there is not potential for buried sites to be impacted by construction of a proposed detention basin at the northwest end of the Project Site because, (1) it will be located within the latest Pleistocene (Solano series) portion of the swale/valley, and (2) the base of the basin will not extend below the surface of the original grade.

RECOMMENDATIONS FOR FURTHER WORK

This assessment indicates the majority of the proposed project area has a very low potential to contain buried archaeological sites. There is, however, a small portion of the Project Site (early Holocene Rincon soils) the potential for buried sites is slightly elevated, yet remains low (Figure 3). Thus, if the natural deposits in this area are disturbed by project-related earth moving there is small chance that a buried archaeological site could be impacted as a result. Given that the project should comply with the requirement that "a reasonable and good faith effort to carry out appropriate identification efforts" is made to identify archaeological resources [Section 106 800.4(b)(1)], the following recommendations are provided to help insure that potentially buried sites are identified, avoided, and/or properly sampled as needed:

- It is recommended that project designs be reviewed to determine if impacts will be occurring below the existing grade in low lying portions of the small swale/valley where the Project Site will be located. If the natural deposits in this area will not be impacted no further archaeological studies or identification efforts, including construction monitoring, are recommended. If subsurface impacts in this area cannot be avoided the following recommendations apply.
- At minimum, it is recommended that the possibility for late archaeological discoveries is specified as part of the construction bid package, and that the construction contract requires the contractor(s): (1) to inform all field personnel of this possibility; (2) to halt excavations immediately within ten meters (~33 feet) of a potential archaeological find; and (3) to allow a qualified professional archaeologist to examine and evaluate the find to determine if it warrants further treatment or not.
- If it is imperative to insure that the project schedule (critical path) and budget are not inadvertently affected by a late archaeological discovery, then a limited (1-2 day) subsurface exploration should be conducted in the area where the early Holocene-age Rincon soil occur at Project Site. Exploratory testing for buried archaeological sites has become an important part of the initial identification process in California and across the country (Monaghan et al. 2006). The ability to locate buried sites in the project area depends on whether or not appropriate methods are properly used to explore sensitive landforms. Based on independent tests of backhoe trenching, coring and auguring; and geophysical survey (resistivity, magnetometry, and ground-penetrating radar) methods, backhoe trenching was found to be the most effective way of identifying buried archaeological sites (Monaghan et al. 2006; Monaghan and Lovis 2005); a finding

reinforced by the author's experience in working throughout California. Since the thickness of the early Holocene deposits are likely less than 4 meters (~12 feet), a backhoe would be the most appropriate method for identifying potentially buried sites in the project area.

- If exploratory studies are not conducted prior to construction, then a qualified professional archaeologist should be retained to actively monitor project-related ground disturbing activities in the sensitive portion of the Project Site. The archaeological monitor should be required to be present before and during any substantial earth disturbances (i.e., trenching or grading) can be performed in the sensitive area to (1) help maximize the opportunity for archaeological discovery, (2) insure that potentially important cultural resources are not impacted, (3) conduct "real-time" preliminary assessments of any finds, and (4) facilitate and re-direct on-going construction activities by providing initial recommendations for the appropriate treatment of any finds. The archaeological monitor should be required to keep detailed records that document their daily activities, observations, decisions, and the presence or absence of any archaeological materials. If archaeological materials are discovered in a particular area, then it may be prudent to explore and/or monitor some adjoining areas, whether or not they were predicted to have the potential for buried sites.
- Finally, it may be possible to stop archaeological monitoring, at least temporarily, if and when it is determined that the Holocene-age deposits have been removed and that only pre-latest Pleistocene deposits will be impacted by further excavations. At the same time, no archaeological monitoring is needed or warranted in the remaining portions of the project area because the potential for buried sites in pre-latest Pleistocene deposits is very low.

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Geological Hazards and Resources (50)

Background

Potential geological hazards include ground shaking and rupture due to seismic activity along faults, which can have a significant effect on the operation of the proposed facility. The development of this project must include an analysis of seismic shaking and potential fault rupture. In order to properly assess the potential impact of such hazards on a project, the location of known faults, their potential to rupture, and the associated ground motions related to such activity must be examined. The AFC for the project states that the Great Valley fault is located approximately at the site, but also that no known faults cross the site and the likelihood of ground rupture is considered low.

Data Request

50. Please verify the location of the Great Valley fault with respect to the project site, and provide a thorough and accurate discussion of its potential to impact the site with respect to ground motion and rupture.

Response:

In 5.4.1.2.3 Major Faults on page 5.4-7 of the AFC, the text for the Great Valley fault incorrectly identifies the fault as underlying the MEP site. The fault does not underlie the site. The location of the closest segments of the fault are identified correctly in Table 5.4-1 of the AFC. As such, the AFC already provides an accurate discussion of the potential ground motion and rupture. Revised text for the Great Valley Fault description on page 5.4-7 of the AFC is provided below.

Great Valley Fault

The Great Valley Fault generally extends from near Red Bluff in northern California to Buttonwillow, northwest of Bakersfield in the southern San Joaquin Valley. The Great Valley Fault is subdivided into various segments, the closest of which are approximately 22 miles to the north of the MEP site (Segment 5) and 6 miles to the south of the site (Segment 7). Segments 5 and 7 have MCEs of Mw 6.5 and Mw of 6.7, respectively (CH2M HILL, 2009).

Traffic and Transportation (51-55)

Background

In the traffic and transportation section of the AFC (pg. 5.12-20), there is a statement that an FAA Form 7460-1, Notice of Proposed Construction or Alteration was filed with the FAA for the exhaust stacks and highest transmission tower (Appendix 5.12B). The applicant believed this filing was necessary because the project is located 2.7 miles southeast of the Byron Airport. The forms were accepted by the FAA on May 29, 2009. Since almost four months have passed, it is possible that the FAA has released a Determination of No Hazard to Navigable Airspace. Staff would like to review this Determination.

Data Request

51. Please provide a copy of any Determination by the FAA. If none has been received please provide an estimate as to when the document will be released.

Response:

FAA has issued a Determination of No Hazard to Air Navigation for each of the four exhaust stacks and 8 transmission poles associated with MEP. Copies of these Determinations are included in Attachment DR51-1.

In the Determinations for the four exhaust stacks, FAA Flight Standards Division addressed the issue of thermal plumes and provided the following recommendations:

- MEP is encouraged to work with the Byron Airport authority to develop pilot education material for local distribution identifying the location of the MEP facility and provide information on plume efflux rates at various altitudes at least as high as 1000 feet above the source.
- It is also suggested that the Byron Airport authority, through the FAA Airports District Office (ADO) provide the MEP location and avoidance information in the listing for Byron Airport contained in the Airport/Facility Directory (AFD).

Background

On pg 5.12-13, it is noted that the Byron Airport is located 2.7 miles northwest of the Mariposa (MEP) site and during a 12-month period ending on January 29, 2004, the Airport had an average of 164 aircraft operations per day. It is also noted that the MEP site is located within the airport's influence area. There is additional discussion on pg. 5.12-19 about the MEP site location with respect to instrument and visual flight paths as displayed on Figure 5.12-5. Staff is interested in potential aviation safety impacts from MEP exhaust plumes during operations on aircraft using the Byron Airport.

Data Request

52. Please provide a copy of any aviation safety analysis that was performed to determine if there would be any adverse impacts from MEP plumes on aircraft flying overhead. If no analysis is available, please prepare one and submit it for staff's review.

Response:

In response to Data Request 52, Mariposa Energy has provided (1) information on Byron Airport established flight patterns, (2) a quantitative thermal plume velocity assessment, and (3) an aviation safety risk analysis prepared by the Federal Aviation Administration for aircraft overflight of power plant exhaust plumes. Mariposa Energy is in the process of developing additional information which will be submitted as it becomes available. MEP will not have a significant adverse impact on aviation safety at Byron Airport as discussed below.

Byron Airport Flight Patterns are too Distant From MEP to Pose a Risk to Aviation

Mariposa Energy carefully considered potential impacts to Byron Airport during the initial site selection process. Potential sites that were in close proximity to the airport or in flight paths were rejected on this basis without further consideration. The proposed MEP site is approximately 2.7 miles southeast of Byron Airport, and not in close proximity to established flight patterns for the airport.

MEP is not in close proximity to the approach to Runway 30, Byron Airport's main precision instrument runway, and would therefore not have the potential to create a hazard to aircraft on an instrument landing. As depicted in Figure DR52-1, the approach centerline to Runway 30, is located approximately 1.0 mile from the MEP site; the closest boundary of this approach is approximately 0.65 miles from MEP at the nearest point. For missed approaches, aircraft are instructed to turn right (away from the MEP site) and climb to 3,000 feet (see Attachment DR52-1).

Likewise, aircraft departing on Runway 12 should not fly over the MEP project site. The takeoff procedures for Runway 12 (Attachment DR52-2) instruct pilots to climb with a left turn, which would be generally towards the east away from the MEP site. If pilots did not follow these procedures and of their own accord executed a "right 45" following takeoff from Runway 12, the flight path would pass approximately 5,000 feet west of the MEP site, as shown in Figure DR52-2. Based on a normal takeoff flight speed of 75 miles per hour and climb rate of 500 feet per minute, aircraft would be at an elevation of approximately 1,150 feet above mean sea level when they pass closest (5,000 feet to the west) to MEP. In order for an airplane to fly over the MEP site after executing a "right 45" from Runway 12, the aircraft would need to follow the runway centerline for approximately 7,500 feet beyond the end of the runway prior to executing the turn. At a normal takeoff flight speed of 75 miles per hour, the pilot would need to fly for more than a minute beyond the runway prior to executing the turn to fly over the MEP site. This would not be a typical flight pattern. If, however, the pilot did execute this flight pattern and flew in the direction of MEP, he or she should follow the recommended FAA "see and avoid" procedures.

Figure DR52-3 presents the range of possible 45-degree entries into both Runways 5 and 23. The closest of these potential approach paths is approximately 4,400 feet from MEP at the nearest point. This illustrates that pilots following required landing instructions for Byron Airport would not be in close proximity to MEP, especially since it is recommended that the 45-degree approach be toward the center of the landing pattern. Furthermore, Aircraft Advisory Circular 90-66A (Attachment DR52-3) Paragraph 8.b. states, "entry to the downwind leg should be at a 45-degree angle abeam the midpoint of the runway."

Based on the above it is evident that Byron Airport Flight Patterns are too distant from MEP to be of significant concern to aircraft approaching or departing from Byron Airport, and even if an aircraft were to venture into the air space over MEP, it is highly unlikely that the pilot would ever experience more than light turbulence.

MEP Thermal Plume Assessment Results Indicate Plumes Would Never Exceed Light Turbulence Level, Would Rarely Exceed 4.3 m/s At Pattern Altitude And Are Not A Cause For Aviation Safety Concern

Mariposa Energy retained Katestone Environmental to perform a vertical plume velocity assessment for MEP (Attachment DR52-4). This assessment is based on the guidelines for aviation safety set out by the Australian Civil Aviation Safety Authority (CASA) and presented in "Guidelines for conducting plume rise assessments (CASA, 2004)." In Australia, CASA requires that the developer of a proposed project with an exhaust plume that has an average vertical velocity exceeding the limiting value (4.3 meters per second [m/s]) at the Obstacle Limitation Surface or at 110 meters above ground level anywhere else) to assess the potential hazard posed by the plume to aircraft operations. CASA's Advisory Circular provides a recommended methodology that adopts a mathematical model named The Air Pollution Model (TAPM) to conduct plume rise assessments for single exhaust plumes. The CASA Advisory Circular does not specify a method to account for interactions between multiple plumes but allows for the use of alternative techniques to address this phenomenon. Katestone Environmental has developed a method that uses the TAPM vertical winds or a calm wind case to assess the average plume vertical velocity and extent due to two or more plumes.

This assessment determined the height at which the average vertical plume velocity emitted from MEP would achieve the Australian screening threshold value of 4.3 m/s (9.6 miles per hour [mph]) and the upper limit of light turbulence (Lester 2007) of 6.09 m/s (13.63 mph) under local meteorological conditions.

Katestone Environmental reported the following conclusions in their assessment:

- The average plume vertical velocities generated by MEP are unlikely to exceed the threshold of 4.3 m/s (9.6 mph) above a height of 1132 feet above ground level.
- The average plume vertical velocities generated by MEP are unlikely to exceed the light turbulence threshold of 6.09 m/s (13.6 mph) above a height of 564 feet above ground level.
- At the Byron Airport Flight Pattern Altitude of 950 feet above ground level, or 1076 feet above mean sea level, the average plume vertical velocity is predicted to be above 4.3

m/s (9.6 mph) for 26[2] hours of the year, and never above the velocity of 6.09 m/s (13.6 mph).

- The average plume vertical velocities are likely to be below 4.3 m/s (9.6 mph) under all meteorological conditions at any horizontal distance beyond 313 feet from the MEP stacks.
- The average plume vertical velocities are likely to be below 6.09 m/s (13.6 mph) under all meteorological conditions at any horizontal distance beyond 115 feet from the MEP stacks.

The conclusions of the Katestone study are significant because that study establishes that vertical plumes above the Australian screening threshold at Byron Airport pattern altitude are extremely rare (incidence is less than 26 hr/yr or 0.3 percent) and the probability of an approaching or departing aircraft using Byron Airport to be in the immediate vicinity of MEP would also be extremely rare, since the published patterns are a considerable distance from MEP as noted above. In order for an aircraft to be subjected to vertical plumes at the screening threshold from MEP, the pilot would have to ignore published traffic pattern directives, choose to fly directly over MEP (a violation of standing Notice to Airmen (NOTAM) requiring pilots to avoid such facilities) and do so during one of the 26 hours per year when vertical plumes are the highest. The possibility of simultaneous occurrence of all of these is virtually zero and thus the possibility of Bryon air traffic being subjected to plumes of even a light turbulence level is virtually nil.

FAA Safety Risk Analysis of Aircraft Overflight of Industrial Exhaust Plumes (FAA 2006) Concluded That The Risk Associated With Plume Is Deemed Acceptable Without Restriction, Limitation or Further Mitigation

The FAA study (Attachment DR 52-5) was conducted by 11 FAA subject matter experts under the auspices of the Flight Procedures Standards Branch, Flight Technologies and Procedures Division. These experts represented various disciplines including aviation safety, risk analysis/assessment, human factors, aeronautical engineering, air traffic control, statistical analysis, and military/civil and commercial aviation operations. The methodology used was the FAA Safety Risk Management process contained in the FAA Safety Management System. It is a rigorous process that exhaustively examines:

- Description of presumed safety issues
- Identification of potential hazards
- Risk analysis
- Risk assessment
- Mitigation of risk

As part of the risk analysis/assessment, the team studied 30 years (1975-2004) of General Aviation aircraft accident data representing more than 849 million flight hours. During this study period, not one single accident or incident could be attributed to overflight of a thermal industrial plume. The FAA concluded that the accident/incident rate for overflights

[2] Page 5, paragraph 5 of the Katestone Report states that the average vertical plume velocity is predicted to be above 4.3 m/s at 1,076 feet above mean sea level for 17 hours per year. This value excludes the 0.1 percentile (9 hours per year) acceptable risk level used in the CASA evaluation process. Therefore the analysis predicts that the average vertical plume velocity will be above 4.3 m/s at 1,076 feet above mean sea level for a total of 26 hours per year (17 hours plus 9 hours).

of exhaust plumes is on the order of 1 in a billion, 100 times less than the target level of safety established by the FAA.

In their human factors assessment, the FAA Subject Matter Expert team concluded that 1) power plant exhaust plumes do not present an immediate or critical increase in human mental or physical workload, 2) like any phenomenon in the navigable air space, pilots need to be properly armed with the knowledge that it exists, 3) pilots should be prepared to see and avoid power plant exhaust plumes (stacks) just as they would be prepared to see and avoid any obstacle in their flight path, and 4) FAA expects that "any plume encounter would be a relatively benign event."

The FAA risk analysis team concluded:

"Given the virtually non-existent accident/incident safety data by either GA or commercial aviation pilots, the team was extremely confident in drawing the preliminary inference that hazard(s) associated with plume overflight represent **an extremely low risk to aviation** and the flying public."

As a result, the FAA deemed the risk associated with overflight of plumes to be "acceptable without restriction, limitation or further mitigation."

In order to make an already safe condition even safer, the FAA team recommended continuance of training and awareness programs that have been successful with similar hazards of acceptable risk. Among these are the recommendations that the position of power plants located near public airports be published in the Airport/Facility Directory (A/FD) and that a Notice to Airmen be issued. Although, as the FAA Study concludes, there is no need for further mitigation of this potential hazard, MEP would support the recommendations contained in the FAA Study that the location of MEP be published in the A/FD and a NOTAM be issued referencing this listing.

Background

Staff will complete a plume velocity analysis and needs additional data for the chiller radiator system to complete this analysis.

Data Request

53. Please provide the maximum total heat rejection for the chiller radiator system.

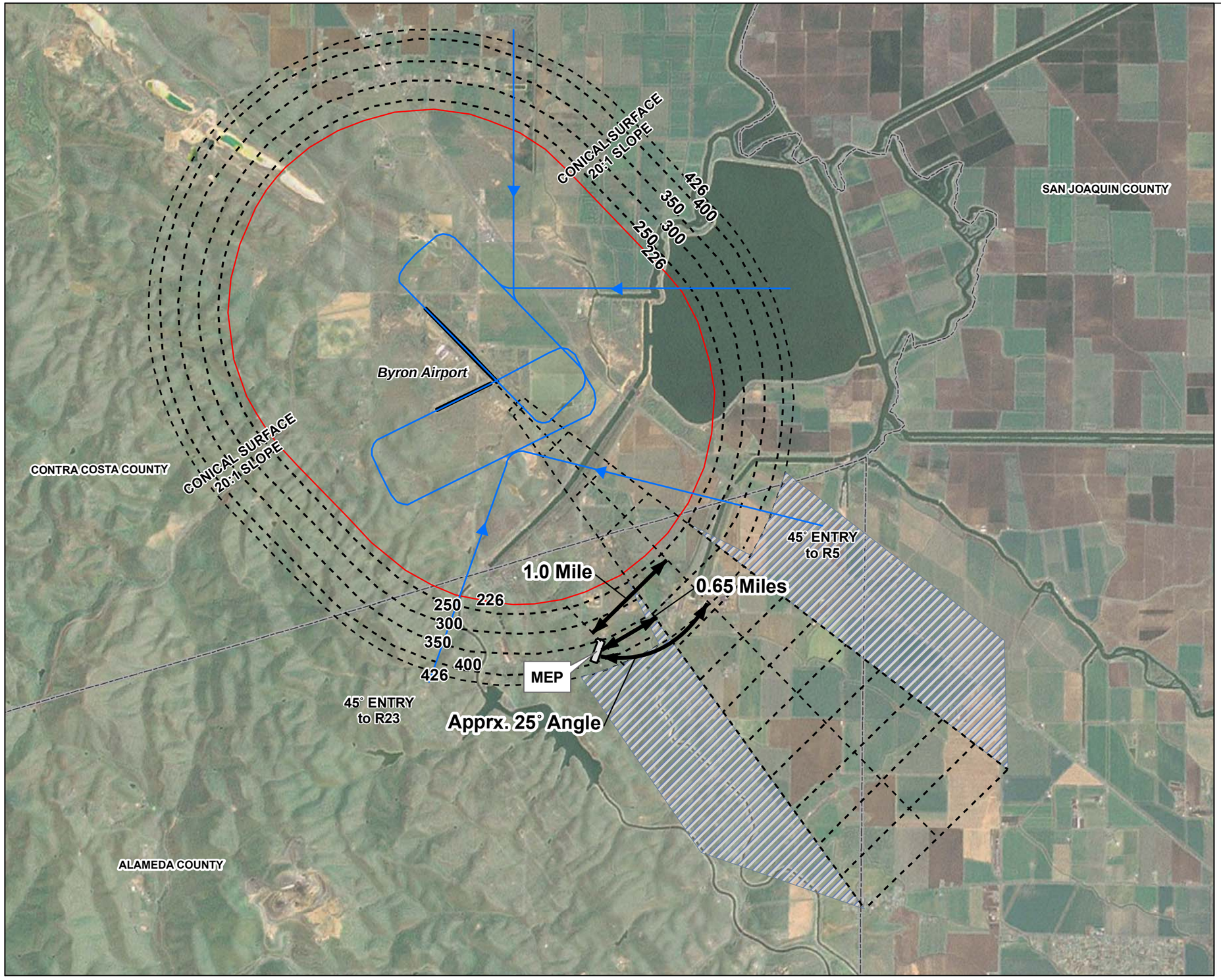
54. Please provide the heat rejection as a function of temperature, either as an equation or provide heat rejection at the following two ambient temperatures: 59°F and 93°F.

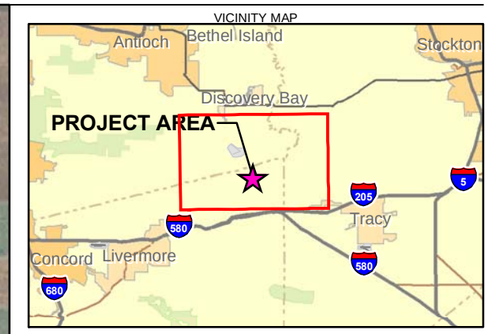
55. Please provide the air flow rate through the chiller radiator system when operating at maximum heat rejection.

Response:

A processes flow diagram for the chiller system is provided as Attachment DR53-1; heat rejection rates for varying temperatures are presented on the diagram. The maximum heat rejection rate would be 112,460,000 BTU/hr at 107.3 degrees Fahrenheit. The air flow rate

through the chiller radiator system when operating at maximum heat rejection would be 155,875 acfm per fan, for a total of 4,988,000 acfm for the 32 fans. The radiator system will consist of four rows of eight fans, as shown on the revised equipment layout drawing included in Attachment DR55-1.





LEGEND

- VISUAL FLIGHT PATHS

SURFACE ZONES

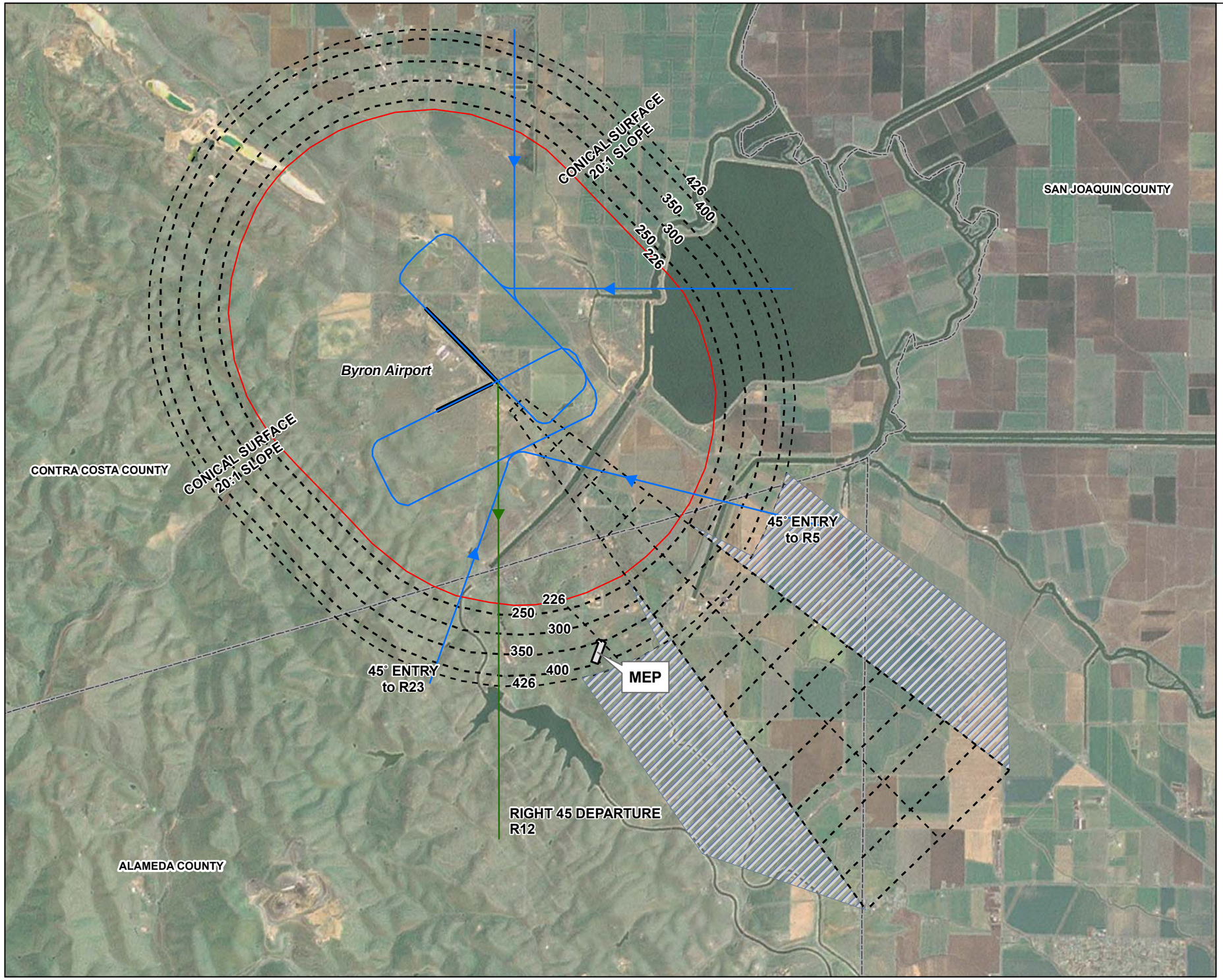
- APPROACH
- CONICAL SURFACES
- RUNWAY
- TRANSITIONAL ZONES
- PROJECT SITE

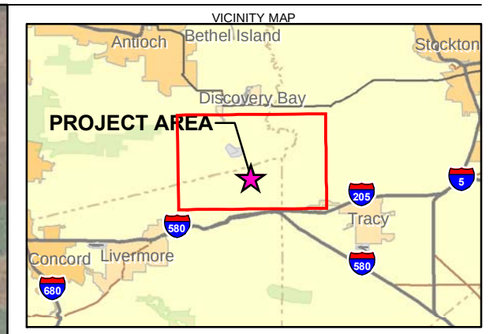
This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 2,500 5,000
Feet

FIGURE DR52-1
BYRON AIRPORT RUNWAY 30 APPROACH
BYRON AIRFIELD





LEGEND

- VISUAL FLIGHT PATHS
- RIGHT 45 DEPARTURE (R12)

SURFACE ZONES

- APPROACH
- CONICAL SURFACES
- RUNWAY
- TRANSITIONAL ZONES
- PROJECT SITE

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

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Feet

FIGURE DR52-2
BYRON AIRPORT RUNWAY 12
45° TAKE OFF
BYRON AIRFIELD

CH2MHILL

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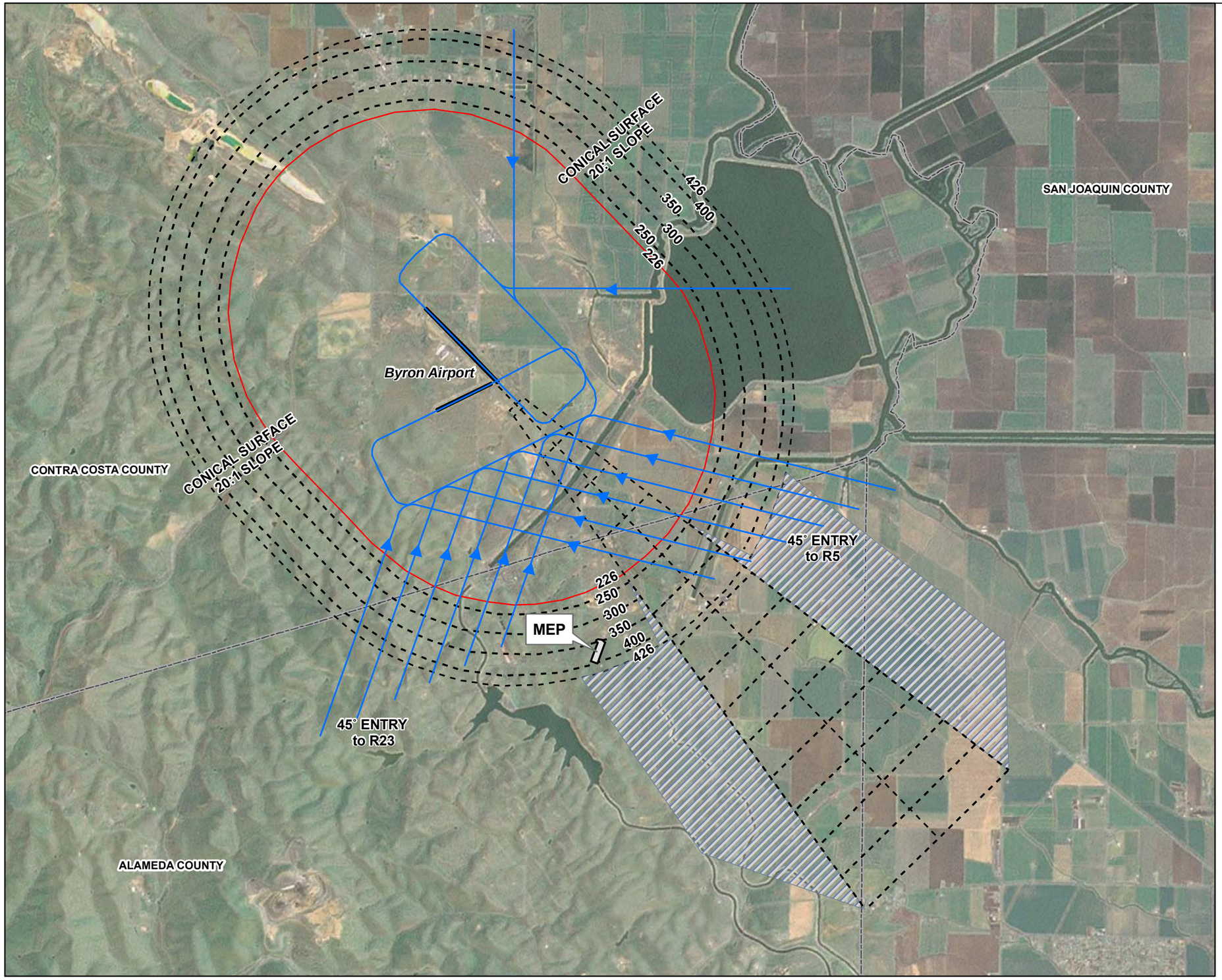
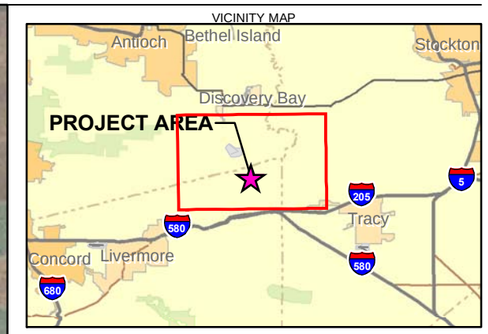




LEGEND

- VISUAL FLIGHT PATHS

SURFACE ZONES

- APPROACH
- CONICAL SURFACES
- RUNWAY
- TRANSITIONAL ZONES
- PROJECT SITE

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 2,500 5,000
Feet

FIGURE DR52-3
BYRON AIRPORT RUNWAY 5 AND RUNWAY 23
45° ENTRY
BYRON AIRFIELD

Attachment DR51-1
FAA Determination of
No Hazard to Air Navigation

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-2565-OE

Issued Date: 07/29/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack Power Plant Exhaust Stack 1
Location:	Byron, CA
Latitude:	37-47-16.81N NAD 83
Longitude:	121-36-06.43W
Heights:	80 feet above ground level (AGL) 206 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 01/29/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will

void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission if the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-2565-OE.

Signature Control No: 635621-117282718 (DNE)
Karen McDonald
Specialist

Attachment(s)
Additional Information
Case Description
Map(s)

Additional information for ASN 2009-AWP-2565-OE

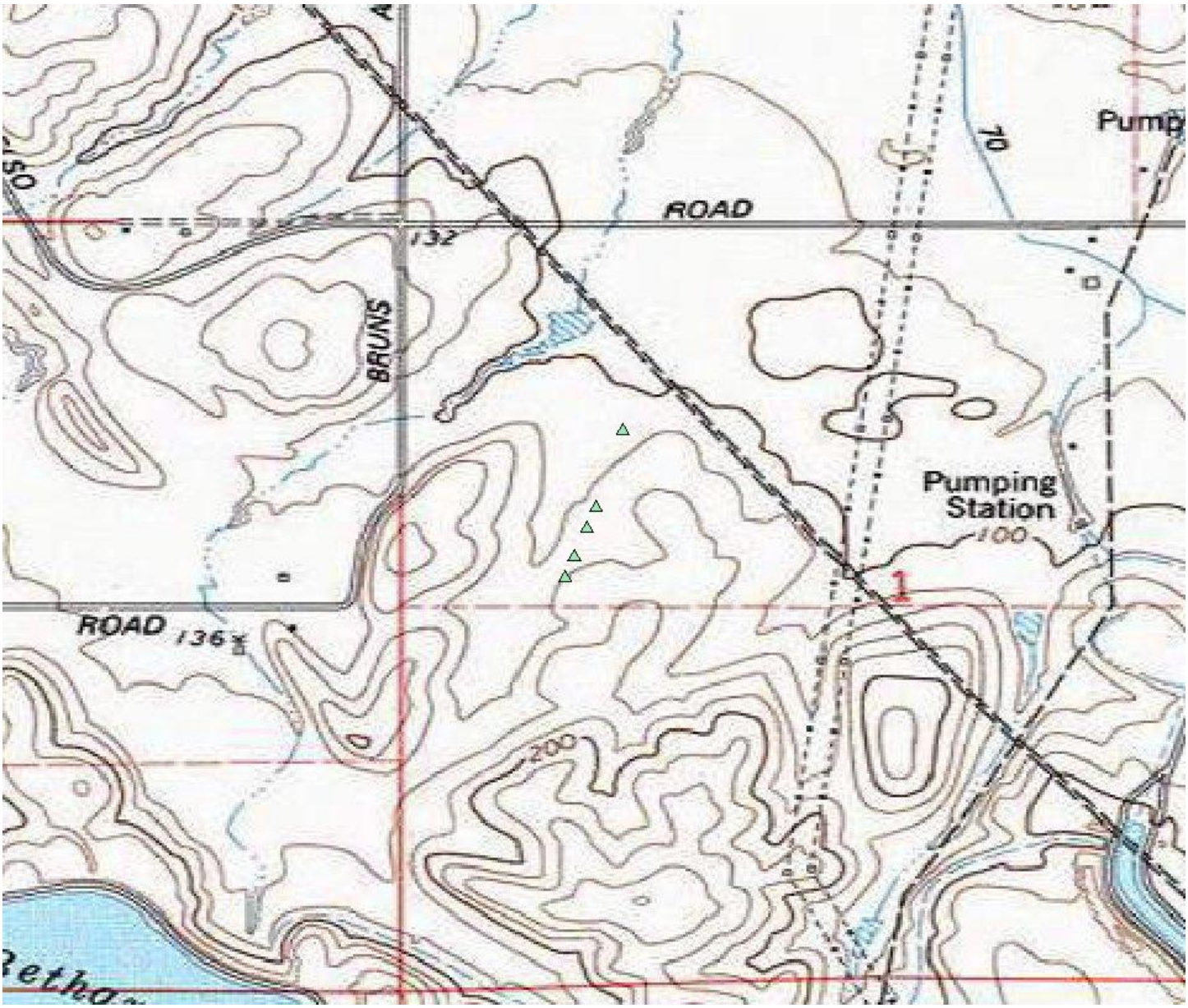
FAA Flight Standards Division is providing the following recommendations that Mariposa Energy and the Byron Airport Manager may want to consider:

The Mariposa Energy Plant (MEP) will be located just over 2 miles southeast from the Byron Airport, a civilian public-use general aviation landing area, that includes ultralight and glider activity. Potential plumes emanating from the MEP stacks may not be readily visible. MEP is encouraged to work with the Byron Airport authority to develop pilot education material for local distribution identifying the location of the MEP facility and provide information on plume eflux rates at various altitudes at least as high as 1000 feet above the source. It is also suggested that the Byron Airport authority, through the FAA Airports District Office (ADO) provide the MEP location and avoidance information in the listing for Byron Airport contained in the Airport/Facility Directory (AFD).

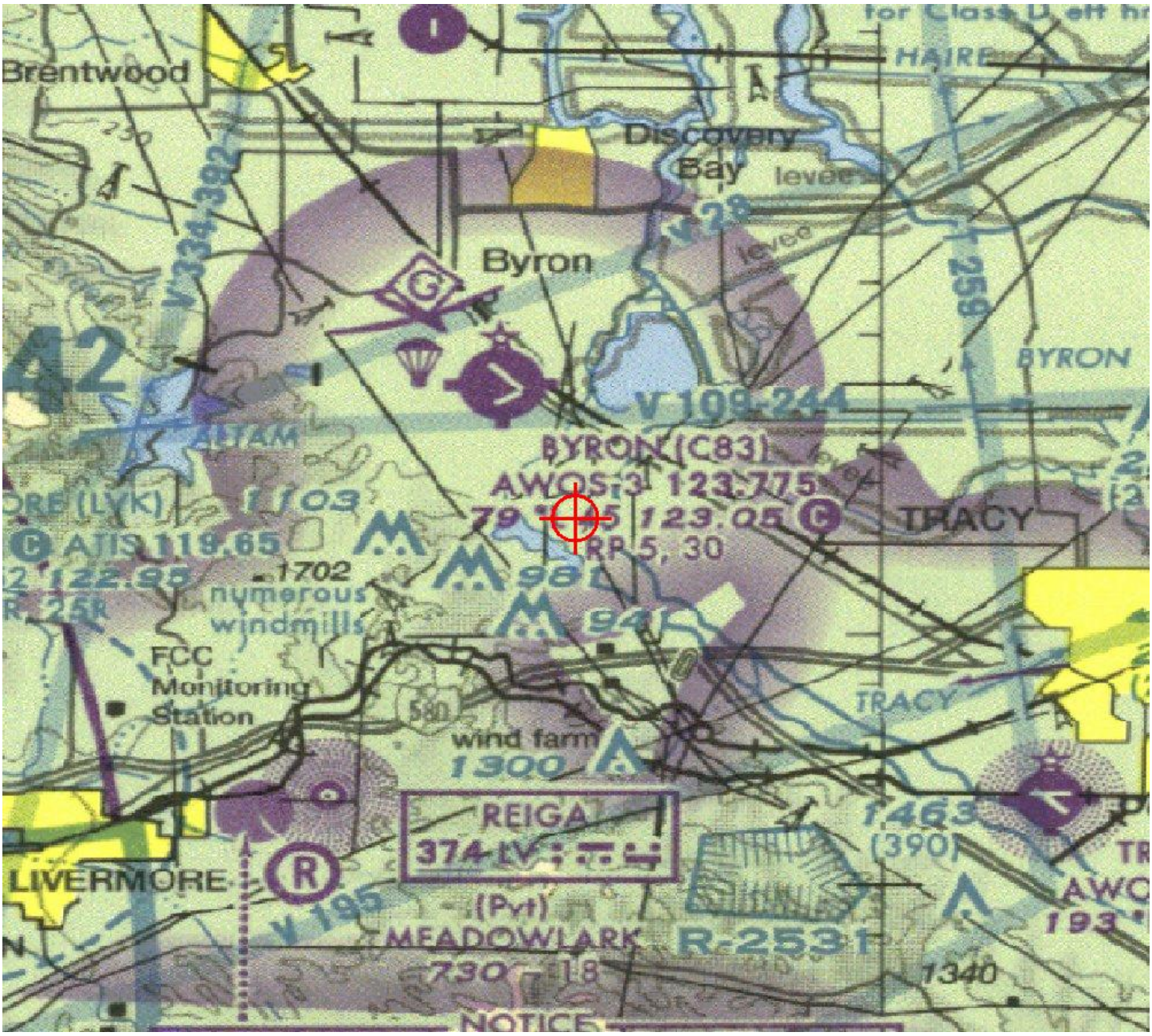
Case Description for ASN 2009-AWP-2565-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.

Verified Map for ASN 2009-AWP-2565-OE



Sectional Map for ASN 2009-AWP-2565-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-2566-OE

Issued Date: 07/29/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack Power Plant Exhaust Stack 2
Location:	Byron, CA
Latitude:	37-47-18.26N NAD 83
Longitude:	121-36-05.79W
Heights:	80 feet above ground level (AGL) 206 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 01/29/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will

void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission if the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-2566-OE.

Signature Control No: 635622-117282716 (DNE)
Karen McDonald
Specialist

Attachment(s)
Additional Information
Case Description
Map(s)

Additional information for ASN 2009-AWP-2566-OE

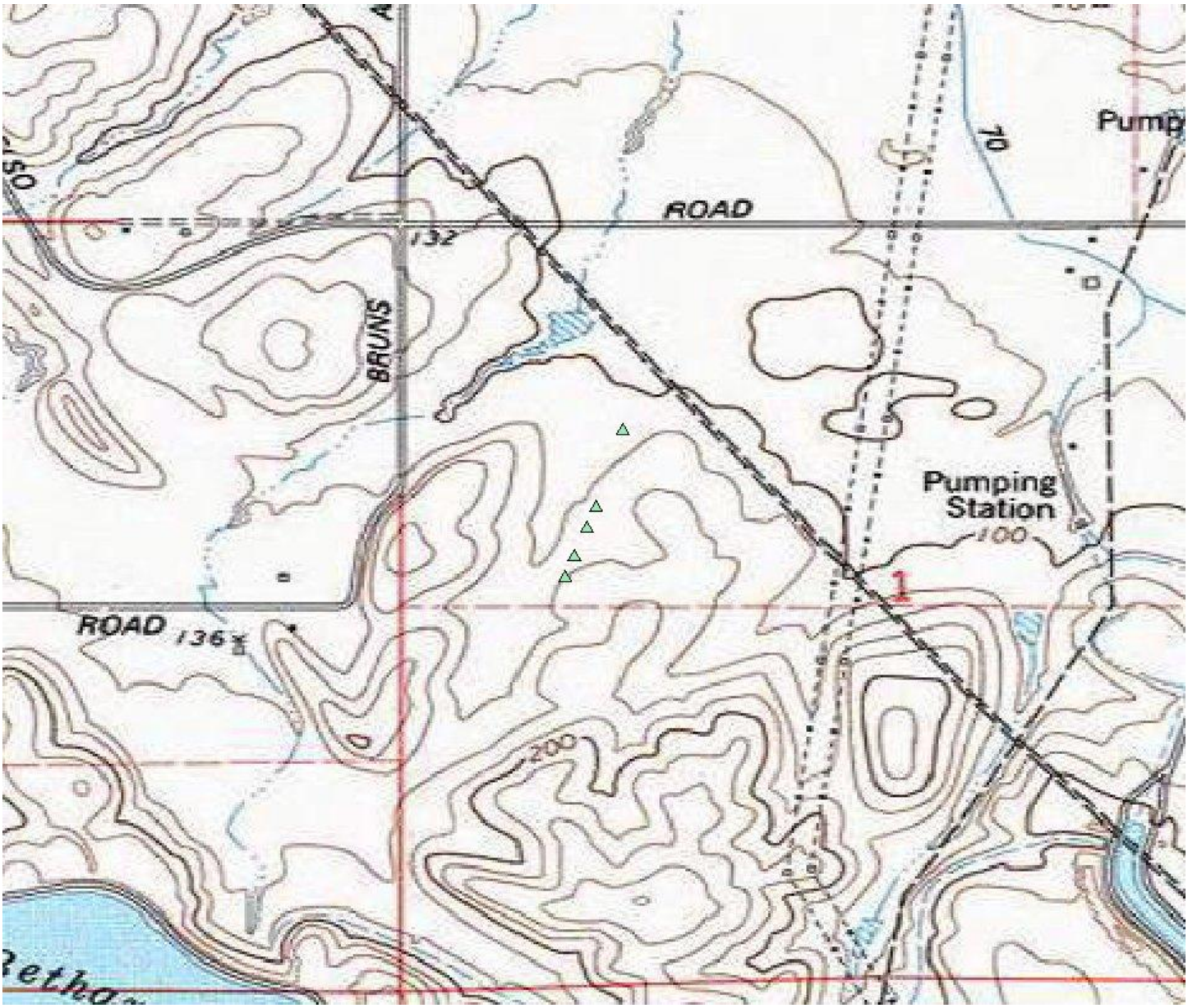
FAA Flight Standards Division is providing the following recommendations that Mariposa Energy and the Byron Airport Manager may want to consider:

The Mariposa Energy Plant (MEP) will be located just over 2 miles southeast from the Byron Airport, a civilian public-use general aviation landing area, that includes ultralight and glider activity. Potential plumes emanating from the MEP stacks may not be readily visible. MEP is encouraged to work with the Byron Airport authority to develop pilot education material for local distribution identifying the location of the MEP facility and provide information on plume eflux rates at various altitudes at least as high as 1000 feet above the source. It is also suggested that the Byron Airport authority, through the FAA Airports District Office (ADO) provide the MEP location and avoidance information in the listing for Byron Airport contained in the Airport/Facility Directory (AFD).

Case Description for ASN 2009-AWP-2566-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.

Verified Map for ASN 2009-AWP-2566-OE



Sectional Map for ASN 2009-AWP-2566-OE

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-2567-OE

Issued Date: 07/29/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack Power Plant Exhaust Stack 3
Location:	Byron, CA
Latitude:	37-47-20.23N NAD 83
Longitude:	121-36-04.92W
Heights:	80 feet above ground level (AGL) 205 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 01/29/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will

void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission if the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-2567-OE.

Signature Control No: 635623-117282719 (DNE)
Karen McDonald
Specialist

Attachment(s)
Additional Information
Case Description
Map(s)

Additional information for ASN 2009-AWP-2567-OE

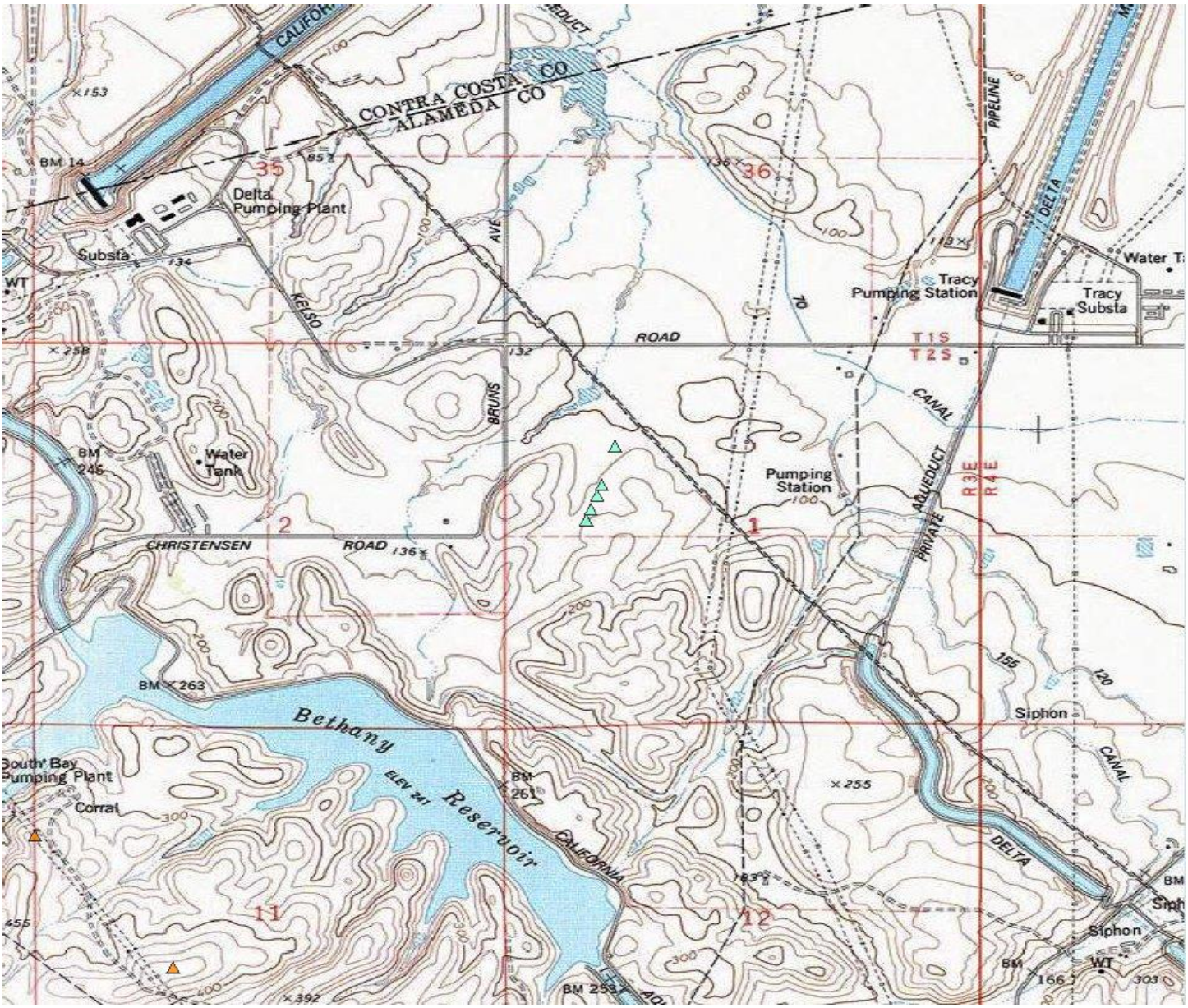
FAA Flight Standards Division is providing the following recommendations that Mariposa Energy and the Byron Airport Manager may want to consider:

The Mariposa Energy Plant (MEP) will be located just over 2 miles southeast from the Byron Airport, a civilian public-use general aviation landing area, that includes ultralight and glider activity. Potential plumes emanating from the MEP stacks may not be readily visible. MEP is encouraged to work with the Byron Airport authority to develop pilot education material for local distribution identifying the location of the MEP facility and provide information on plume eflux rates at various altitudes at least as high as 1000 feet above the source. It is also suggested that the Byron Airport authority, through the FAA Airports District Office (ADO) provide the MEP location and avoidance information in the listing for Byron Airport contained in the Airport/Facility Directory (AFD).

Case Description for ASN 2009-AWP-2567-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.

Verified Map for ASN 2009-AWP-2567-OE



Sectional Map for ASN 2009-AWP-2567-OE

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-2568-OE

Issued Date: 07/29/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack Power Plant Exhaust Stack 4
Location:	Byron, CA
Latitude:	37-47-21.66N NAD 83
Longitude:	121-36-04.28W
Heights:	80 feet above ground level (AGL) 205 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 01/29/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will

void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission if the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-2568-OE.

Signature Control No: 635624-117282717 (DNE)
Karen McDonald
Specialist

Attachment(s)
Additional Information
Case Description
Map(s)

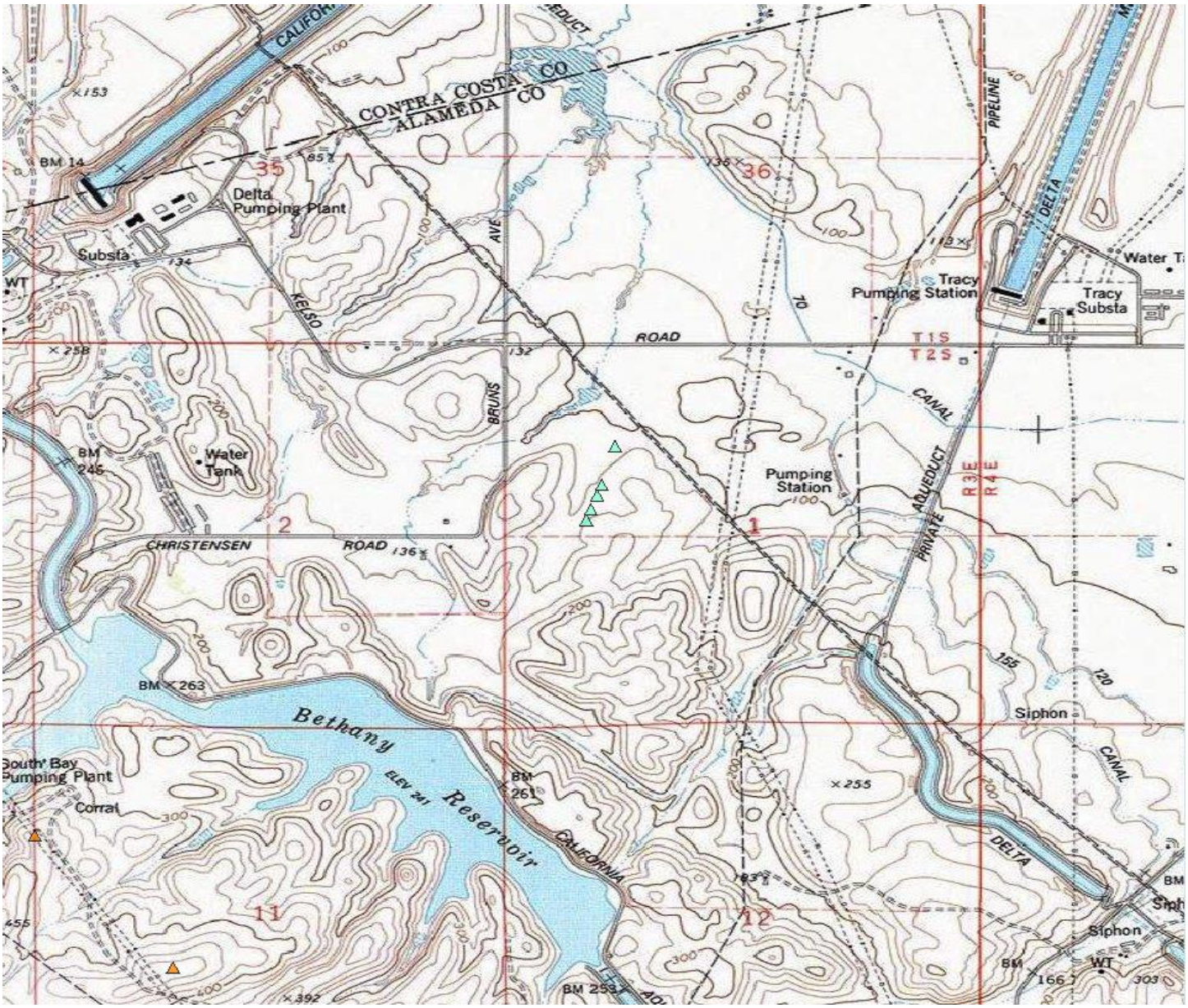
Additional information for ASN 2009-AWP-2568-OE

FAA Flight Standards Division is providing the following recommendations that Mariposa Energy and the Byron Airport Manager may want to consider:

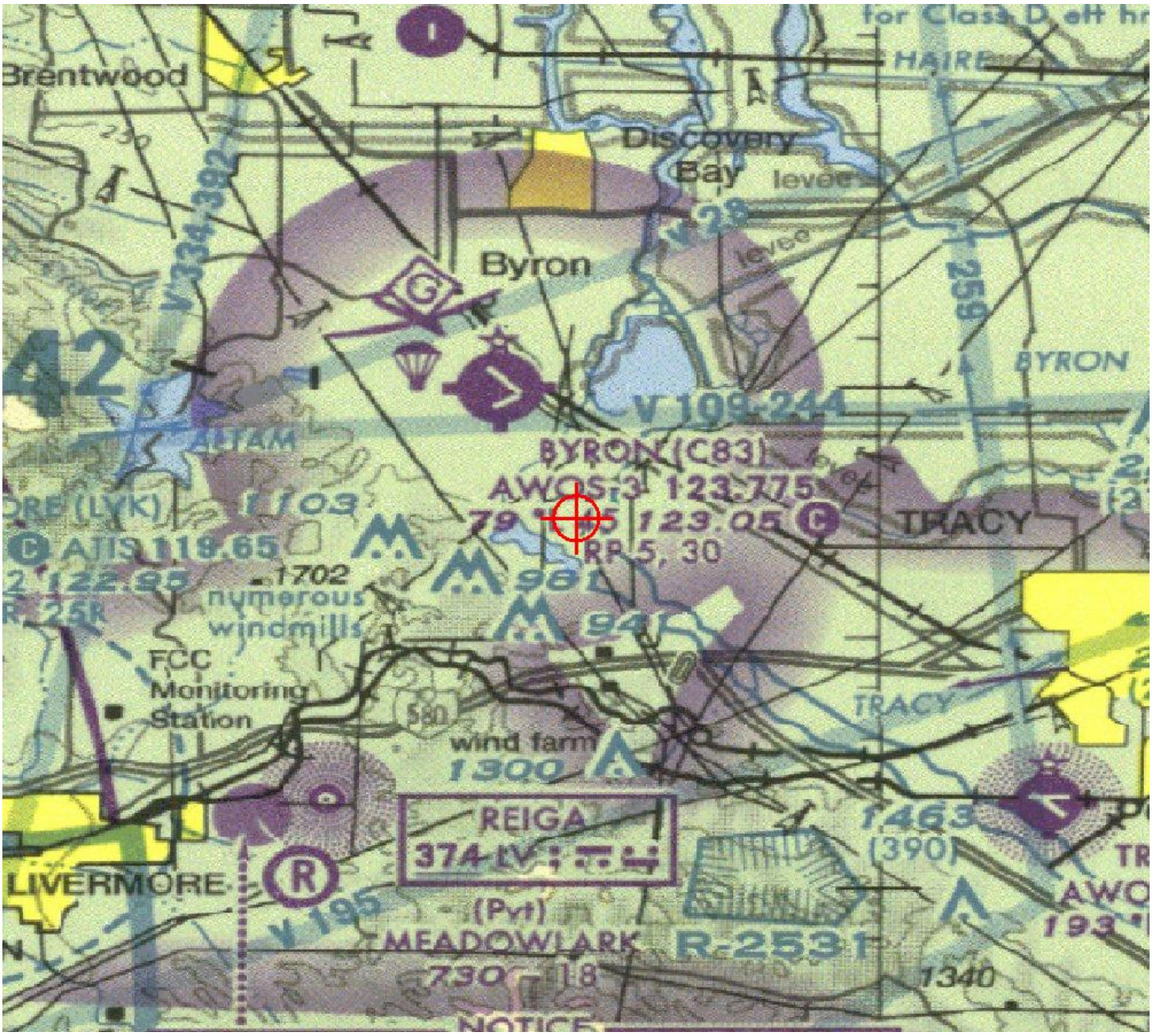
The Mariposa Energy Plant (MEP) will be located just over 2 miles southeast from the Byron Airport, a civilian public-use general aviation landing area, that includes ultralight and glider activity. Potential plumes emanating from the MEP stacks may not be readily visible. MEP is encouraged to work with the Byron Airport authority to develop pilot education material for local distribution identifying the location of the MEP facility and provide information on plume eflux rates at various altitudes at least as high as 1000 feet above the source. It is also suggested that the Byron Airport authority, through the FAA Airports District Office (ADO) provide the MEP location and avoidance information in the listing for Byron Airport contained in the Airport/Facility Directory (AFD).

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.

Verified Map for ASN 2009-AWP-2568-OE



Sectional Map for ASN 2009-AWP-2568-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-2569-OE

Issued Date: 07/29/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Transmission Line Pole 1
Location:	Byron, CA
Latitude:	37-47-27.01N NAD 83
Longitude:	121-36-02.43W
Heights:	95 feet above ground level (AGL) 210 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 01/29/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will

void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission if the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-2569-OE.

Signature Control No: 635625-117282715 (DNE)
Karen McDonald
Specialist

Attachment(s)
Additional Information
Case Description
Map(s)

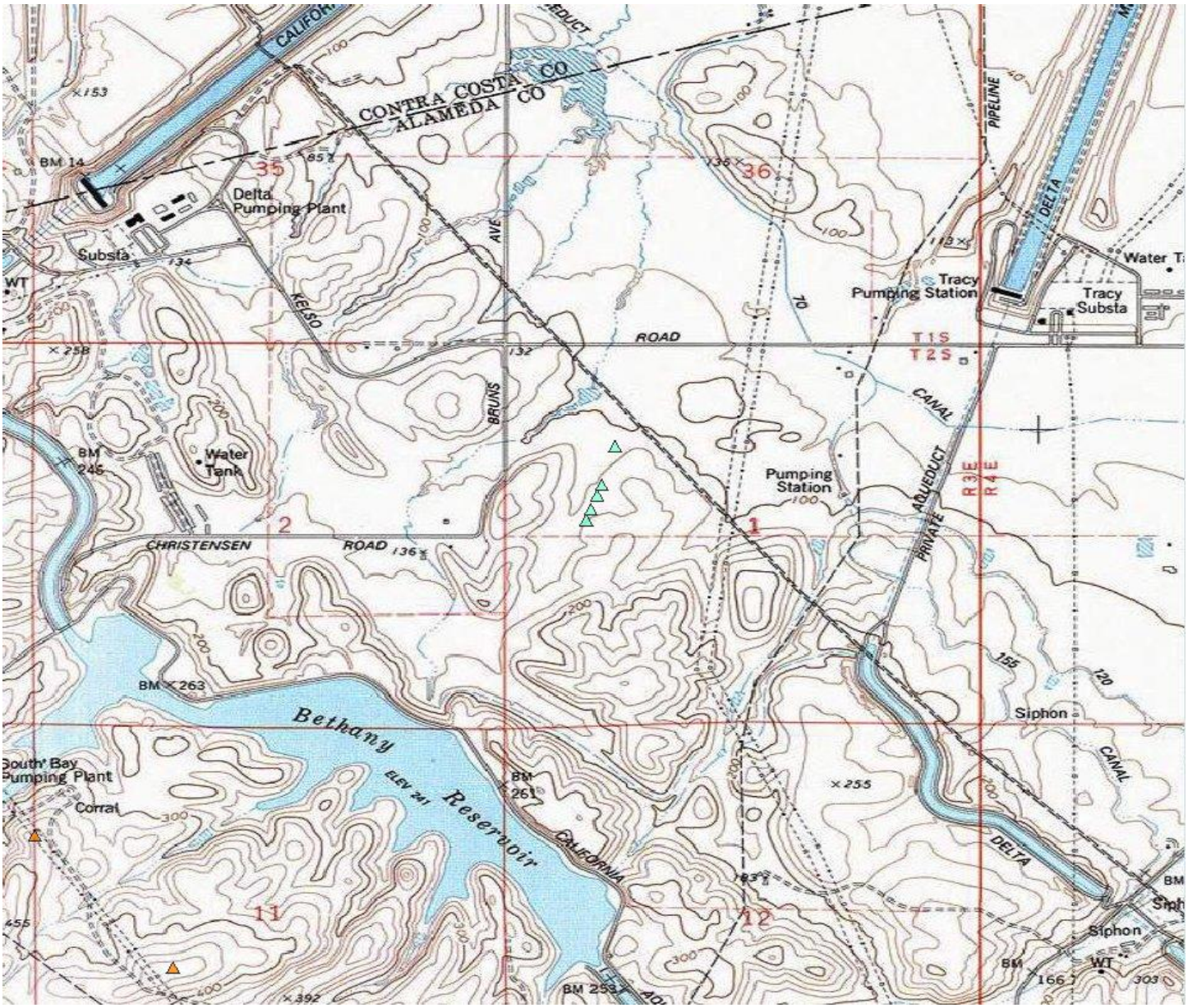
Additional information for ASN 2009-AWP-2569-OE

FAA Flight Standards Division is providing the following recommendations that Mariposa Energy and the Byron Airport Manager may want to consider:

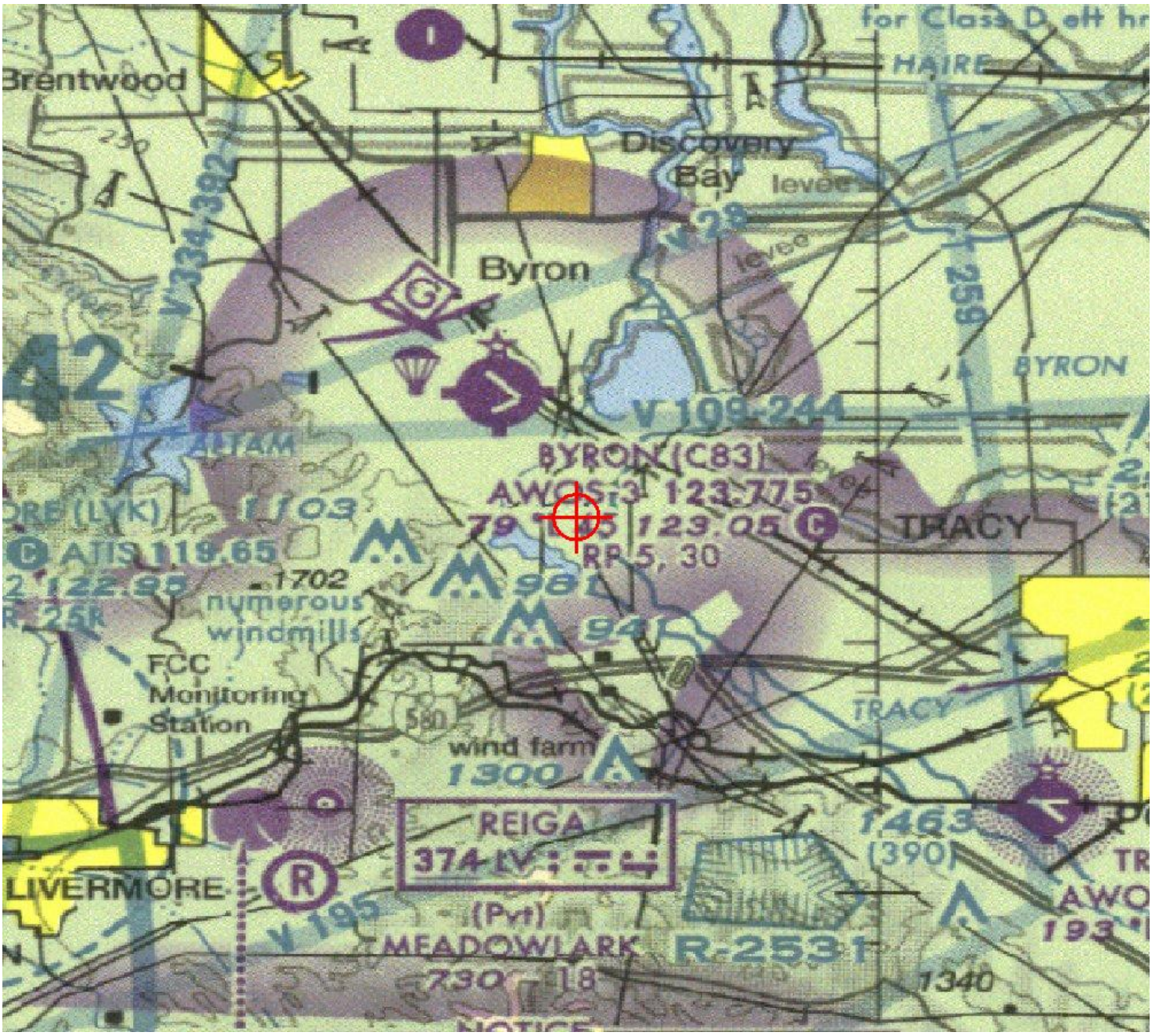
The Mariposa Energy Plant (MEP) will be located just over 2 miles southeast from the Byron Airport, a civilian public-use general aviation landing area, that includes ultralight and glider activity. Potential plumes emanating from the MEP stacks may not be readily visible. MEP is encouraged to work with the Byron Airport authority to develop pilot education material for local distribution identifying the location of the MEP facility and provide information on plume eflux rates at various altitudes at least as high as 1000 feet above the source. It is also suggested that the Byron Airport authority, through the FAA Airports District Office (ADO) provide the MEP location and avoidance information in the listing for Byron Airport contained in the Airport/Facility Directory (AFD).

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.

Verified Map for ASN 2009-AWP-2569-OE



Sectional Map for ASN 2009-AWP-2569-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-3943-OE

Issued Date: 10/06/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Transmission Line Pole 2
Location:	Byron, CA
Latitude:	37-47-29.66N NAD 83
Longitude:	121-35-56.96W
Heights:	95 feet above ground level (AGL) 192 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 04/06/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

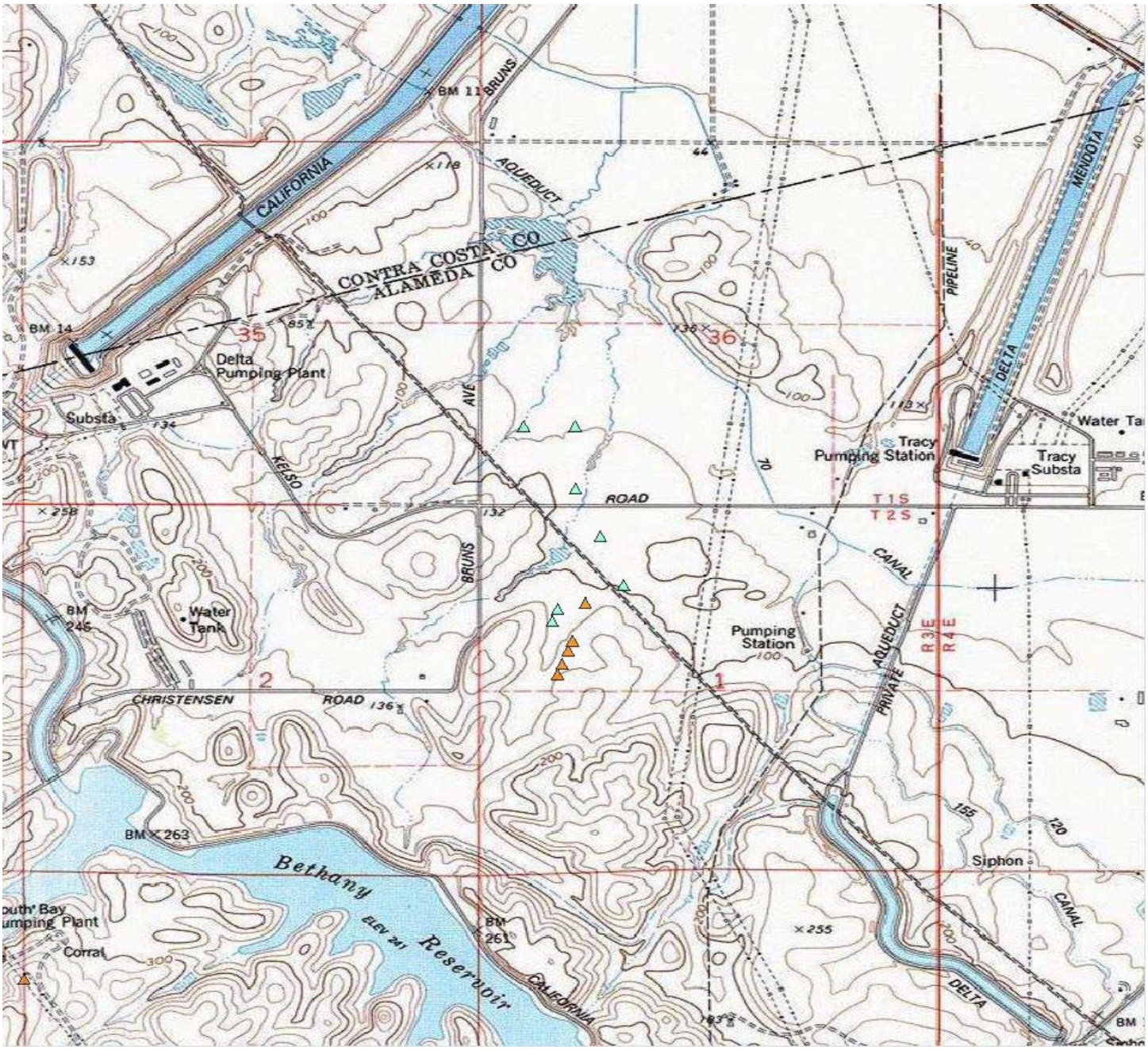
If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-3943-OE.

Signature Control No: 649446-119227156 (DNE)
Karen McDonald
Specialist

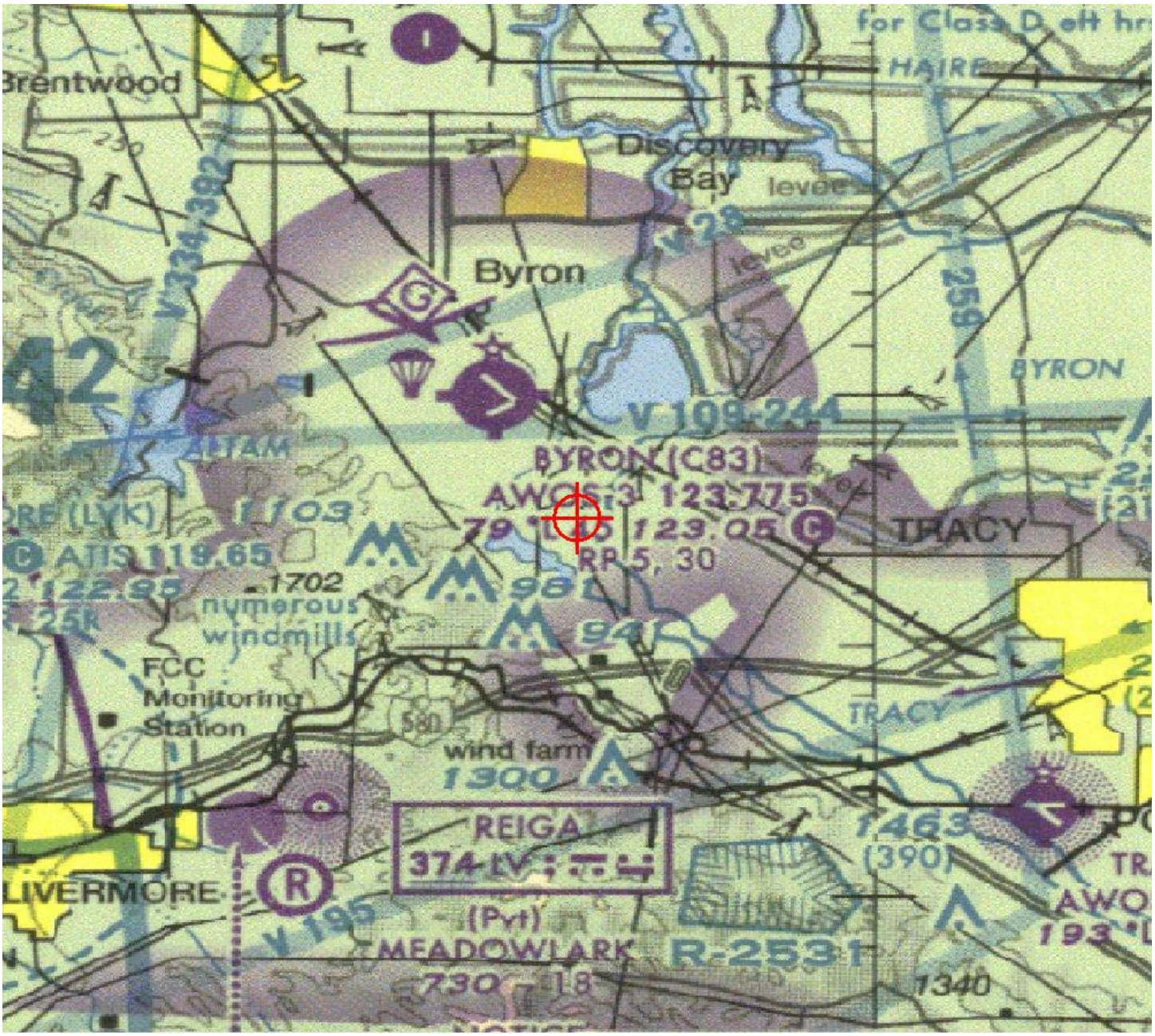
Attachment(s)
Case Description
Map(s)

Case Description for ASN 2009-AWP-3943-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl


CALIFORNIA
AQUEDUCT
BM 11
BRUNS
CONTRA COSTA CO
ALAMEDA CO
BM 14
Delta
Pumping Plant
Substa
35
36
KELSO
AVE
BRUNS
ROAD
T 1 S
T 2 S
Tracy
Pumping Station
Tracy
Substa
Water Ta
DELTA
MENDOTA
PIPELINE
CANAL
AQUEDUCT
PRIVATE
R 3 E
R 4 E
Pumping
Station
BM
245
Water
Tank
2
1
CHRISTENSEN
ROAD
BM 263
Bethany
Reservoir
ELEV 241
South Bay
Pumping Plant
Corral
BM
261
CALIFORNIA
Siphon
CANAL
DELTA

Sectional Map for ASN 2009-AWP-3943-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-3944-OE

Issued Date: 10/06/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Transmission Line Pole 3
Location:	Byron, CA
Latitude:	37-47-36.62N NAD 83
Longitude:	121-36-00.29W
Heights:	95 feet above ground level (AGL) 190 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 04/06/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

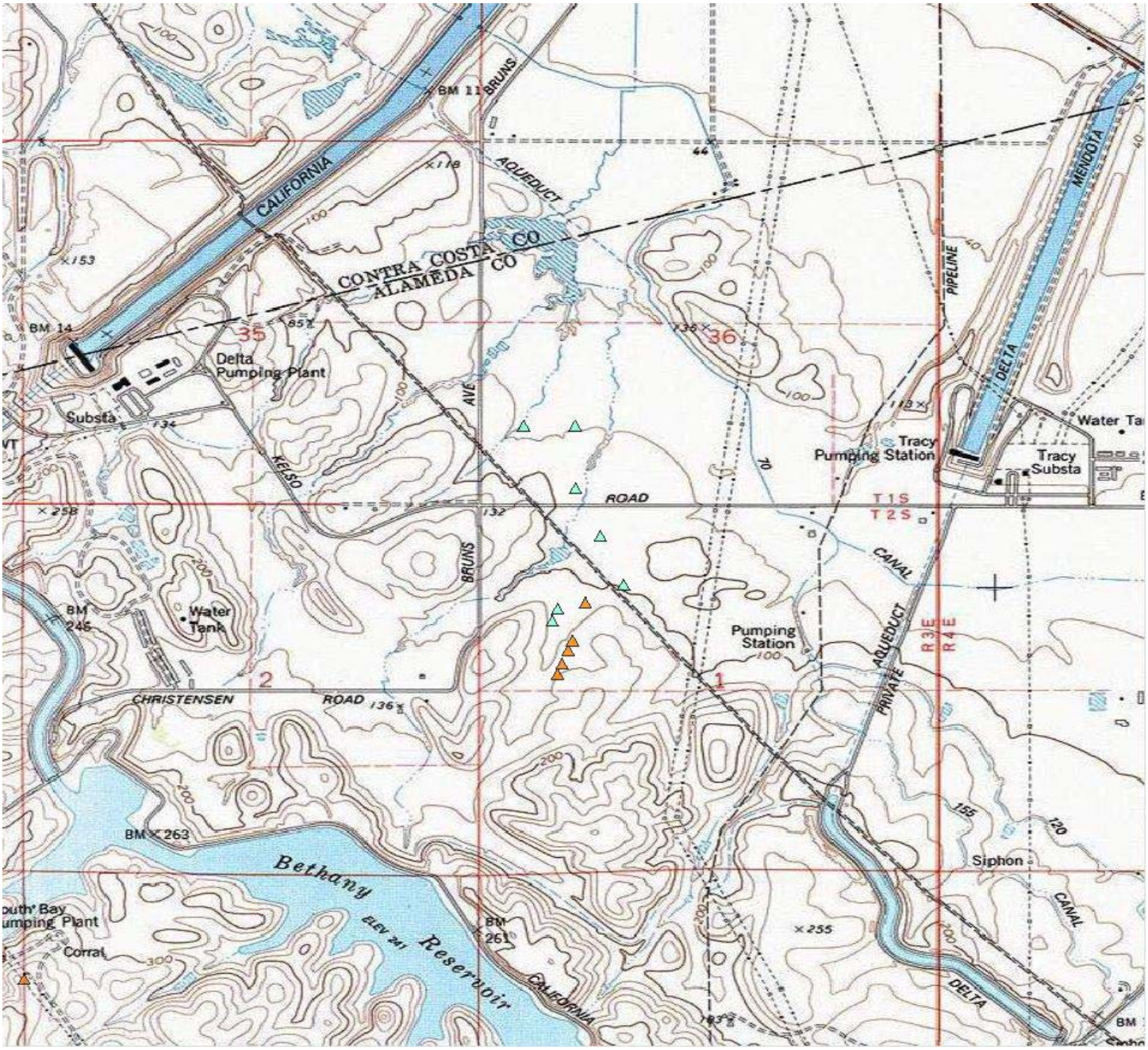
If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-3944-OE.

Signature Control No: 649447-119227157 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

Case Description for ASN 2009-AWP-3944-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.


CALIFORNIA
AQUEDUCT
BM 11
BRUNS
CONTRA COSTA CO
ALAMEDA CO
BM 14
Delta
Pumping Plant
Substa
35
36
KELSO
AVE
BRUNS
ROAD
T 1 S
T 2 S
Tracy
Pumping Station
Tracy
Substa
Water Ta
DELTA
MENDOTA
PIPELINE
CANAL
AQUEDUCT
PRIVATE
R 3 E
R 4 E
Pumping
Station
BM
245
Water
Tank
2
1
CHRISTENSEN
ROAD
BM 263
Bethany
Reservoir
ELEV 241
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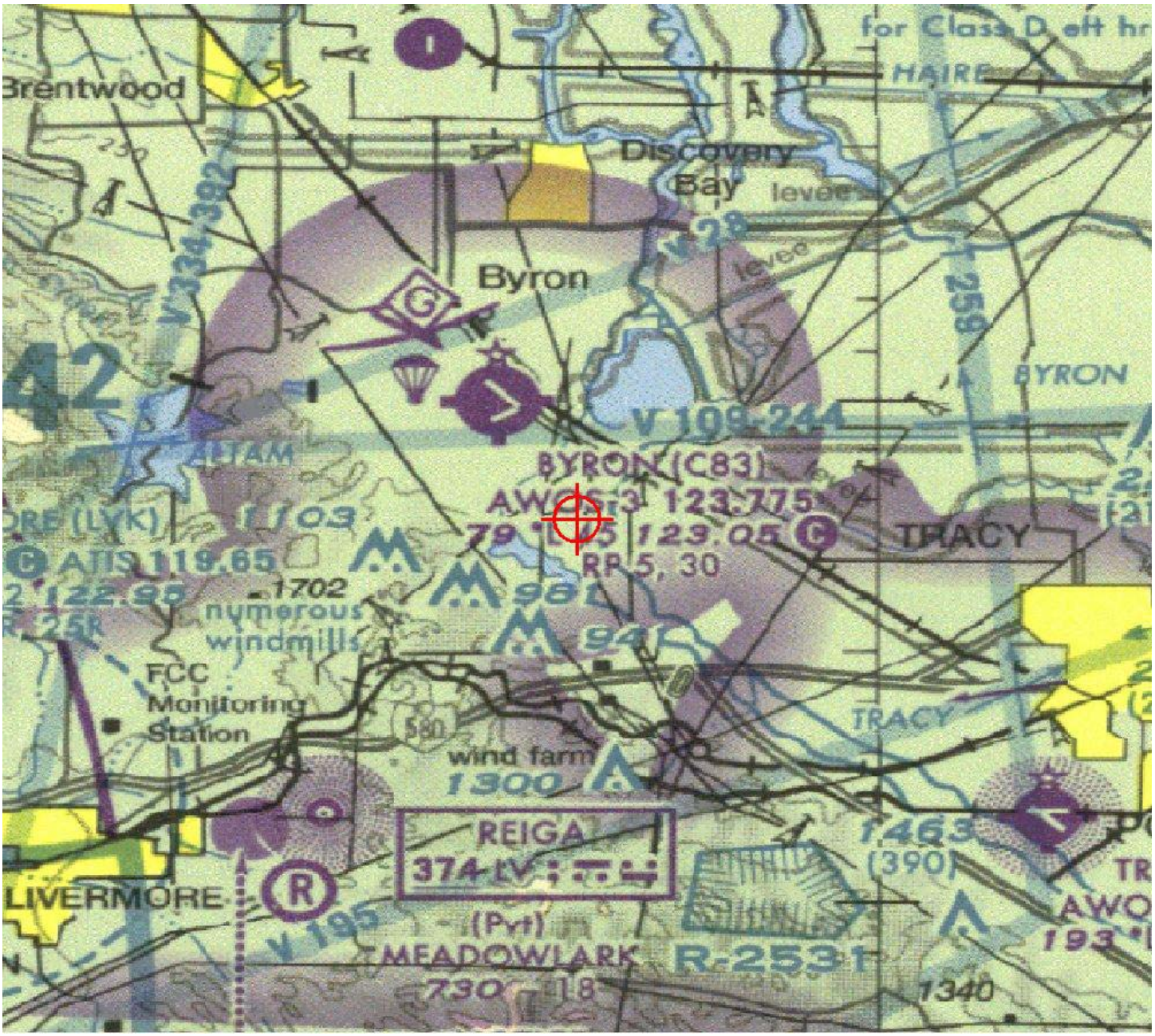
Pumping Plant
Corral
BM
261
CALIFORNIA
Siphon
CANAL
DELTA

Sectional Map for ASN 2009-AWP-3944-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-3945-OE

Issued Date: 10/06/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Transmission Line Pole 4
Location:	Byron, CA
Latitude:	37-47-43.49N NAD 83
Longitude:	121-36-03.84W
Heights:	95 feet above ground level (AGL) 185 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 04/06/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-3945-OE.

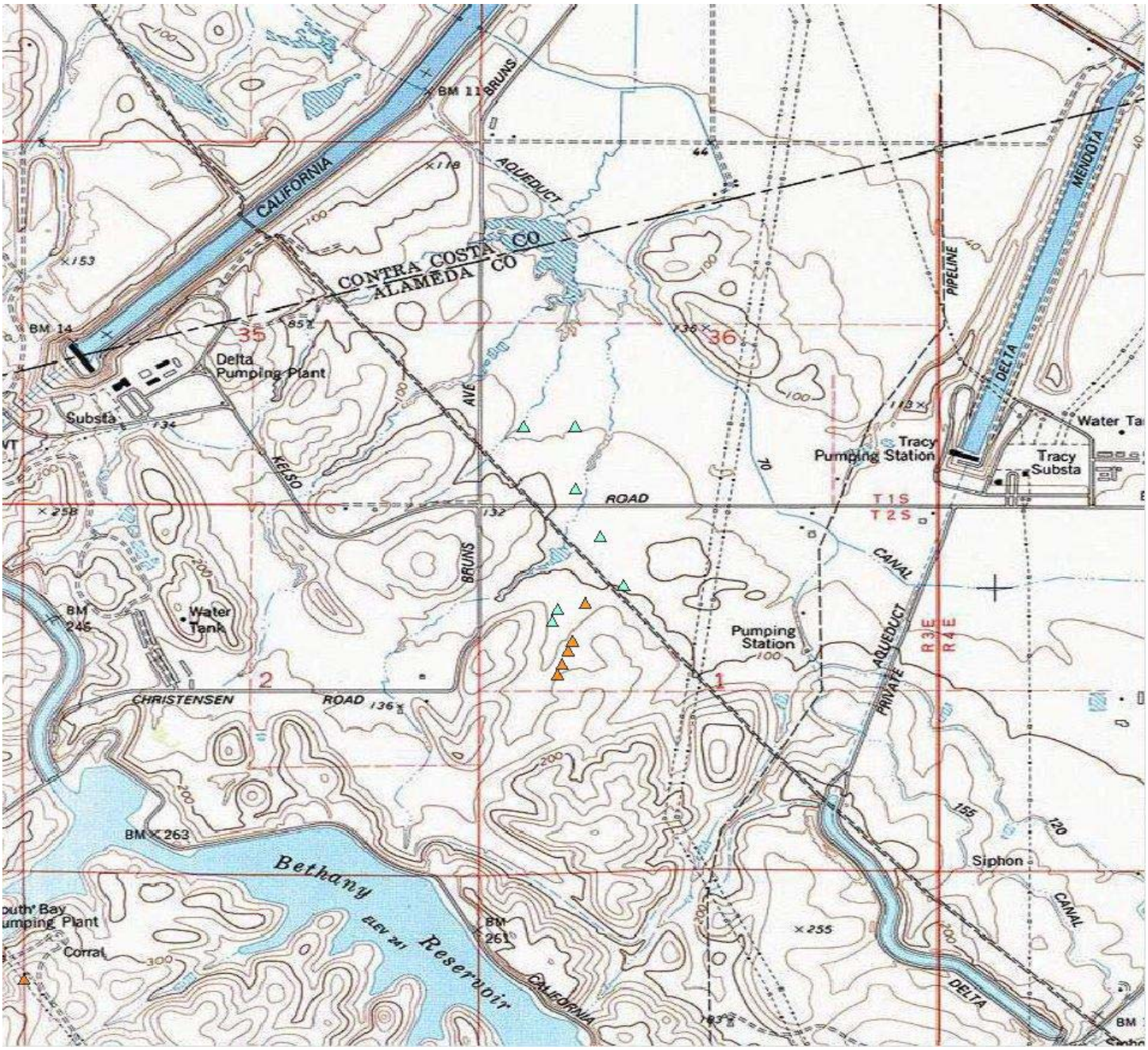
Signature Control No: 649448-119227159 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

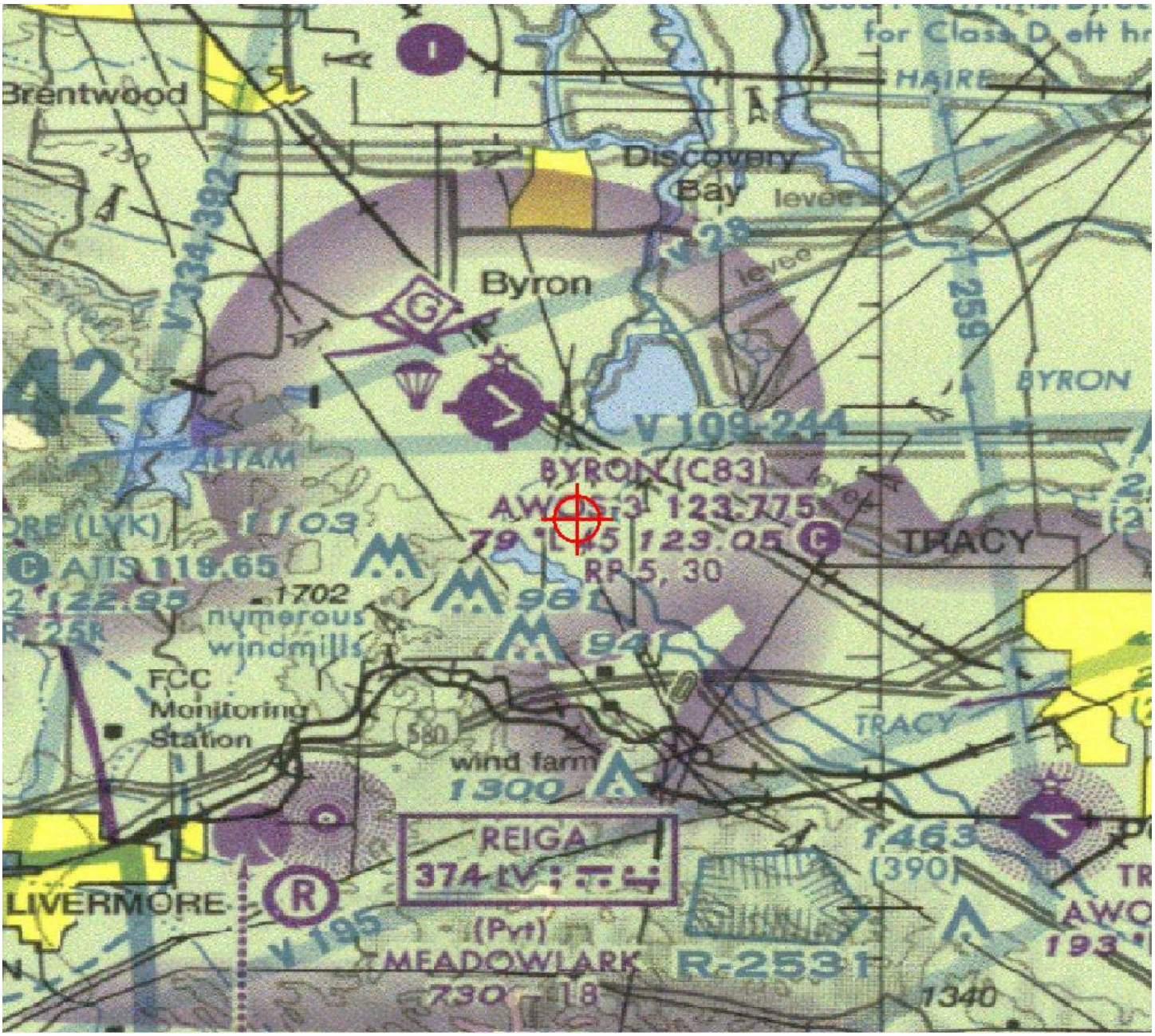
Case Description for ASN 2009-AWP-3945-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.

Verified Map for ASN 2009-AWP-3945-OE



Sectional Map for ASN 2009-AWP-3945-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-3946-OE

Issued Date: 10/06/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Transmission Line Pole 5
Location:	Byron, CA
Latitude:	37-47-52.51N NAD 83
Longitude:	121-36-03.91W
Heights:	95 feet above ground level (AGL) 185 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 04/06/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

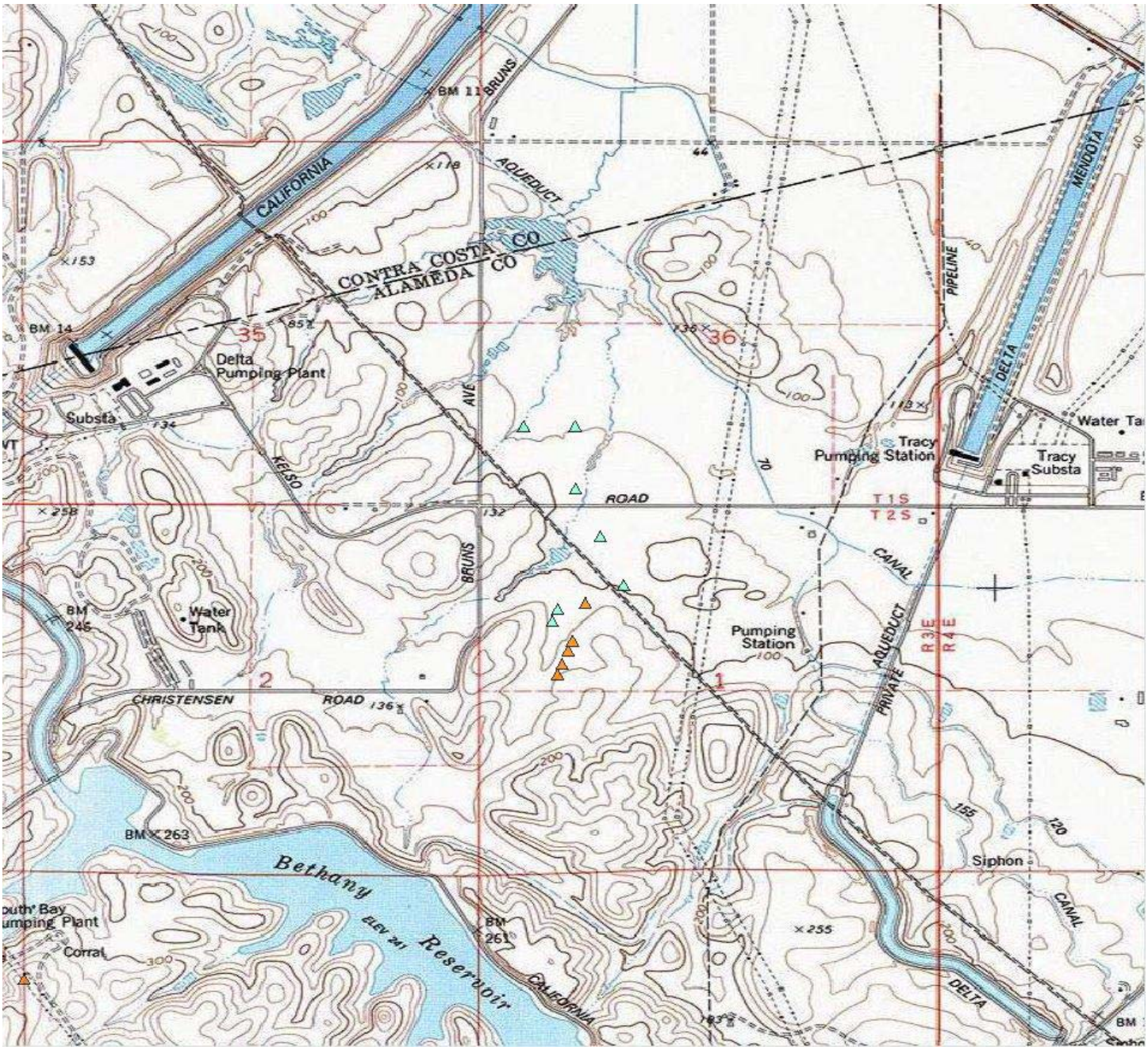
If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-3946-OE.

Signature Control No: 649449-119227161 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

Case Description for ASN 2009-AWP-3946-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.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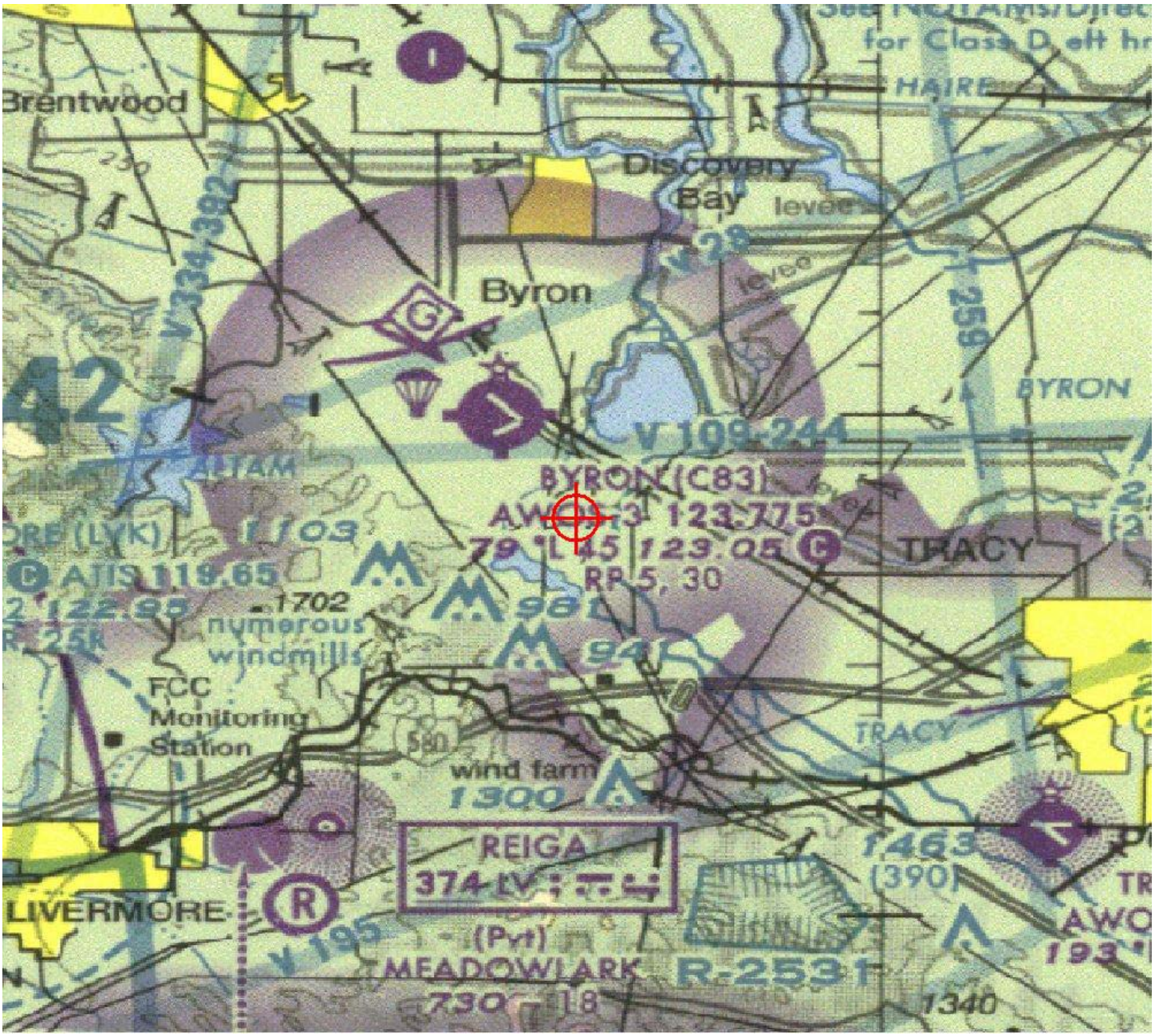
Sectional Map for ASN 2009-AWP-3946-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-3947-OE

Issued Date: 10/06/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Transmission Line Pole 6
Location:	Byron, CA
Latitude:	37-47-52.47N NAD 83
Longitude:	121-36-11.29W
Heights:	95 feet above ground level (AGL) 190 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 04/06/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

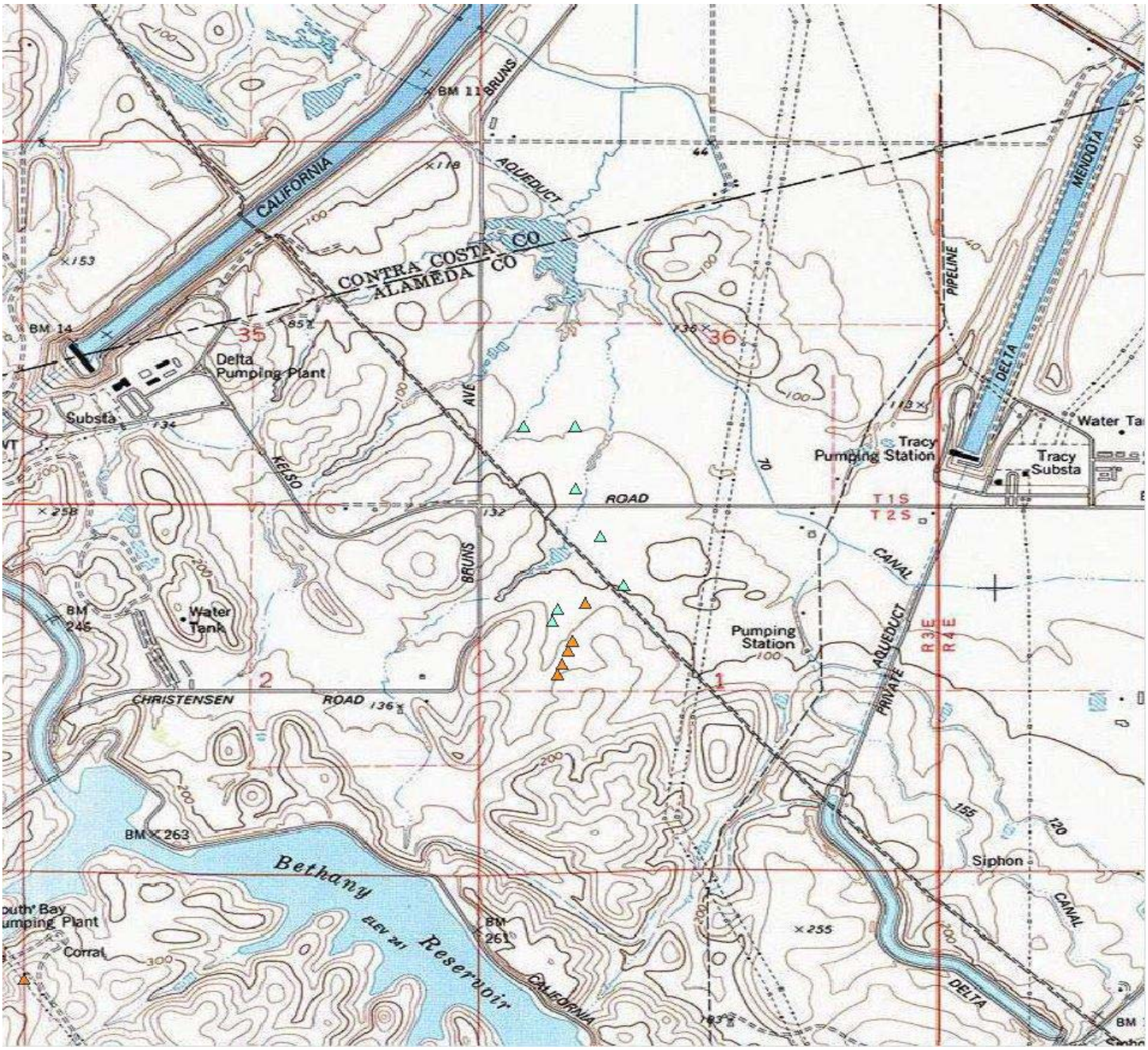
If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-3947-OE.

Signature Control No: 649450-119227160 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

Case Description for ASN 2009-AWP-3947-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.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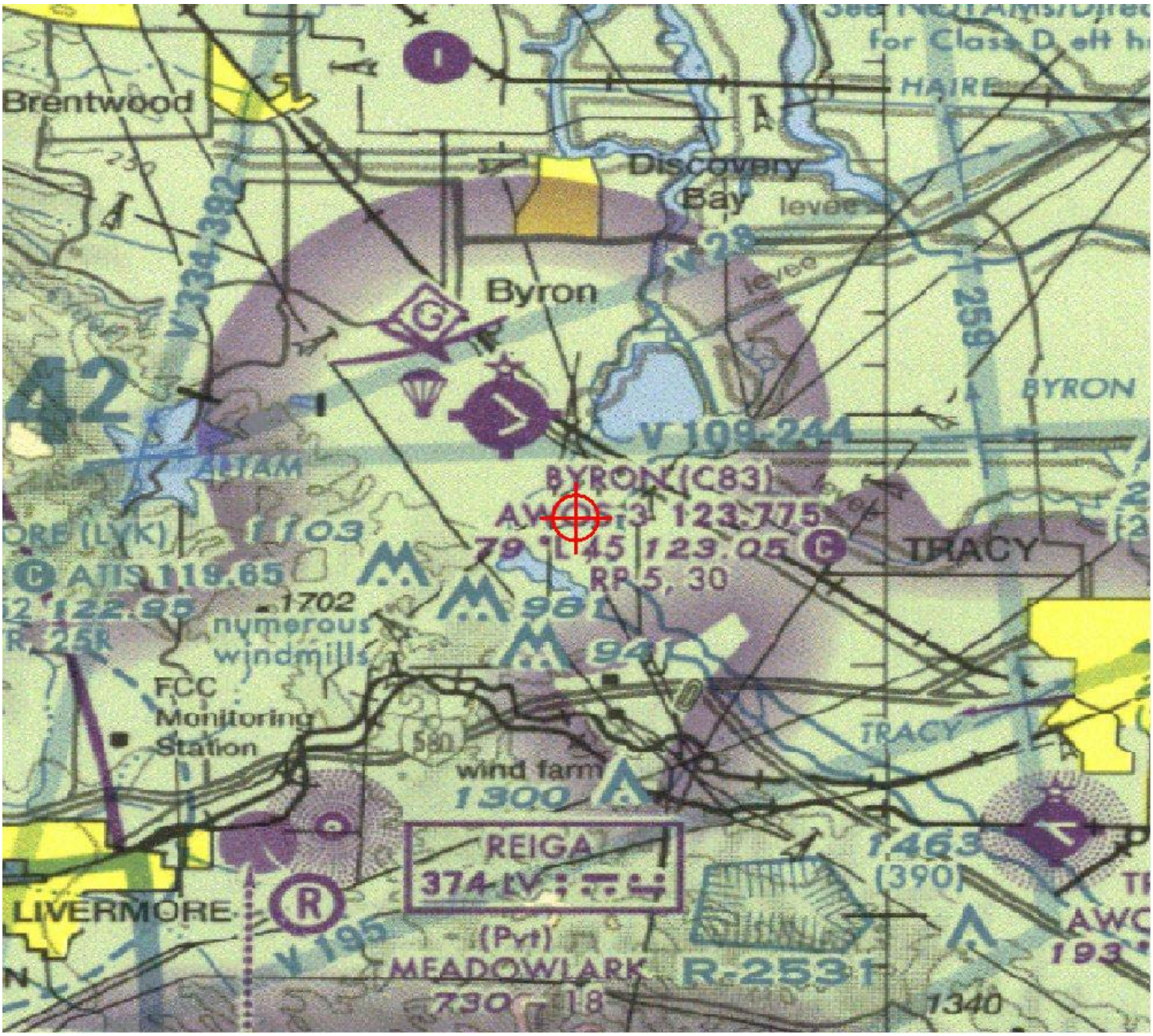
Sectional Map for ASN 2009-AWP-3947-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-3948-OE

Issued Date: 10/06/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line West Transmission Line Pole 1 - South
Location:	Byron, CA
Latitude:	37-47-24.45N NAD 83
Longitude:	121-36-07.19W
Heights:	84 feet above ground level (AGL) 209 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 04/06/2011 unless:

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This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

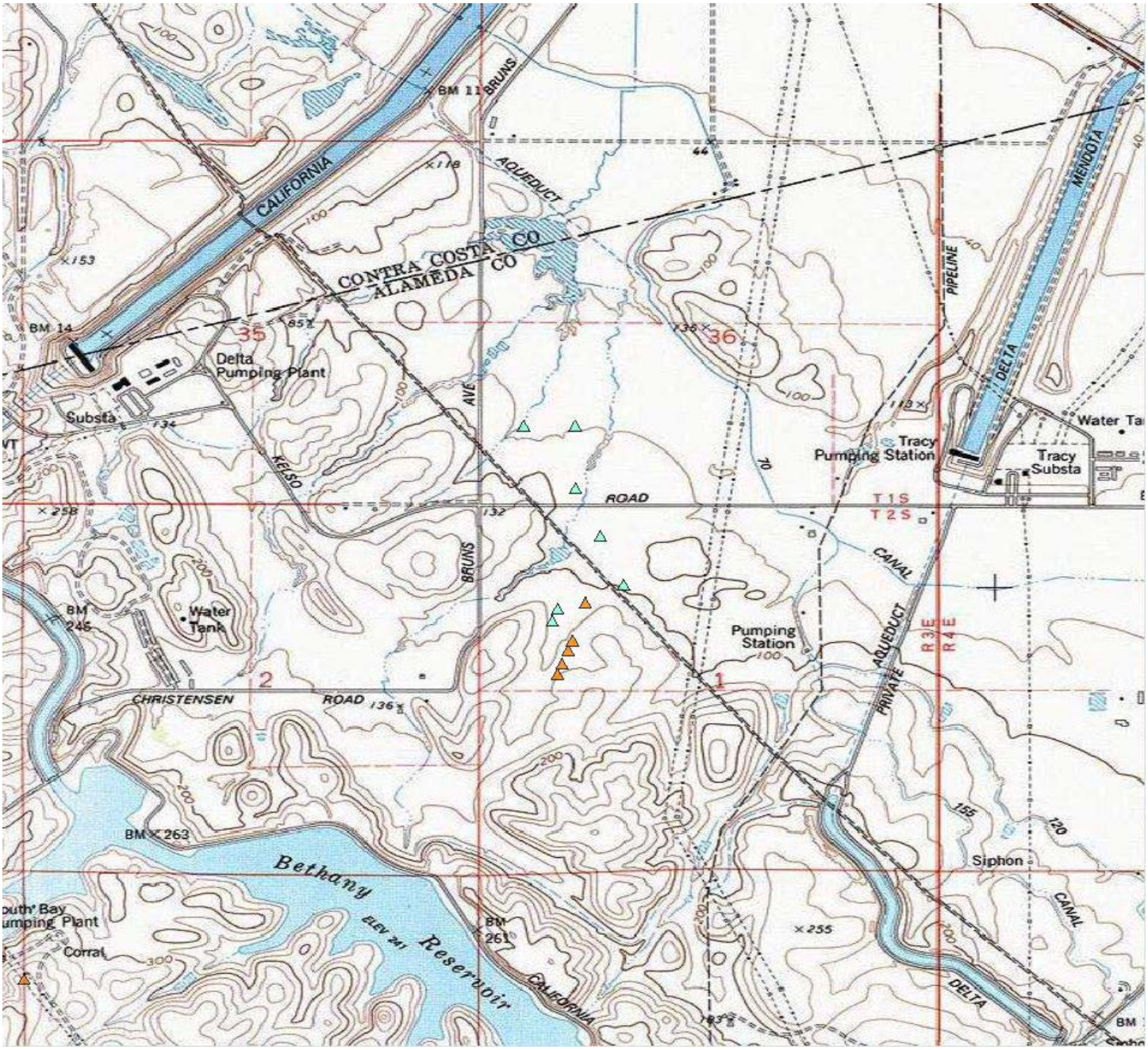
If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-3948-OE.

Signature Control No: 649451-119227155 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

Case Description for ASN 2009-AWP-3948-OE

The MEP will be a nominal 200-MW peaking facility consisting of 4 GE Energy LM6000 PC Sprint natural gas-fired combustion turbine generators & associated equipment. The tops of the exhaust stacks & power poles will be less than 100 feet agl.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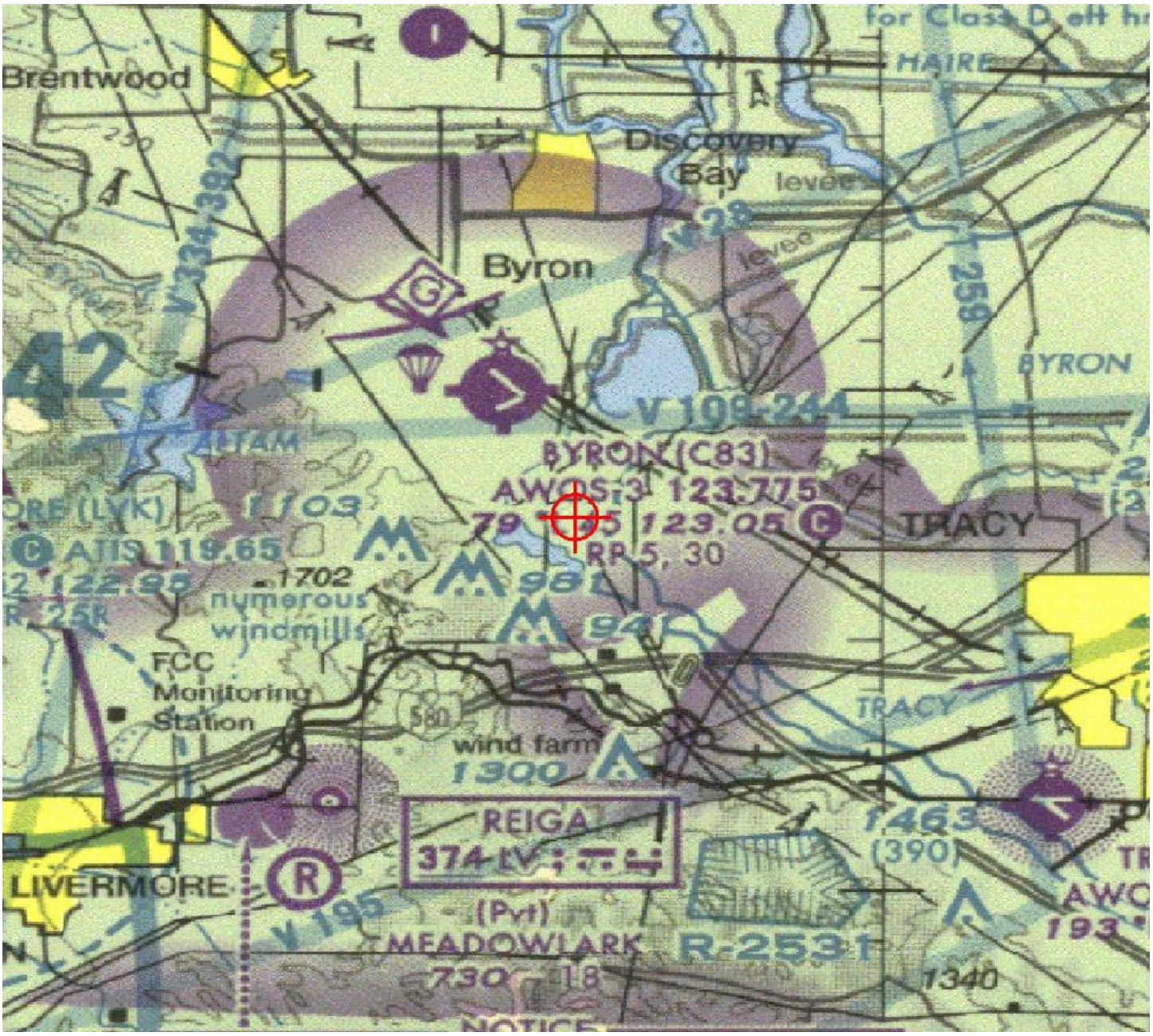
Sectional Map for ASN 2009-AWP-3948-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-AWP-3949-OE

Issued Date: 10/06/2009

Bo Buchynsky
Mariposa Energy, LLC.
333 South Grand Avenue
Suite 1570
Los Angeles, CA 90071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line West Transmission Line Pole 2 - North
Location:	Byron, CA
Latitude:	37-47-26.17N NAD 83
Longitude:	121-36-06.41W
Heights:	84 feet above ground level (AGL) 209 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

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If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-AWP-3949-OE.

Signature Control No: 649452-119227158 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

Case Description for ASN 2009-AWP-3949-OE

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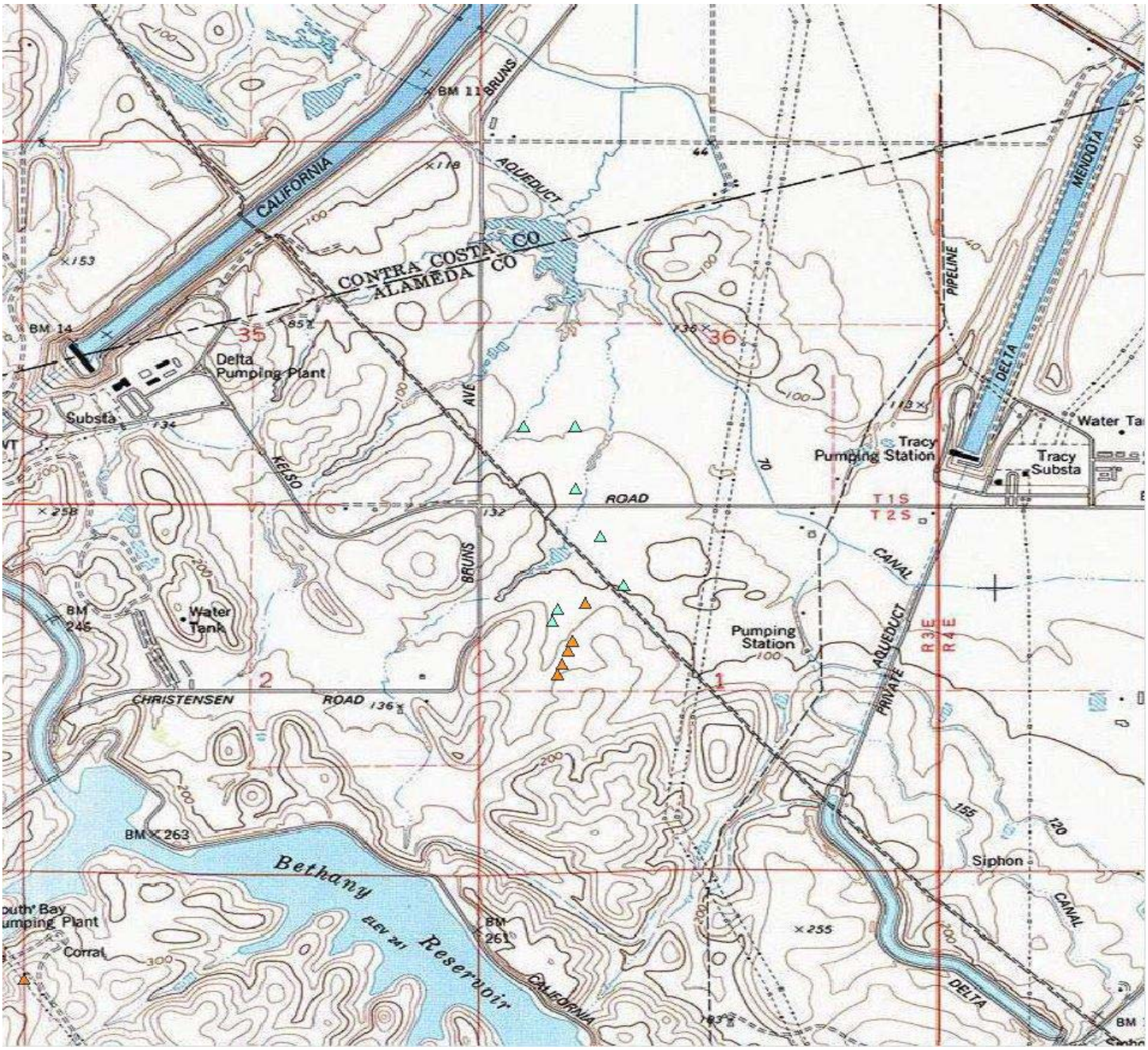
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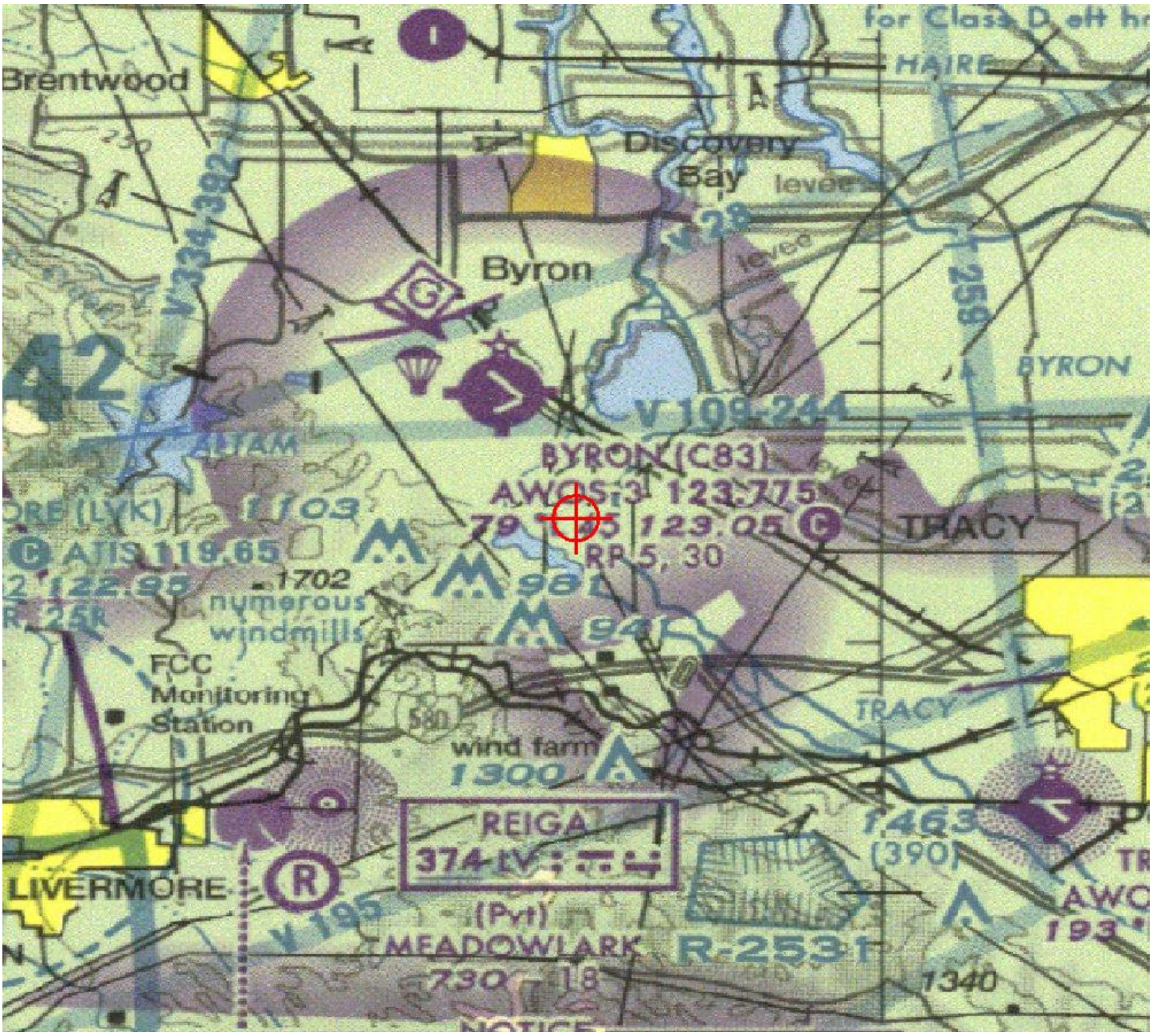
Sectional Map for ASN 2009-AWP-3949-OE



Attachment DR52-1
RNAV Runway 30, Byron Airport

WAAS CH 65902 W30A	APP CRS 300°	Rwy ldg 4500 TDZE 55 Apt Elev 79

RNAV (GPS) RWY 30
BYRON (C83)

T
NA
W

Circling to Rwy 5, 12 NA at night. Circling NA SW of Rwy 12-30.
If local altimeter setting not received, use Stockton Metropolitan altimeter setting and increase all DA/MDAs 60 feet.
DME/DME RNP-0.3 NA.
VDP NA when using Stockton Metropolitan altimeter setting.

MISSED APPROACH: Climb to 3000 direct ROGOY and right turn via 030° track to HOXAV and right turn via 120° track to HAIRE and hold, continue climb-in-hold to 3000.

AWOS-3	NORCAL APP CON	UNICOM
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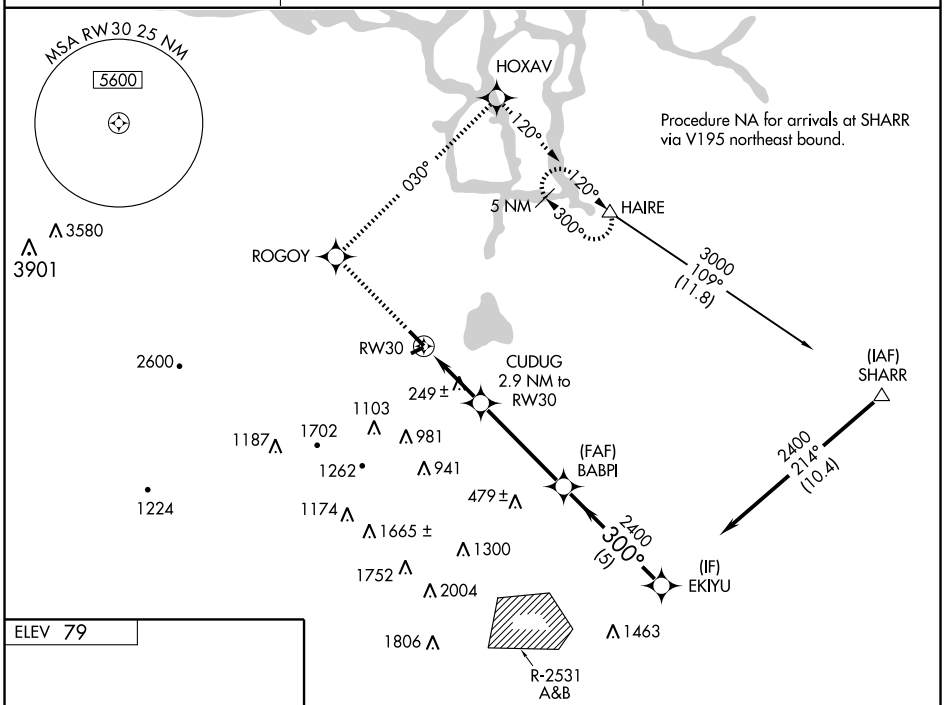
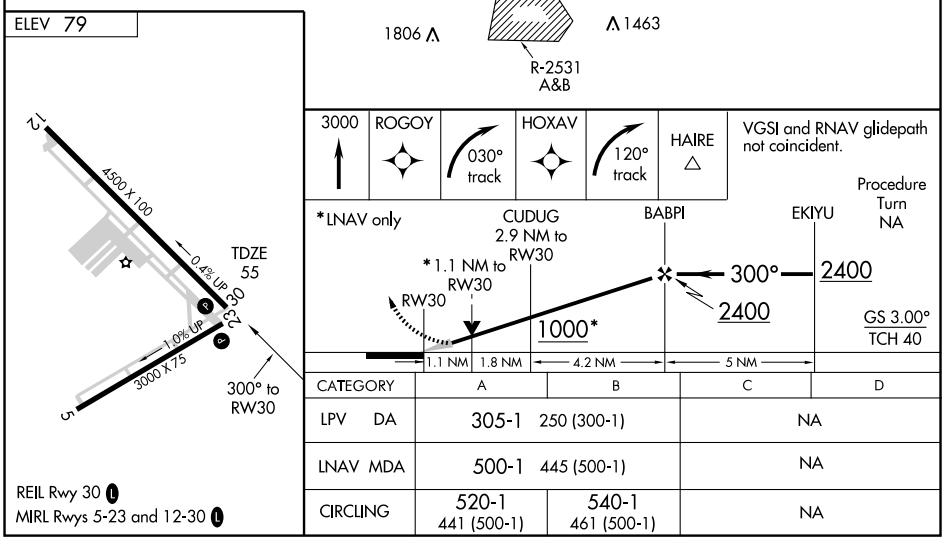




CATEGORY	A	B	C	D
LPV DA	305-1 250 (300-1)		NA	
LNAV MDA	500-1 445 (500-1)		NA	
CIRCLING	520-1 441 (500-1)	540-1 461 (500-1)	NA	

REIL Rwy 30 L
MIRL Rwys 5-23 and 12-30 L

SW-2, 22 OCT 2009 to 19 NOV 2009
SW-2, 22 OCT 2009 to 19 NOV 2009

Attachment DR52-2
Take-off Minimums and (Obstacle) Departure Procedures

INSTRUMENT APPROACH PROCEDURE CHARTS

IFR TAKE-OFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES

Civil Airports and Selected Military Airports

ALL USERS: Airports that have Departure Procedures (DPs) designed specifically to assist pilots in avoiding obstacles during the climb to the minimum enroute altitude , and/or airports that have civil IFR take-off minimums other than standard, are listed below. Take-off Minimums and Departure Procedures apply to all runways unless otherwise specified. Altitudes, unless otherwise indicated, are minimum altitudes in MSL.

DPs specifically designed for obstacle avoidance are referred to as Obstacle Departure Procedures (ODPs) and are described below in text, or published separately as a graphic procedure. If the (Obstacle) DP is published as a graphic procedure, its name will be listed below, and it can be found in either this volume (civil), or a separate Departure Procedure volume (military), as appropriate. Users will recognize graphic obstacle DPs by the term "(OBSTACLE)" included in the procedure title; e.g., TETON TWO (OBSTACLE). If not assigned a SID or radar vector by ATC, an ODP may be flown without ATC clearance to ensure obstacle clearance.

Graphic DPs designed by ATC to standardize traffic flows, ensure aircraft separation and enhance capacity are referred to as "Standard Instrument Departures (SIDs)". SIDs also provide obstacle clearance and are published under the appropriate airport section. ATC clearance must be received prior to flying a SID.

CIVIL USERS NOTE: Title 14 Code of Federal Regulations Part 91 prescribes standard take-off rules and establishes take-off minimums for certain operators as follows: (1) Aircraft having two engines or less - one statute mile. (2) Aircraft having more than two engines - one-half statute mile. These standard minima apply in the absence of any different minima listed below.

MILITARY USERS NOTE: Civil (nonstandard) take-off minima are published below. For military take-off minima, refer to appropriate service directives.

NAME TAKE-OFF MINIMUMS

ALTURAS, CA

ALTURAS MUNI (AAT)
AMDT 2 08101 (FAA)
DEPARTURE PROCEDURE: Use BACHS DEPARTURE.

AMEDEE AAF (KAHC),

HERLONG, CA. . . . . AMDT 1, 09239
Rwy 8, 26: 4000-3 for climb in visual conditions.
Rwy 8, 26: Cross Amedee AAF at or above 7900 before proceeding on course.

NAME TAKE-OFF MINIMUMS

ARCATA-EUREKA, CA

ARCATA
TAKE-OFF MINIMUMS: **Rwy 1,** std. w/ a min. climb of 429' per NM to 1900. **Rwy 14,** 600-2¼ or std. w/ a min. climb of 486' per NM to 1000'.
DEPARTURE PROCEDURE: **Rwy 1,** climbing left turn thence..., or for climb in visual conditions: cross Arcata Airport westbound at or above 1100, thence...**Rwys 14, 19,** climbing right turn thence...**Rwy 32,** climbing left turn thence...
...via ACV R-250 to HOCUT INT and continue climb to MEA on V27.
NOTE: **Rwy 1,** multiple trees beginning 182' from departure end of runway, 11' rightof centerline, up to 161' AGL/370' MSL. Multiple tees beginning 281' from departure end of runway, 86' left of centerline, up to 148' AGL/357' MSL. **Rwy 14,** multiple trees beginning 838' from departure end of runway, 372' left of centerline, up to 200' AGL/759' MSL. Multiple trees beginning 1286' from departure end of runway, 716' right of centerline, up to 65' AGL/286' MSL. **Rwy 19,** multiple trees beginning 57' from departure end of runway, 270' right of centerline, up to 30' AGL/218' MSL. **Rwy 32,** multiple trees beginning 113' from departure end of runway, 211' right of centerline, up to 86' AGL/267' MSL. Multiple trees 1' from departure end of runway, 161' left of centerline, up to 21' AGL/202' MSL. Obstruction light 426' from departure end of runway, 257' right of centerline, 21' AGL/202' MSL.

AUBURN, CA

AUBURN MUNI

TAKE-OFF MINIMUMS: **Rwy 7,** CAT A,B 600-2 or std. with a min. climb of 350' per NM to 2300. CAT C,D NA. **Rwy 25,** CAT A,B 300-1 or std. with a min. climb of 390' per NM to 1700. CAT C,D NA.

DEPARTURE PROCEDURE: **Rwy 7,** climbing left turn to 3000 heading 305°, intercept MYV R-089 to MYV VOR/DME, then via assigned routing. **Rwy 25,** climb runway heading to 3000, intercept and proceed via MYV R-098 to MYV VOR/DME, then via assigned heading.

BEALE AFB (KBAB)

MARYSVILLE, CA. . . . . .ORIG, 09155

DEPARTURE PROCEDURE: **Rwy 15,** Climb on a heading between 100° CW to 325° from DER. **Rwy 33,** Climb on a heading between 146° CW to 344° from DER.

TAKE-OFF OBSTACLES: **Rwy 33,** Terrain 118' MSL, 62' from DER, 500' right of centerline. Terrain 119' MSL, 190' from DER, 551' right of centerline.

BECKWOURTH, CA

NERVINO

TAKE-OFF MINIMUMS: **Rwys 7, 25,** 3500-3 for climb in visual conditions.

DEPARTURE PROCEDURE: **Rwys 7, 25,** for climb in visual conditions: cross Nervino Airport at or above 8300 before proceeding on course.

NOTE: **Rwy 7,** road 58' from departure end of runway, 469' right of centerline, 15' AGL/4920' MSL. Pole 310' from departure end of runway, 522' right of centerline, 49' AGL/4925' MSL. Pole 528' from departure end of runway, 522' right of centerline, 39' AGL/4924' MSL. Tree 1.47 NM from departure end of runway, 727' right of centerline, 100' AGL/5193' MSL. Tree 1.9 NM from departure end of runway, 2534' right of centerline, 100' AGL/5499' MSL. Bush 2.03 NM from departure end of runway, 2126' right of centerline, 4' AGL/5406' MSL. **Rwy 25,** tree 5856' from departure end of ruwnay, 1984' right of centerline, 100' AGL/5339' MSL. Tree 1.25 NM from departure end of runway, 2439' right of centerline, 100' AGL/5420' MSL. Tree 2.07 NM from departure end of runway, 3302' left of centerline, 100' AGL/5570' MSL.

BISHOP, CA

EASTERN SIERRA RGNL

TAKE-OFF MINIMUMS: **Rwys 7,12,16,** NA. **Rwys 25, 30,34,** 4000-2 or std. with a min. climb of 350' per NM to 9000.

DEPARTURE PROCEDURE: **Rwys 25,30,** turn right. **Rwy 34,** turn left, climb northwestbound to 13000 via BIH R-322 to NIKOL Int.

BYRON, CA

BYRON

TAKE-OFF MINIMUMS: **Rwy 23,** NA-obstacles. **Rwy 30,** 200-1 or std. with a min. climb of 240' per NM to 300. Alternatively, with standard take-off minimums and a normal 200'/NM climb gradient, take-off must occur no later than 2000' prior to departure end of runway.

DEPARTURE PROCEDURE: **Rwy 5,** climbing right turn via heading 120° and ECA VORTAC before proceedingon course. **Rwy 12,** climbing left turn via heading 050° and ECA VORTAC R-250 to ECA VORTAC before proceeding on course. **Rwy 30,** climbing right turn via heading 130° and ECA VORTAC R-250 to ECA VORTAC before proceeding on course.

NOTE: **Rwy 5,** bush 17' from departure end of runway, 67' right of centerline, 6' AGL/52' MSL. **Rwy 12,** multiple trees and bush beginning 240' from departure end of runway, 286' right of centerline, up to 39' AGL/76' MSL. **Rwy 30,** multiple poles, building, and terrain beginning 66' from departure end of runway, 228' left of centerline, up to 65' AGL/225' MSL. Multiple poles beginning 949' from departure end of runway, 28' right of centerline, up to 42' AGL/103' MSL.

CHICO, CA

CHICO MUNI

DEPARTURE PROCEDURE: **Rwys 13L/R,** climbing right turn. **Rwys 31L/R,** climbing left turn. **All aircraft,** climb via CIC R-205 to JINGO Int. Aircraft departing JINGO Int 020° CW 350° climb on course. All others climb in JINGO Int holding pattern (SE, right turns,320° inbound) to depart JINGO Int at or above 2800.

CLOVERDALE, CA

CLOVERDALE MUNI

TAKE-OFF MINIMUMS: **Rwy 14,** 400-2 or std. with a min. climb of 280' per NM to 1500, then a min. climb of 260' per NM to 3900. **Rwy 32,** NA.

DEPARTURE PROCEDURE: **Rwy 14,** climb direct STS VOR/DME. Continue climb in holding pattern (NW right turns, 140° inbound) to MEA for route of flight.

NOTE: **Rwy 14,** tree 9337' from departure end of runway, 4633' right of centerline, 150' AGL/889' MSL.

COLUMBIA, CA

COLUMBIA

TAKE-OFF MINIMUMS: **Rwy 17,** 300-1 with a min. climb rate of 300' per NM to 3000. **Rwy 35,** NA.

DEPARTURE PROCEDURE: **Rwy 17,** use FICHU RNAV DEPARURE. **Rwy 35,** NA.

NOTE: **Rwy 17,** 51' AGL pole 502' from departure end of runway, 368' right of centerline, 90' AGL tree 483' from departure end of runway, 535' right of centerline; 100 AGL tree 1258' from departure end of runway, 494' left of centerline;167' AGL tree 1644' from departure end of runway, 924' right of centerline.

COLUSA, CA

COLUSA COUNTY

DEPARTURE PROCEDURE: Climb direct to ILA VORTAC.

Attachment DR52-3
FAA Advisory Circular No. 90-66A

U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: RECOMMENDED STANDARD TRAFFIC PATTERNS AND PRACTICES FOR AERONAUTICAL OPERATIONS AT AIRPORTS WITHOUT OPERATING CONTROL TOWERS

Date: 8/26/93
Initiated by: ATP-230

AC No. 90-66A

1. PURPOSE.

This advisory circular (AC) calls attention to regulatory requirements and recommended procedures for aeronautical operations at airports without operating control towers. It recommends traffic patterns and operational procedures for aircraft, lighter than air, glider, parachute, rotorcraft, and ultralight vehicle operations where such use is not in conflict with existing procedures in effect at those airports.

2. CANCELLATION.

AC 90-66, Recommended Standard Traffic Patterns for Airplane Operations at Uncontrolled Airports, dated February 27, 1975, is cancelled.

3. PRINCIPAL CHANGES.

This AC has been updated to reflect current procedures at airports without operating control towers. Principal changes include: adding on "Other Traffic Pattern" section, amending appendix charts to remain consistent with the Airman's Information Manual (AIM), expanding the "Related Reading Material" section from "airplane" to "aeronautical" operations, adding definition and references to Common Traffic Advisory Frequency (CTAF), acknowledging straight-in approaches are not prohibited but may be operationally advantageous, and adding a paragraph on wake turbulence.

4. DEFINITIONS.

a. Airports Without Operating Control Towers. Airports without control towers or an airport with a control tower which is not operating. These airports are commonly referred to as non-towered, uncontrolled, or part-time towered airports.

b. Common Traffic Advisory Frequency (CTAF). A frequency designed for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower. The CTAF may be a UNICOM, MULTICOM, flight service station, or tower frequency and is identified in appropriate aeronautical publications.

5. RELATED READING MATERIAL.

a. Airport/Facility Directory (AFD).

b. Airman's Information Manual (AIM).

c. Fly Neighborly Guide, Helicopter Association International.

d. Aviation USA, Aircraft Owners and Pilots Association (AOPA).

e. State aviation publications.

f. Various pilot guides.

g. Pilot Operations at Nontowered Airports, AOPA Air Safety Foundation pamphlet.

h. Guidelines for the Operation of Ultralight Vehicles at Existing Airports, United States Ultralight Association.

i. Facts for Pilots, United States Parachute Association.

j. The latest addition of the following AC's also contain information applicable to operations at airports without operating control towers:

(1) AC 90-23, Aircraft Wake Turbulence.

(2) AC 90-42, Traffic Advisory Practices at Airports Without Operating Control Towers.

(3) AC 90-48, Pilot's Role in Collision Avoidance.

(4) AC 91-32, Safety In and Around Helicopters.

(5) AC 103-6, Ultralight Vehicle Operations-Airports, Air Traffic Control, and Weather.

(6) AC 105-2, Sport Parachute Jumping.

6. BACKGROUND AND SCOPE.

a. Regulatory provisions relating to traffic patterns are found in Parts 91, 93, and 97 of the Federal Aviation Regulations (FAR). The airport traffic

patterns contained in Part 93 relate primarily to those airports where there is a need for unique traffic pattern procedures not provided for in Part 91. Part 97 addresses instrument approach procedures. At airports without operating control towers, Part 91 requires only that pilots of airplanes approaching to land make all turns to the left unless light signals or visual markings indicate that turns should be made to the right.

b. The Federal Aviation Administration (FAA) believes that observance of a standard traffic pattern and the use of CTAF procedures as detailed in AC 90–42 will improve the safety and efficiency of aeronautical operations at airports without operating control towers.

7. GENERAL OPERATING PRACTICES.

a. Use of standard traffic patterns for all aircraft and CTAF procedures by radio–equipped aircraft are recommended at all airports without operating control towers. However, it is recognized that other traffic patterns may already be in common use at some airports or that special circumstances or conditions exist that may prevent use of the standard traffic pattern.

b. The use of any traffic pattern procedure does not alter the responsibility of each pilot to see and avoid other aircraft. Pilots are encouraged to participate in "Operation Lights On," which is a voluntary pilot safety program described in the AIM designed to enhance the "see–and–avoid" requirement.

c. As part of the preflight familiarization with all available information concerning a flight, each pilot should review all appropriate publications (AFD, AIM, Notices to Airmen (NOTAM), etc.), for pertinent information on current traffic patterns at the departure and arrival airports.

d. It is recommended that pilots utilize visual indicators, such as the segmented circle, wind direction indicator, landing direction indicator, and traffic pattern indicators which provide traffic pattern information.

e. The FAA encourages pilots to use the standard traffic pattern. However, for those pilots who choose to execute a straight–in approach, maneuvering for and execution of the approach should be completed so as not to disrupt the flow of arriving and departing traffic. Therefore, pilots operating in the traffic pattern should be alert at all times to aircraft executing straight–in approaches.

f. Pilots who wish to conduct instrument approaches should be particularly alert for other aircraft in the pattern so as to avoid interrupting the flow of traffic. Position reports on the CTAF should include distance and direction from the airport, as well as the pilot's intentions upon completion of the approach.

g. Pilots of inbound nonradio–equipped aircraft should determine the runway in use prior to entering the traffic pattern by observing the landing direction indicator or by other means. Pilots should be aware that procedures at airports without operating control towers generally do not require the use of two–way radios; therefore, pilots should be especially vigilant for other aircraft while operating in the traffic pattern.

h. Wake turbulence is generated by all aircraft. Therefore, pilots should expect to encounter turbulence while operating in a traffic pattern and in proximity to other aircraft. Aircraft components and equipment can be damaged by wake turbulence. In flight, avoid the area below and behind the aircraft generating turbulence especially at low altitude where even a momentary wake encounter can be hazardous. All operators should be aware of the potential adverse effects that their wake, rotor or propeller turbulence has on light aircraft and ultralight vehicles.

8. RECOMMENDED STANDARD TRAFFIC PATTERN.

Airport owners and operators, in coordination with the FAA, are responsible for establishing traffic patterns. However, the FAA encourages airport owners and operators to establish traffic patterns as recommended in this AC. Further, left traffic patterns should be established except where obstacles, terrain, and noise–sensitive areas dictate otherwise. Appendix 1 contains diagrams for recommended standard traffic patterns.

a. Prior to entering the traffic pattern at an airport without an operating control tower, aircraft should avoid the flow of traffic until established on the entry leg. For example, wind and landing direction indicators can be checked while at an altitude above the traffic pattern. When the proper traffic pattern direction has been determined, the pilot should then proceed to a point well clear of the pattern before descending to the pattern altitude.

b. Arriving aircraft should be at the appropriate traffic pattern altitude before entering the traffic pattern. Entry to the downwind leg should be at a 45–degree angle abeam the midpoint of the runway.

c. It is recommended that airplanes observe a 1000-foot above ground level (AGL) traffic pattern altitude. Large and turbine-powered airplanes should enter the traffic pattern at an altitude of 1,500 feet AGL or 500 feet above the established pattern altitude. A pilot may vary the size of the traffic pattern depending on the aircraft's performance characteristics.

d. The traffic pattern altitude should be maintained until the aircraft is at least abeam the approach end of the landing runway on the downwind leg.

e. The base leg turn should commence when the aircraft is at a point approximately 45 degrees relative bearing from the runway threshold.

f. Landing and takeoff should be accomplished on the operating runway most nearly aligned into the wind. However, if a secondary runway is used, pilots using the secondary runway should avoid the flow of traffic to the runway most nearly aligned into the wind.

g. Airplanes on takeoff should continue straight ahead until beyond the departure end of the runway. Aircraft executing a go-around maneuver should continue straight ahead, beyond the departure end of the runway, with the pilot maintaining awareness of other traffic so as not to conflict with those established in the pattern. In cases where a go-around was caused by an aircraft on the runway, maneuvering parallel to the runway may be required to maintain visual contact with the conflicting aircraft.

h. Airplanes remaining in the traffic pattern should not commence a turn to the crosswind leg until beyond the departure end of the runway and within 300 feet below traffic pattern altitude, with the pilot ensuring that the turn to downwind leg will be made at the traffic pattern altitude.

i. When departing the traffic pattern, airplanes should continue straight out or exit with a 45-degree left turn (right turn for right traffic pattern) beyond the departure end of the runway after reaching pattern altitude. Pilots need to be aware of any traffic entering the traffic pattern prior to commencing a turn.

j. Airplanes should not be operated in the traffic pattern at an indicated airspeed of more than 200 knots (230 mph).

k. Throughout the traffic pattern, right-of-way rules apply as stated in FAR Part 91.113. Any aircraft in distress has the right-of-way over all other aircraft. In addition, when converging aircraft are of different categories, a balloon has the right-of-way over any other category of aircraft; a glider has the right-of-way over an airship, airplane, or rotorcraft; and an airship has the right-of-way over an airplane or rotorcraft.

9. OTHER TRAFFIC PATTERNS.

Airport operators routinely establish local procedures for the operation of gliders, parachutists, lighter than air aircraft, helicopters, and ultralight vehicles. Appendices 2 and 3 illustrate these operations as they relate to recommended standard traffic patterns.

a. Rotorcraft.

(1) In the case of a helicopter approaching to land, the pilot must avoid the flow of fixed-wing aircraft and land on a marked helipad or suitable clear area. Pilots should be aware that at some airports, the only suitable landing area is the runway.

(2) All pilots should be aware that rotorcraft may fly slower and approach at steeper angles than airplanes. Air taxi is the preferred method for helicopter ground movements which enables the pilot to proceed at an optimum airspeed, minimize downwash effect, and conserve fuel. However, flight over aircraft, vehicles, and personnel should be avoided.

(3) In the case of a gyrocopter approaching to land, the pilot should avoid the flow of fixed-wing aircraft until turning final for the active runway.

(4) A helicopter operating in the traffic pattern may fly a pattern similar to the airplane pattern at a lower altitude (500 AGL) and closer to the airport. This pattern may be on the opposite side of the runway with turns in the opposite direction if local policy permits.

(5) Both classes of rotorcraft can be expected to practice power-off landing (autorotation) which will involve a very steep angle of approach and high rate of descent (1,500-2,000 feet/minute).

b. Gliders.

(1) A glider, including the tow aircraft during towing operations, has the right-of-way over powered aircraft.

(2) If the same runway is used by both airplanes and gliders, the glider traffic pattern will be inside the pattern of engine driven aircraft. If a "Glider Operating Area" is established to one side of a powered-aircraft runway, the glider pattern will normally be on the side of the airport closest to the "Glider Operating Area." This will allow gliders to fly the same direction traffic pattern as powered aircraft in one wind condition and necessitate a separate opposing direction traffic

pattern in the opposite wind condition. (See examples in Appendix 2, Glider Operations).

(3) Typically, glider traffic patterns have entry points (initial points) from 600 to 1,000 feet AGL.

c. Ultralight Vehicles.

(1) In accordance with FAR Part 103, ultralight vehicles are required to yield the right–of–way to all aircraft.

(2) Ultralight vehicles should fly the rectangular pattern as described in Appendix 2. Pattern altitude should be 500 feet below and inside the standard pattern altitude established for the airport. An ultralight pattern with its own dedicated landing area will typically have a lower traffic pattern parallel to the standard pattern with turns in the opposite direction.

(3) All pilots should be aware that ultralights will fly significantly slower than airplanes. In addition, ultralights may also exhibit very steep takeoff and approach angles. Turns may be executed near the end of the runway in order to clear the area expediently.

d. Lighter Than Air Aircraft.

(1) A balloon has the right–of–way over any other category of aircraft and does not follow a standard traffic pattern.

(2) Due to limited maneuverability, airships do not normally fly a standard traffic pattern. However, if a standard traffic pattern is flown, it will be at an airspeed below most other aircraft.

e. Parachute Operations.

(1) All activities are normally conducted under a NOTAM noting the location, altitudes, and time or duration of jump operations. The Airport/Facility Directory lists airports where permanent drop zones are located.

(2) Jumpers normally exit the aircraft either above, or well upwind of, the airport and at altitudes well above traffic pattern altitude. Parachutes are normally deployed between 2,000 feet and 5,000 feet AGL and can be expected to be below 3,000 feet AGL within 2 miles of the airport.

(3) Pilots of jump aircraft are required by Part 105 to establish two–way radio communications with the air traffic control facility or Flight Service Station which has jurisdiction over the affected airspace prior to jump operations for the purpose of receiving information in the aircraft about known air traffic in the vicinity. In addition, when jump aircraft are operating at or in the vicinity of an airport, pilots are also encouraged to provide advisory information on the CTAF, i.e., "Chambersburg traffic, jumpers away over Chambersburg.

(4) When a drop zone has been established on an airport, parachutists are expected to land within the drop zone. At airports that have not established drop zones, parachutists should avoid landing on runways, taxiways, aprons, and their associated safety areas. Pilots and parachutists should both be aware of the limited flight performance of parachutes and take steps to avoid any potential conflicts between aircraft and parachute operations.

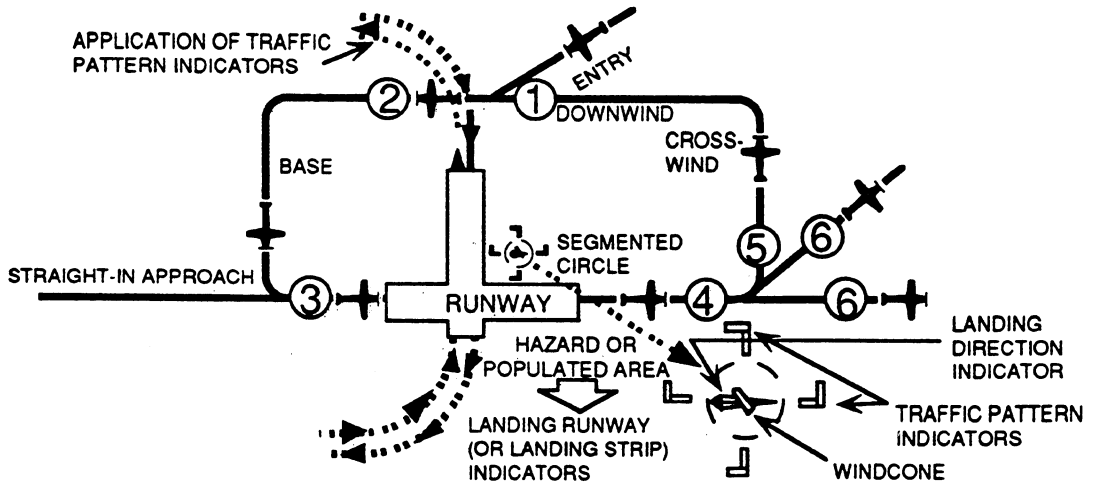
(5) Appendix 3 diagrams operations conducted by parachutists.

Harold W Becker

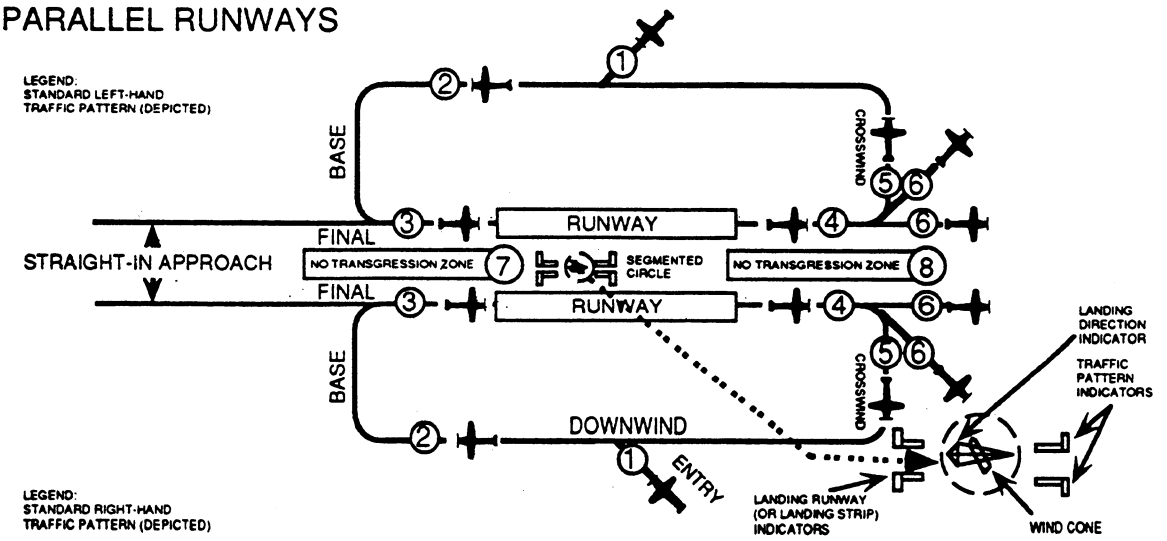
Harold W. Becker
Acting Director, Air Traffic
Rules and Procedures Service

AIRPORT OPERATIONS

SINGLE RUNWAY



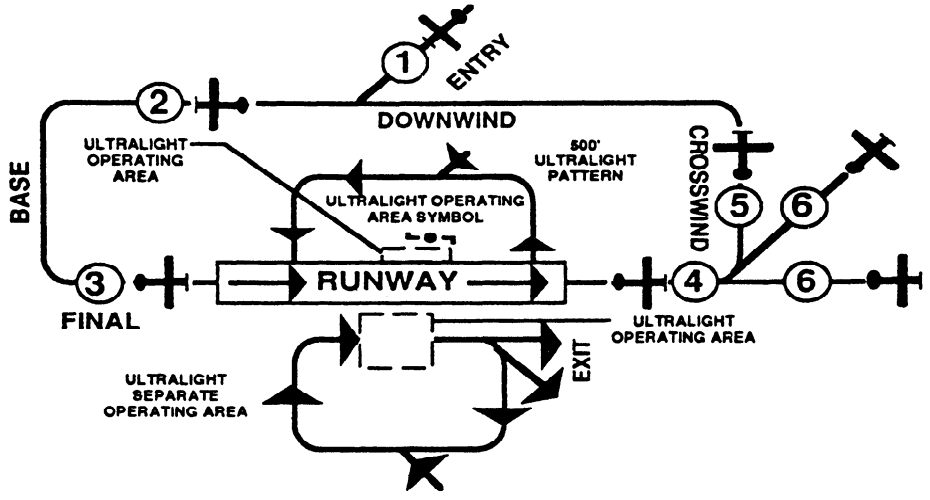
PARALLEL RUNWAYS



KEY

1. Enter pattern in level flight, abeam the midpoint of the runway, at pattern altitude. (1000' AGL is recommended pattern altitude unless established otherwise).
2. Maintain pattern altitude until abeam approach end of the landing runway, or downwind leg.
3. Complete turn to final at least 1/4 mile from the runway.
4. Continue straight ahead until beyond departure end of runway.
5. If remaining in the traffic pattern, commence turn to crosswind leg beyond the departure end of the runway, within 300 feet of pattern altitude.
6. If departing the traffic pattern, continue straight out, or exit with a 45º left turn beyond the departure end of the runway, after reaching pattern altitude.
7. Do not overshoot final or continue on a track which will penetrate the final approach of the parallel runway.
8. Do not continue on a track which will penetrate the departure path of the parallel runway.

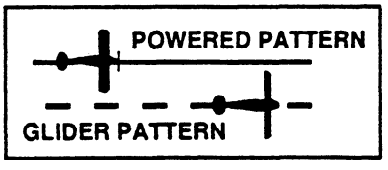
ULTRALIGHT OPERATIONS

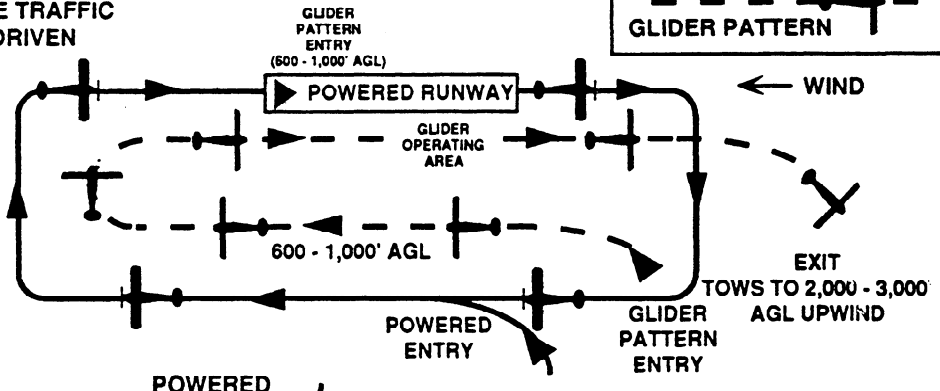


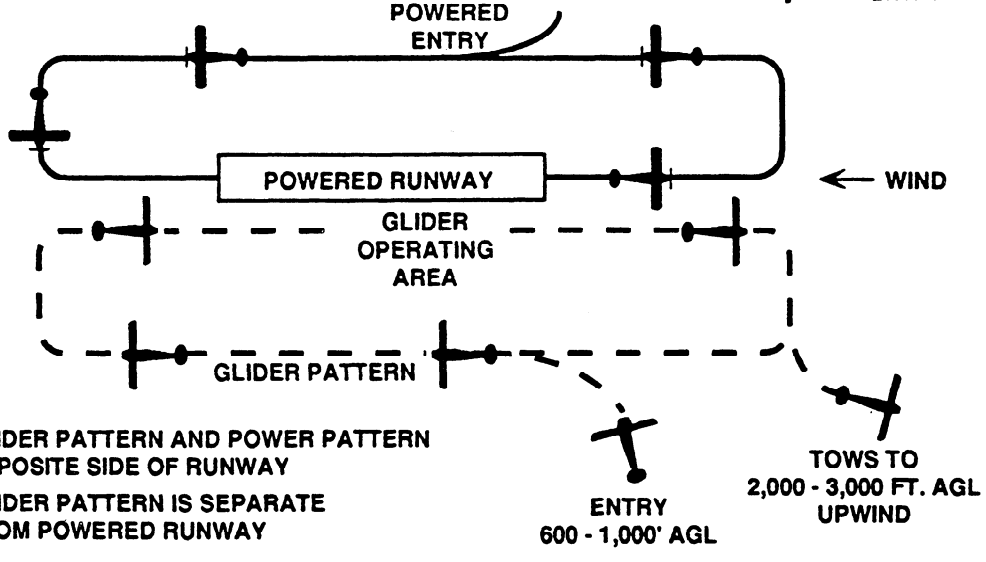
GLIDER OPERATIONS

GLIDER PATTERN AND POWER PATTERN SAME SIDE OF RUNWAY

GLIDER PATTERN INSIDE TRAFFIC PATTERN FOR ENGINE-DRIVEN AIRCRAFT



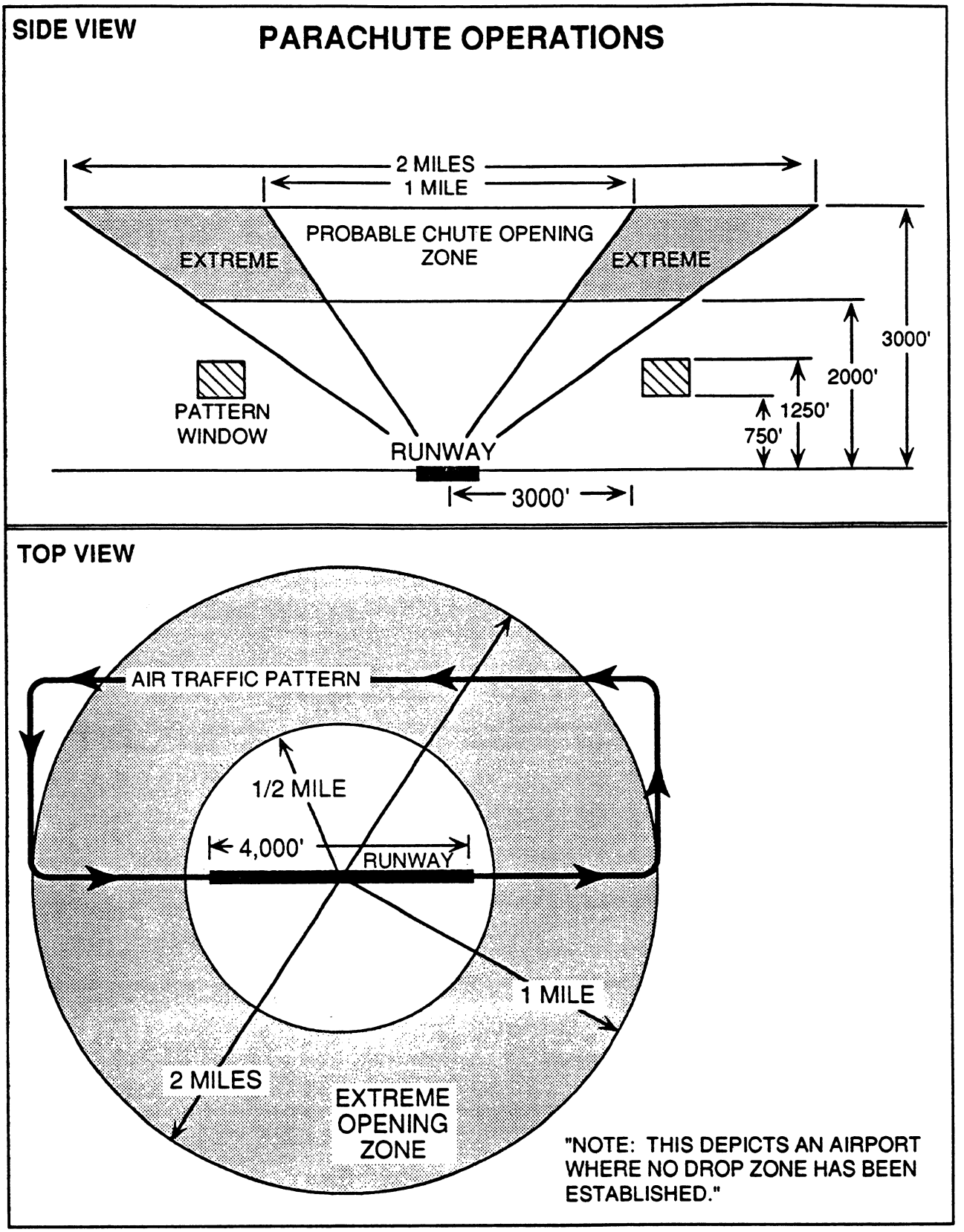




GLIDER PATTERN AND POWER PATTERN OPPOSITE SIDE OF RUNWAY

GLIDER PATTERN IS SEPARATE FROM POWERED RUNWAY

PARACHUTE OPERATIONS



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Attachment DR52-4
Assessment of Vertical Plume Velocities

Assessment of Vertical Plume Velocities for the Mariposa Energy Project

Prepared for

Ellison, Schneider & Harris, LLP

KE0907697

October 2009

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1. Introduction

Katestone Environmental has been commissioned by Ellison, Schneider & Harris, LLP to prepare a plume vertical velocity assessment of a proposed gas-fired power station located near Tracy in California. The proposed power station, called the Mariposa Energy Project (MEP) is to consist of four simple-cycle gas-turbines and a configuration of thirty-two cooling fans.

The assessment presented in this report is based on the guidelines for aviation safety set out by the Australian Civil Aviation Safety Authority (CASA) and presented in "*Guidelines for conducting plume rise assessments (CASA, 2004)*".

The aim of this assessment is to determine the height at which the average vertical plume velocity emitted from the power station achieves the threshold value of 4.3 m/s (846.5 ft/min, 9.6 mph) and the upper limit of light turbulence of 6.09 m/s (1193 ft/min, 13.63 mph). This report details the methodology used for the vertical plume velocity assessment and summarises the plume heights of interest based upon local flight path elevation and plume downwind distance from the MEP power station.

2. Local terrain and surrounding land use

The MEP is to be located in a rural area on the western edge of San Joaquin Valley, California. The MEP is located approximately 12 kilometres (7.4 miles) west-northwest of the town of Tracy. The terrain within the region consists of undulating hills to the west, with flatter farming activities across the valley floor. The Pacific Ocean is located 80 kilometres (50 miles) to the west of the site. There are many terrain influences that would affect local scale meteorology between the ocean and the site.

Figure 1 shows an image of the area surrounding the MEP. The closest airport to the facility is the Byron Airfield located approximately 4.4 kilometres (2.7 miles) to the northwest.

3. Vertical plume velocity guidelines

Since the development of an open-cycle gas turbine power station at the end of a runway in Australia in the mid 1990s, the CASA has taken a keen interest in the siting of industries with discharges to the atmosphere. Potential risks that could affect the safety of aircraft include tall visible or invisible obstructions. Visible obstructions include structures such as tall stacks or communication towers. Invisible obstructions include vertical industrial exhausts that are of high velocity and buoyancy. CASA has issued an Advisory Circular, (CASA 2004) that specifies the requirements and methodologies to be used to assess whether a new industrial plume is likely to have adverse implications for aviation safety. In the absence of any guidance for such activities in California, the CASA guidelines have been used in this assessment. This methodology was accepted by the California Energy Commission for the Russell City Energy Center assessment of vertical plume velocities (CEC, 2007).

The general CASA requirement is to determine the height at which the plume (or plumes) could exceed an average vertical velocity threshold of 4.3 m/s (846.5 ft/min, 9.6 mph) and to determine the dimensions of the plume in these circumstances. If the average vertical velocity threshold of 4.3 m/s (846.5 ft/min, 9.6 mph) is significantly exceeded at the expected flight path elevation, then additional evaluations may be under taken. The frequency of in-plume vertical velocities at the lowest height an aircraft may possibly travel over the site, and at other heights are also required. For large plumes that are remote from airports, CASA requires an assessment that determines the size of potential plumes.

The Flight Pattern Altitude from the Byron Airfield above the proposed site is 328 metres (1076 feet) above mean sea level. With a base elevation of the site at 38.4 metres (126 feet), the plume elevation of interest above ground level is 290 metres (950 feet). Subsequently results of this study will be presented as above ground level and compared to the 290 m (950 feet) above ground level or 328 metres (1076 feet) above mean sea level Flight Pattern Altitude.

For this report, the average plume vertical velocity has been used. While there are some sections of the plume that may have a vertical velocity higher than the average, it has been Katestone Environmental's experience that these peak plume vertical velocity predictions do not assess aviation safety risk appropriately. Past discussions between Katestone Environmental and CASA have concluded that analysis of the average plume vertical velocity is appropriate for these assessments. CASA use the 0.1 percentile over one or more years as the guideline for assessing an appropriate level of risk. The threshold value of 4.3 m/s (846.5 ft/min, 9.6 mph) for the average vertical velocity has been used in this assessment as a preliminary review of the plume extent. Subsequent analysis of the threshold value of 6.09 m/s (1193 ft/min, 13.63 mph) has been performed to characterise the possible upper limits of light turbulence (see Lester, 2007) generated by the MEP power station.

4. Stack Characteristics

For this assessment it is assumed that the power station operates continuously throughout the year. A normal operating scenario for the gas turbines and cooling fans have been modelled as detailed below. For each of the plumes, an assessment has been made of a single plume from one operating gas turbine and of merged plumes from all operating turbines. The stack characteristics for various operating conditions used in this assessment are presented in Table 1.

Table 1 Stack characteristics used in modelling

Parameters	Units	Gas Turbines	Cooling Fans
Number of units	-	4	32
Stack height	metres	24.23	9.41
	feet	79.5	30.88
Stack diameter	metres	3.66	5.5
	feet	12	18
Stack temperature	°C	449	n/a
	°F	840	Ambient + 18.3°F
Exit velocity	metres/sec	27.5	3.11
	feet/sec	90.2	10.2
	miles/hour	61.5	6.9
Flow rate per unit (actual)	m^3/ sec	289	73
	ft^3/min	612,224	155,875
Stack separation	metres	47	n/a
	feet	154	n/a

5. Methodology

In Australia, CASA requires that the proponent of a facility with an exhaust plume that has an average vertical velocity exceeding the threshold value 4.3 m/s (846.5 ft/min, 9.6 mph) at the Obstacle Limitation Surface or at 110 metres (361 feet) above ground level anywhere else to assess the level of risk posed by the plume to aircraft operations. Attachment A of CASA's Advisory Circular provides a recommended methodology that adopts TAPM (The Air Pollution Model) to conduct plume rise assessments for single exhaust plumes. The CASA Advisory Circular does not specify a method for dealing with multiple plumes and possible buoyancy enhancements but allows for the use of alternative techniques.

For a scenario involving the merging of stack plumes, plume growth will involve several stages:

(a) In the first stage very close to the stack exit, the high plume momentum will result in a short section in which the conditions at the centre of each plume are unaffected by ambient conditions. The potential core in which maximum core velocity and temperature remain constant extends approximately a distance of 6.25 D (D is the stack diameter) above the outlet in calm conditions. At the end of this stage, the plume-average velocity has decreased to half of the exit velocity, with a corresponding increase in effective plume diameter.

(b) In the second stage, the plume dynamics and trajectories respond to ambient conditions, with much cooler air being entrained into the outer regions of the plume. The momentum and buoyancy of the plume significantly influence its rise as this air mixes into the plume and provides dilution of the exhaust. This dilution is very sensitive to ambient wind speed.

(c) In the third stage of plume development, plume rise is due entirely to the buoyancy of the plume and continues until there is an equalization of turbulence conditions within and outside the plume. This final rise is often only achieved at distances over 100 metres downstream of the stack; the effective average vertical velocity is then close to zero.

In this study TAPM (Version 4.0.2) was used to calculate the plume height and horizontal movement downwind after discharge from the stack for a full year of meteorological conditions. Possible buoyancy enhancement associated with multiple plumes has been accounted for as follows:

- A single gas turbine plume is modelled using TAPM.
- The methodology described by Manins et al (1992) has been used to calculate the enhancement of vertical velocities that would occur if the plumes from multiple stacks merge and form a higher buoyancy combined plume. The average final plume rise height of a single plume, the number of stacks and the average separation distance between stacks is used to derive the buoyancy enhancement factor.
- This enhancement factor is input into TAPM as a second iteration to represent the impacts on vertical velocities from the four merged turbine plumes.

A detailed description of how the TAPM has been configured, along with a verification of meteorology is included in Appendix A. The methodology presented and used in this assessment is the recommended approach in the TAPM documentation.

6. Results

A one-year TAPM simulation using site representative meteorological conditions for 2003 has been conducted to quantify:

(a) The plume height of interest at which the average vertical velocity of the plume falls below 4.3 m/s (846.5 ft/min, 9.6 mph) and 6.09 m/s (1193 ft/min, 13.63 mph).

(b) The frequency at which plume heights of various magnitudes are likely to occur.

(c) The maximum extent of the plume for various heights above the ground where the vertical velocity of the plume is above the threshold velocity.

Results for the MEP gas turbines operating under normal conditions are presented in Table 2 to Table 7.

Modelling of the cooling fans has identified that insufficient buoyancy is generated from merging of adjacent fans to result in an enhanced vertical plume velocity that will exceed 4.3 m/s (846.5 ft/min, 9.6 mph). At no time will the cooling fans result in an exit velocity exceeding 4.3 m/s (846.5 ft/min, 9.6 mph).

The height above ground level at which the average vertical plume velocity is above 4.3 m/s (846.5 ft/min, 9.6 mph) for less than 0.1% of the time, 9 hours per year, is 345 metres (1132 feet) above ground level and 172 metres (564 feet) above ground level for a velocity of 6.09 m/s (1193 ft/min, 13.63 mph).

The average vertical plume velocity is predicted to be above 4.3 m/s (846.5 ft/min, 9.6 mph) at the Flight Pattern Altitude of 290 metres (950 feet) above ground level, or 1076 feet above mean sea level, for 17 hours of the year, and never above 6.09 m/s (1193 ft/min, 13.63 mph).

Figure 2 and Figure 3 show the frequency of plume heights for each hour of the day for the single and merged gas turbine plumes for threshold velocities of 4.3 m/s and 6.09 m/s respectively.

The plume extent is calculated as the sum of the distance the plume travels downwind plus the plume radius. The results in Table 4 and Table 5 indicate that the average vertical velocity of the plume is likely to be below 4.3 m/s (846.5 ft/min, 9.6 mph) under all meteorological conditions at a horizontal distance of 95 metres (313 feet) from the power station stacks.

The results in Table 6 and Table 7 indicate that the average vertical velocity of the plume is likely to be below 6.09 m/s (1193 ft/min, 13.63 mph) under all meteorological conditions at a horizontal distance of 35 metres (115 feet) from the power station stacks.

There is no interaction between the cooling fan discharges of the air cooled condenser plumes and the gas turbine plumes that will result in additional enhancement of plume buoyancy.

The conservative nature of the buoyancy enhancement methodology employed for the interaction of the four gas turbines (i.e. conservation of buoyancy of all plumes at stack top); will ensure that this assessment defines the upper limit of any plume generated by the MEP.

Table 2 **Plume height above ground level for the Mariposa Energy Project power station and the proportion of the simulation year that the threshold velocity of 4.3 m/s (846.5 ft/min, 9.6 mph) is exceeded at that plume height**

Percent of time (%)	Plume height (above ground level)			
	Gas Turbines			
	Single		Four Merged	
	Metres	Feet	Metres	Feet
90	37	121	37	121
80	37	121	38	125
70	37	121	38	125
60	37	121	38	125
50	38	125	43	141
40	38	125	44	144
30	38	125	54	177
20	39	128	65	213
10	45	148	95	312
9	56	184	100	328
8	57	187	108	354
7	61	200	114	374
6	62	203	121	397
5	67	220	130	427
4	69	226	143	469
3	74	243	163	535
2	83	272	199	653
1	94	308	242	794
0.5	118	387	273	896
0.3	139	456	291	955
0.2	148	486	315	1033
0.1	159	522	345	1132
0.05	187	614	372	1220
Maximum	210	689	399	1309

Table 3 **Plume height above ground level for the Mariposa Energy Project power station and the proportion of the simulation year that the threshold velocity of 6.09 m/s (1193 ft/min, 13.63 mph) is exceeded at that plume height**

Percent of time (%)	Plume height (above ground level)			
	Gas Turbines			
	Single		Four Merged	
	Metres	Feet	Metres	Feet
90	35	115	41	135
80	41	135	41	135
70	41	135	41	135
60	41	135	41	135
50	41	135	41	135
40	41	135	41	135
30	41	135	42	138
20	42	138	49	161
10	43	141	64	210
9	43	141	65	213
8	49	161	71	233
7	49	161	73	240
6	50	164	79	259
5	50	164	79	259
4	50	164	83	272
3	51	167	89	292
2	57	187	103	338
1	62	203	122	400
0.5	66	217	145	476
0.3	72	236	155	509
0.2	76	249	162	531
0.1	80	262	172	564
0.05	89	292	195	640
Maximum	114	374	212	696

Table 4 Predicted plume extent (plume radius + distance downwind in metres and feet) for a single gas turbine where the average vertical velocity exceeds the 4.3 m/s (846.5 ft/min, 9.6 mph) threshold for various heights above ground level

Height above ground level	Plume extent (Metres)				Height above ground level	Plume extent (Feet)			
	Min	Mean	0.1 percentile	Max		Min	Mean	0.1 percentile	Max
x <= 100 m	15	20	30	32	x <= 328 ft	49	67	100	104
100 < x <= 150 m	24	31	38	38	328 < x <= 492 ft	79	102	125	125
150 < x <= 200 m	29	34	42	42	492 < x <= 656 ft	97	112	138	138
200 < x <= 250 m	29	36	40	40	656 < x <= 820 ft	97	118	132	132
250 < x <= 300 m	NA	NA	NA	NA	820 < x <= 984 ft	NA	NA	NA	NA
300 < x <= 350 m	NA	NA	NA	NA	984 < x <= 1148 ft	NA	NA	NA	NA
350 < x <= 400 m	NA	NA	NA	NA	1148 < x <= 1312 ft	NA	NA	NA	NA

Table 5 Predicted plume extent (plume radius + distance downwind in metres and feet) for four merged gas turbines where the average vertical velocity exceeds the 4.3 m/s (846.5 ft/min, 9.6 mph) threshold for various heights above ground level

Height above ground level	Plume extent (Metres)				Height above ground level	Plume extent (Feet)			
	Min	Mean	0.1 percentile	Max		Min	Mean	0.1 percentile	Max
x <= 100 m	19	29	54	56	x <= 328 ft	61	95	177	185
100 < x <= 150 m	43	55	67	67	328 < x <= 492 ft	141	180	221	221
150 < x <= 200 m	46	63	77	77	492 < x <= 656 ft	151	205	253	253
200 < x <= 250 m	47	64	86	86	656 < x <= 820 ft	154	209	281	281
250 < x <= 300 m	51	69	95	95	820 < x <= 984 ft	166	227	313	313
300 < x <= 350 m	47	68	95	95	984 < x <= 1148 ft	154	224	312	312
350 < x <= 400 m	58	71	87	87	1148 < x <= 1312 ft	191	233	287	287

Table 6 Predicted plume extent (plume radius + distance downwind in metres and feet) for a single gas turbine where the average vertical velocity exceeds the 6.09 m/s (1193 ft/min, 13.63 mph) threshold for various heights above ground level

Height above ground level	Plume extent (Metres)				Height above ground level	Plume extent (Feet)			
	Min	Mean	0.1 percentile	Max		Min	Mean	0.1 percentile	Max
x <= 50 m	10	13	14	14	x <= 164 ft	33	41	46	47
50 < x <= 100 m	10	12	14	14	164 < x <= 328 ft	33	40	46	46
100 < x <= 150 m	13	14	14	14	328 < x <= 492 ft	43	44	46	46
150 < x <= 200 m	NA	NA	NA	NA	492 < x <= 656 ft	NA	NA	NA	NA
200 < x <= 220 m	NA	NA	NA	NA	656 < x <= 722 ft	NA	NA	NA	NA

Table 7 Predicted plume extent (plume radius + distance downwind in metres and feet) for four merged gas turbines where the average vertical velocity exceeds the 6.09 m/s (1193 ft/min, 13.63 mph) threshold for various heights above ground level

Height above ground level	Plume extent (Metres)				Height above ground level	Plume extent (Feet)			
	Min	Mean	0.1 percentile	Max		Min	Mean	0.1 percentile	Max
x <= 50 m	11	16	20	20	x <= 164 ft	37	53	65	66
50 < x <= 100 m	16	22	28	28	164 < x <= 328 ft	52	71	93	93
100 < x <= 150 m	21	28	35	35	328 < x <= 492 ft	69	91	115	115
150 < x <= 200 m	26	29	34	34	492 < x <= 656 ft	85	96	112	112
200 < x <= 220 m	30	31	31	31	656 < x <= 722 ft	98	101	103	103

7. Conclusions

An assessment of vertical plume velocities has been conducted in accordance with Australian Civil Aviation Safety Authority requirements for the Mariposa Energy Project power station. The outcomes of the assessment can be used to define the size of the plume around the Mariposa Energy Project power station.

The assessment has shown the following important characteristics:

- The average plume vertical velocities generated by the Mariposa Energy Project are unlikely to exceed the threshold of 4.3 m/s (846.5 ft/min, 9.6 mph) above a height of 345 metres (1132 feet) above ground level.

- The average plume vertical velocities generated by the Mariposa Energy Project are unlikely to exceed the threshold of 6.09 m/s (1193 ft/min, 13.63 mph) above a height of 172 metres (564 feet) above ground level.

- At the Flight Pattern Altitude of 290 metres (950 feet) above ground level, or 1076 feet above mean sea level, the average plume vertical velocity is predicted to be above 4.3 m/s (846.5 ft/min, 9.6 mph) for 17 hours of the year, and never above the velocity of 6.09 m/s (1193 ft/min, 13.63 mph).

- The average plume vertical velocities are likely to be below 4.3 m/s (846.5 ft/min, 9.6 mph) under all meteorological conditions at a distance of up to 95 metres (313 feet) from the Mariposa Energy Project power station stacks.

- The average plume vertical velocities are likely to be below 6.09 m/s (1193 ft/min, 13.63 mph) under all meteorological conditions at a distance of up to 35 metres (115 feet) from the Mariposa Energy Project power station stacks.

- At no time will the cooling fans result in an exit velocity exceeding 4.3 m/s (846.5 ft/min, 9.6 mph).

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(http://www.csiro.au/products/TAPM.html)

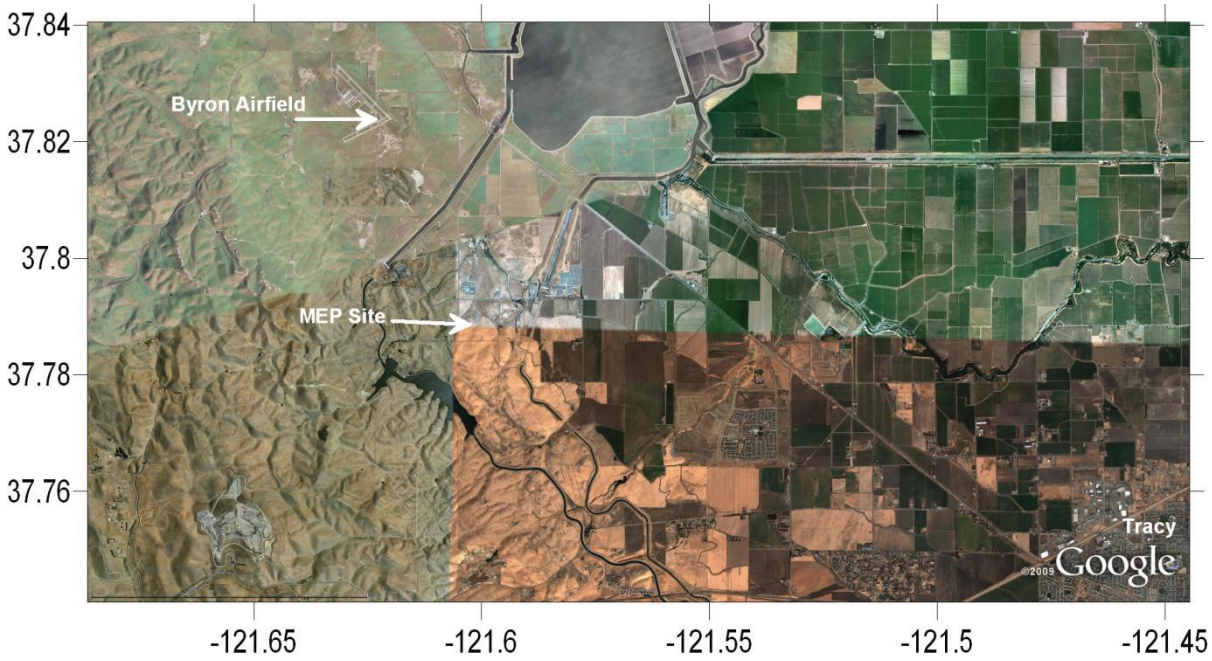


Figure 1 Location of the Mariposa Energy Project

Location: Tracy, California	**Data source:** Google Earth	**Units:** Latitude/Longitude
Type: Aerial map	**Prepared by:** A. Schloss	**Date:** October 2008

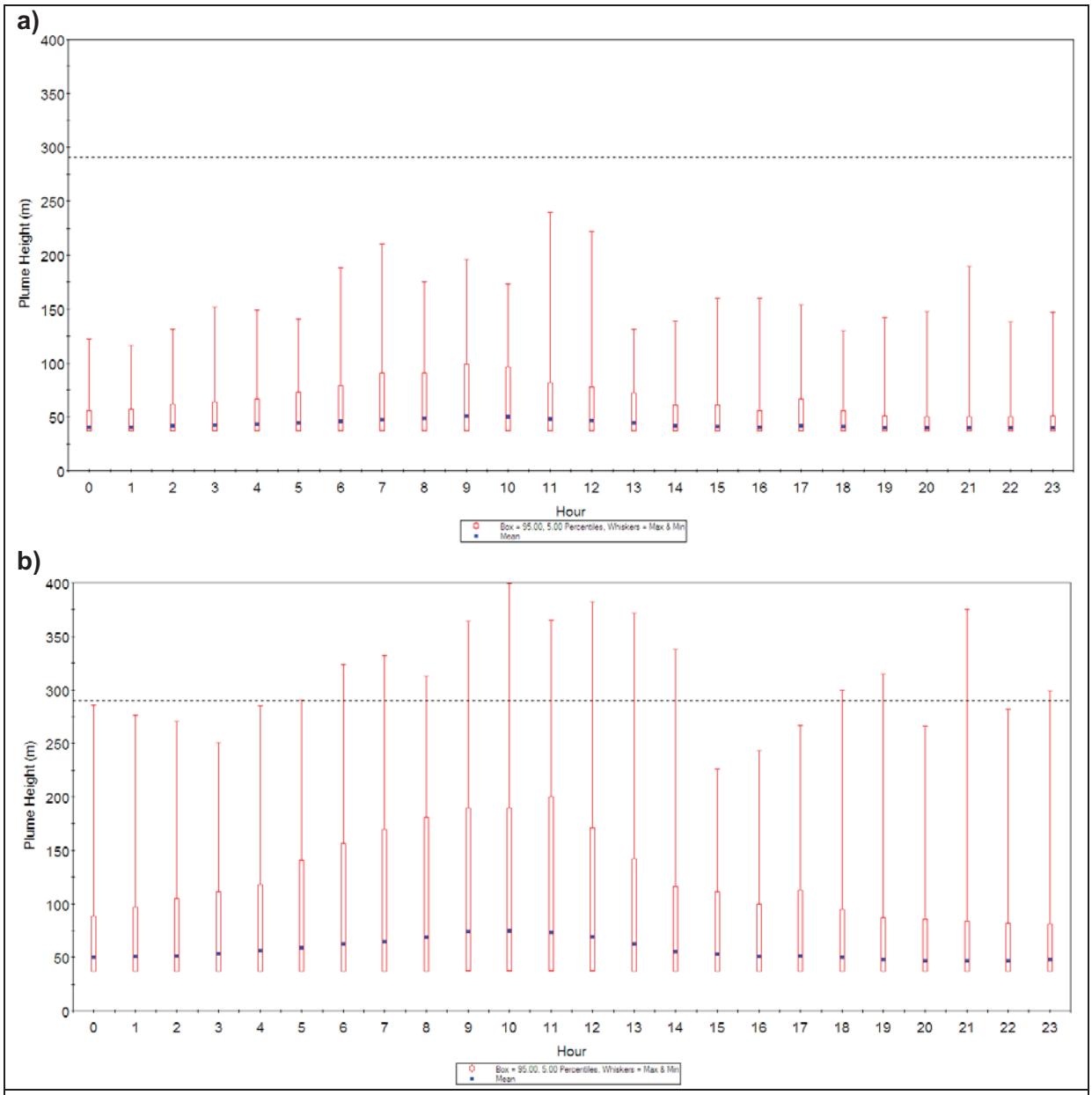


Figure 2 **Plume height versus hour of day for the Mariposa Energy Project gas turbines for a threshold velocity of 4.3 m/s (846.5 ft/min, 9.6 mph) presented with a Flight Pattern Altitude of 290 m above ground level (1076 feet above mean sea level) – for a) single and b) merged plumes**

Source: Gas Turbines	**Threshold Velocity:** 4.3 m/s (846.5 ft/min, 9.6 mph)	**Data source:** TAPM	**Units:** Metres above ground-level
Type: Box and Whiskers		**Prepared by:** A. Schloss	**Date:** October 2009

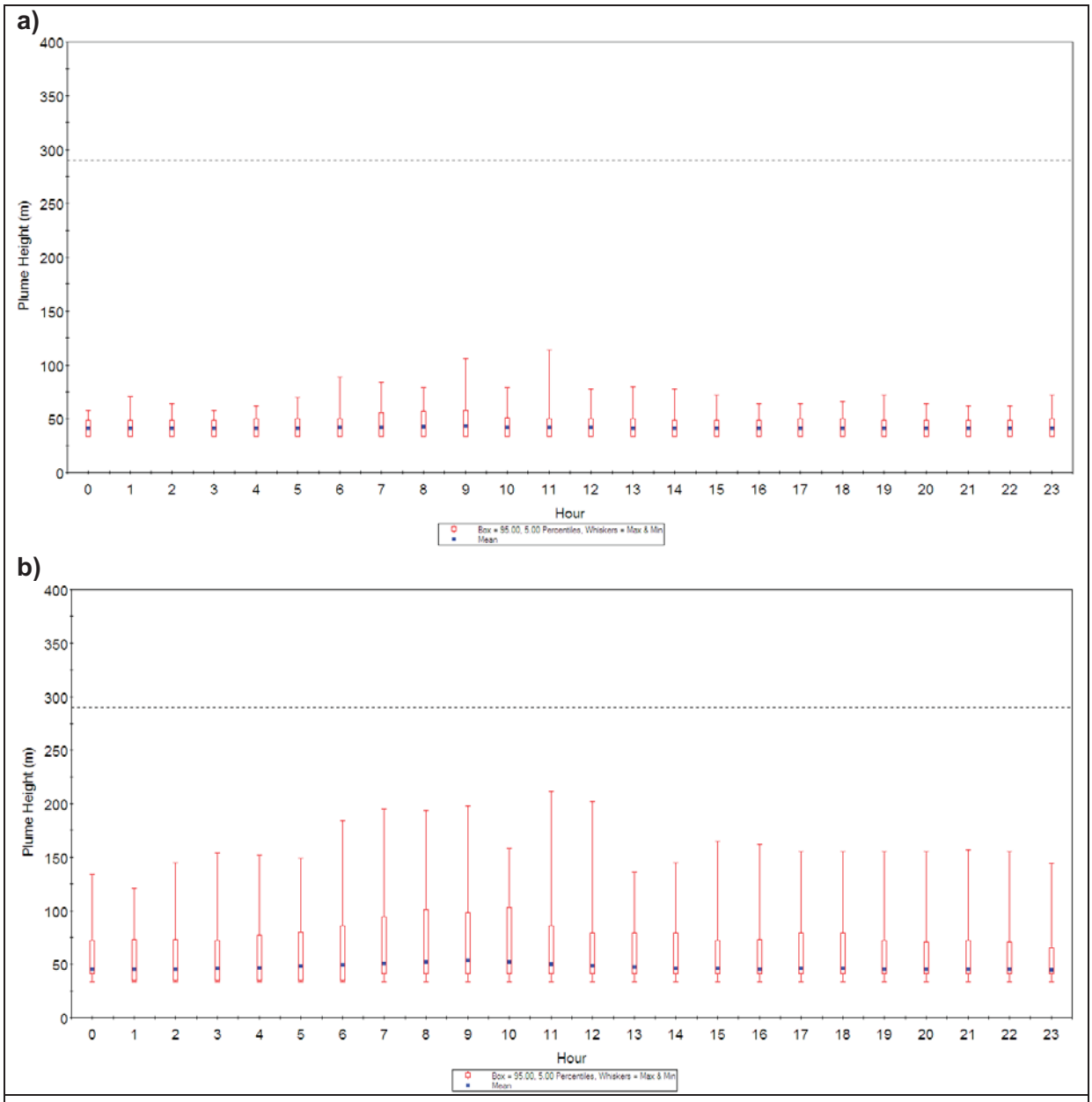


Figure 3 **Plume height versus hour of day for the Mariposa Energy Project gas turbines for a threshold velocity of 6.09 m/s (1193 ft/min, 13.63 mph) presented with a Flight Pattern Altitude of 290 m above ground level (1076 feet above mean sea level) – for a) single and b) merged plumes**

Source: Gas Turbines	**Threshold Velocity:** 6.09 m/s (1193 ft/min, 13.63 mph)	**Data source:** TAPM	**Units:** Metres above ground-level
Type: Box and Whiskers		**Prepared by:** A. Schloss	**Date:** October 2009

APPENDIX A
TAPM

A1.1 Methodology

The prognostic meteorological model, TAPM (The Air Pollution Model) Version 4.0.2, was developed by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) and has been validated by the CSIRO, Katestone Environmental and others for many locations in Australia, in southeast Asia and in North America (see http://www.csiro.au/products/TAPM.html for more details on the model and validation results from the CSIRO). Katestone Environmental has used the TAPM model throughout Australia as well as in parts of New Caledonia, Bangladesh, Vietnam and California. This model generally has performed well for simulating winds in a region. TAPM has proven to be a useful model for simulating meteorology in locations where detailed monitoring data is unavailable.

TAPM is a prognostic meteorological model which predicts the flows important to regional and local scale meteorology, such as sea breezes and terrain-induced flows from the larger-scale meteorology provided by the synoptic analyses. TAPM solves the fundamental fluid dynamics equations to predict meteorology at a mesoscale (20 kilometres to 200 kilometres) and at a local scale (down to a few hundred meters). TAPM includes parameterizations of cloud/rain micro-physical processes, urban/vegetation canopy and soil, and radiative fluxes.

TAPM requires synoptic meteorological information for the study region as input into the model. This information is generated by a global model similar to the large scale models used to forecast the weather. This assessment used the National Center for Environmental Prediction (NCEP)/National Center for Atmospheric Research (NCAR) reanalysis data (Kalnay et al., 1996) on horizontal wind components, temperature and moisture, to obtain the required synoptic fields for the model. These data have a horizontal resolution of 2.5º and a temporal resolution of six hours, while the vertical levels are in a pressure coordinate system with the lowest five levels being 1000, 925, 850, 700 and 600 hPa. TAPM uses this synoptic information, along with specific details of the location such as surrounding terrain, landuse, soil moisture content and soil type to simulate the likely meteorology of a region as well as at a specific location.

TAPM was setup as follows:

- 35 x 35 grid point domain with an mother grid of 30 kilometres and nested daughter grids of 10 kilometres, 3 kilometres and 1 kilometre;
- 25 vertical levels;
- Grid centered latitude 37° 47', longitude -121°-36';
- The TAPM defaults for sea surface temperature;
- Default options selected for advanced meteorological inputs;
- Default vegetation information; and
- The synoptic data used in the simulation is for the year 2003.

The year 2003 was selected from a five year period (2000 – 2004) of available data from the Modesto monitoring station. This year had the highest data capture rate, and a large number of light winds.

The TAPM land-use at a 1 kilometre resolution was mainly defined as low sparse shrubland and mid-dense seasonal pasture. Small regions of urban characterised landuse also existed. The soils were predominantly defined as sandy clay loam within the domain.

The Mariposa Energy Project Power Station sources were modelled in Lagrangian mode.

A1.2 Verification of winds

To determine the suitability of the meteorological data generated by TAPM, an evaluation of the predicted and measured winds was conducted for the meteorological station located at Modesto. This site was sourced as the nearest meteorological monitoring station location to the Mariposa Energy Project and used as an evaluation of TAPM model in simulating regional meteorological conditions.

The Modesto monitoring station is located approximately 60 kilometres (37.2 miles) east-southeast of the MEP site in an industrial area of the city. This suggests that it may not be representative of meteorological conditions at the Mariposa Energy Project. Wind roses are presented in Figure 4 to Figure 6 for the MEP site. Moderate to strong winds are typical from the south westerly direction.

Wind roses are presented in Figure 7 to Figure 9 that compare the measured and predicted wind speeds and wind directions at Modesto, without data assimilation used in the model. The wind roses suggest that TAPM simulates the winds quite well at the Modesto monitoring site and that the general wind pattern at Modesto is quite different to that at the MEP site.

Statistical correlation has been performed between the TAPM predicted and the measured wind speed and direction at the Modesto monitoring location. A vector correlation between the predicted and measured winds indicates a (magnitude, phase) of (0.711, -13.44). This is reasonably well correlated, suggesting that TAPM is appropriately simulating regional flows for the modelled period.

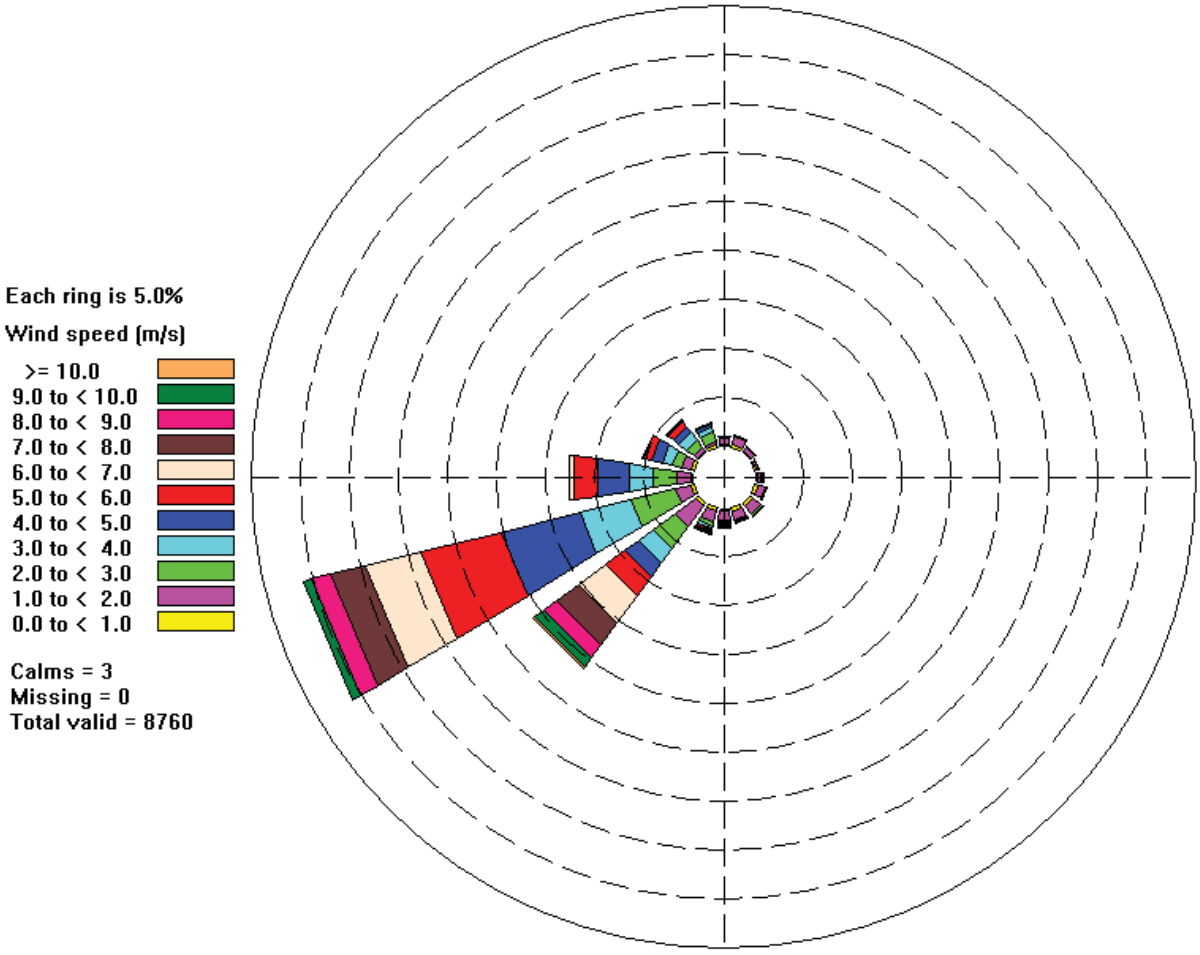


Figure 4 Annual wind rose as predicted by TAPM for the MEP site

Location: MEP Site	**Period:** Jan 2003 – Dec 2003	**Data source:** TAPM	**Units:** m/s and °
Type: Wind rose		**Prepared by:** SJD	**Date:** October 2009

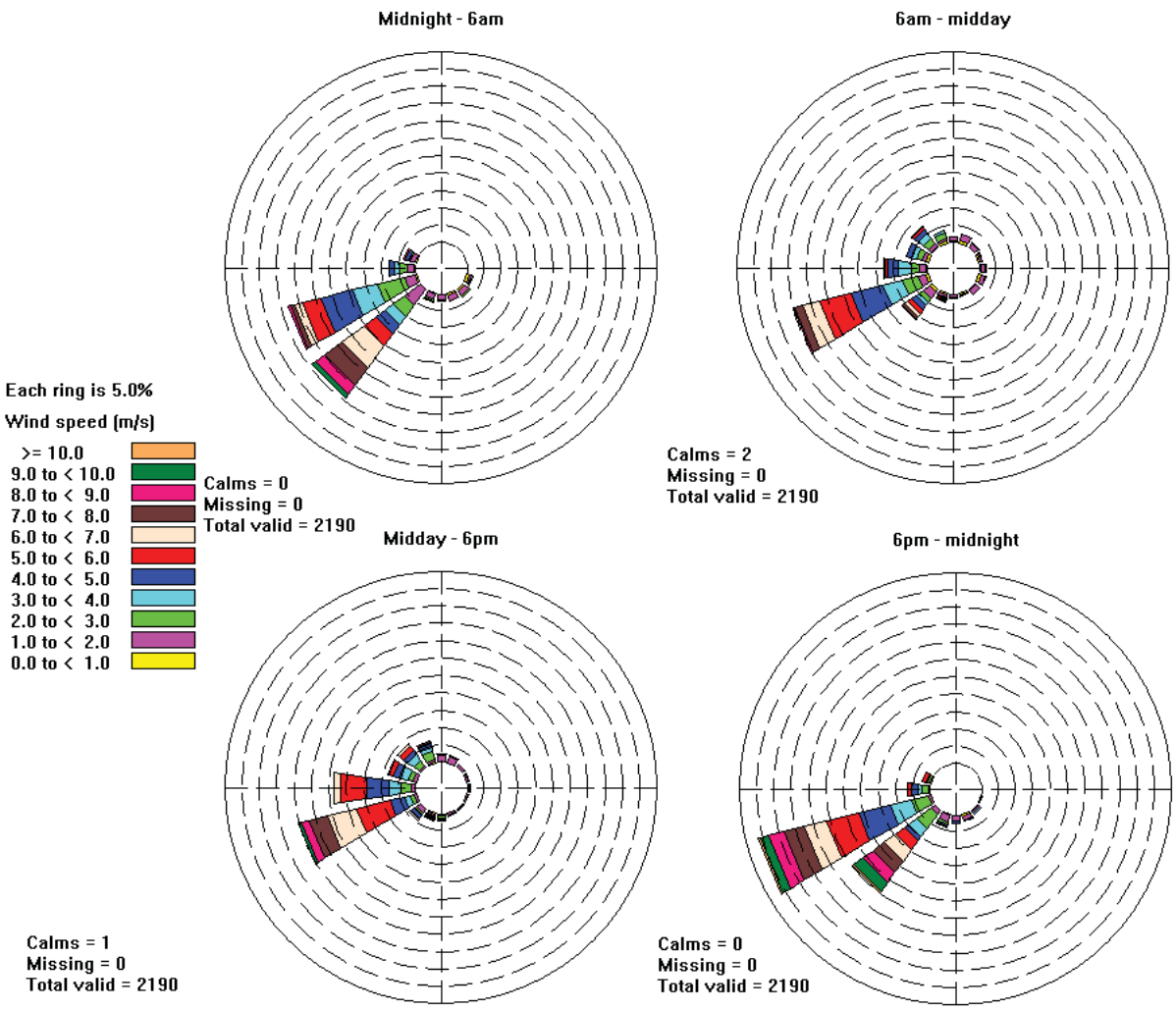


Figure 5 Daily wind roses as predicted by TAPM for the MEP site

Location:	**Period:**	**Data source:**	**Units:**
MEP Site	Jan 2003 – Dec 2003	TAPM	m/s and °
Type:		**Prepared by:**	**Date:**
Wind rose		SJD	October 2009

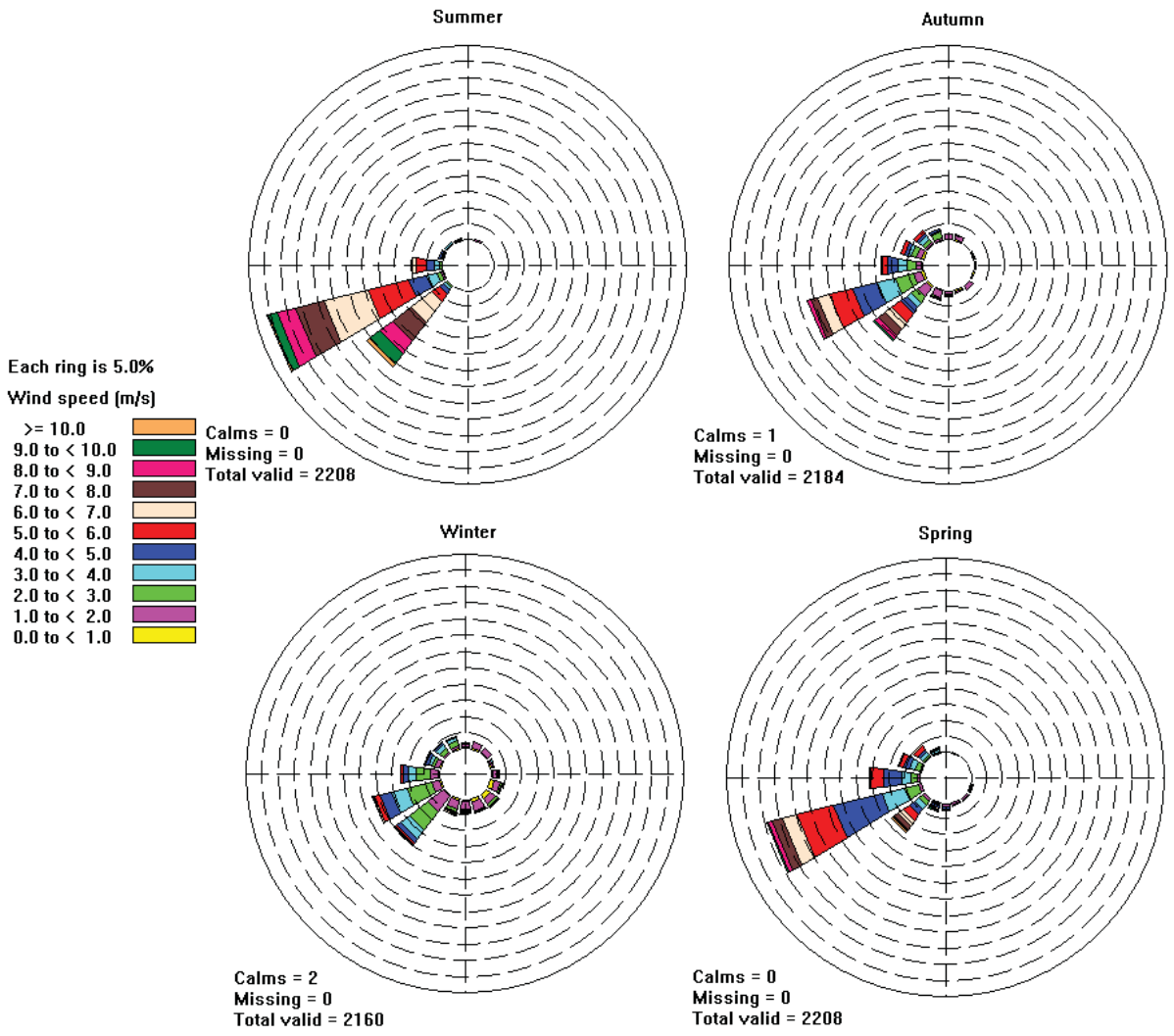


Figure 6 Seasonal wind rose as predicted by TAPM for the MEP site

Location:	**Period:**	**Data source:**	**Units:**
MEP Site	Jan 2003 – Dec 2003	TAPM	m/s and °
Type:		**Prepared by:**	**Date:**
Wind rose		SJD	October 2009

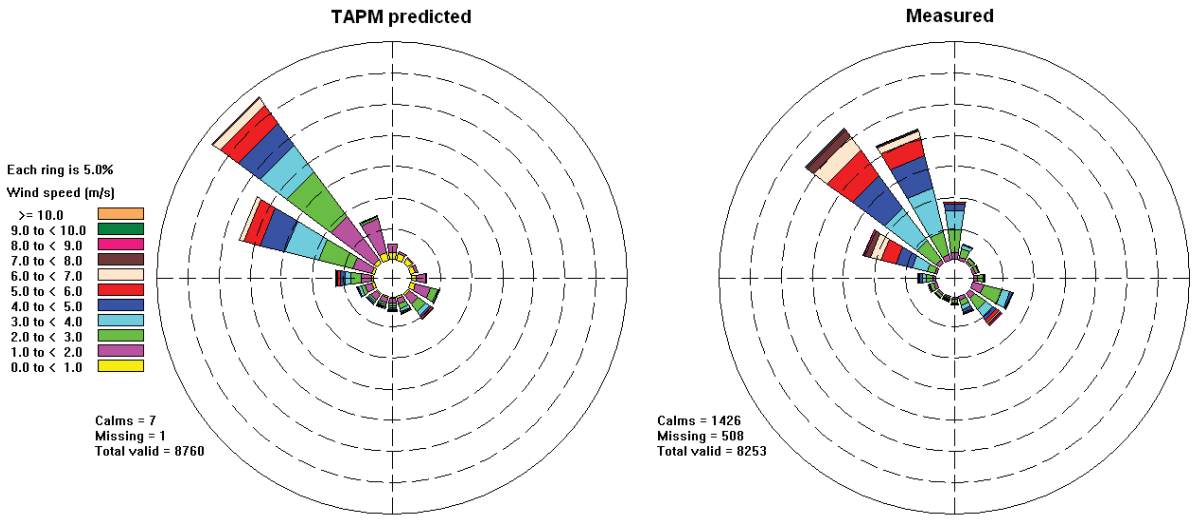
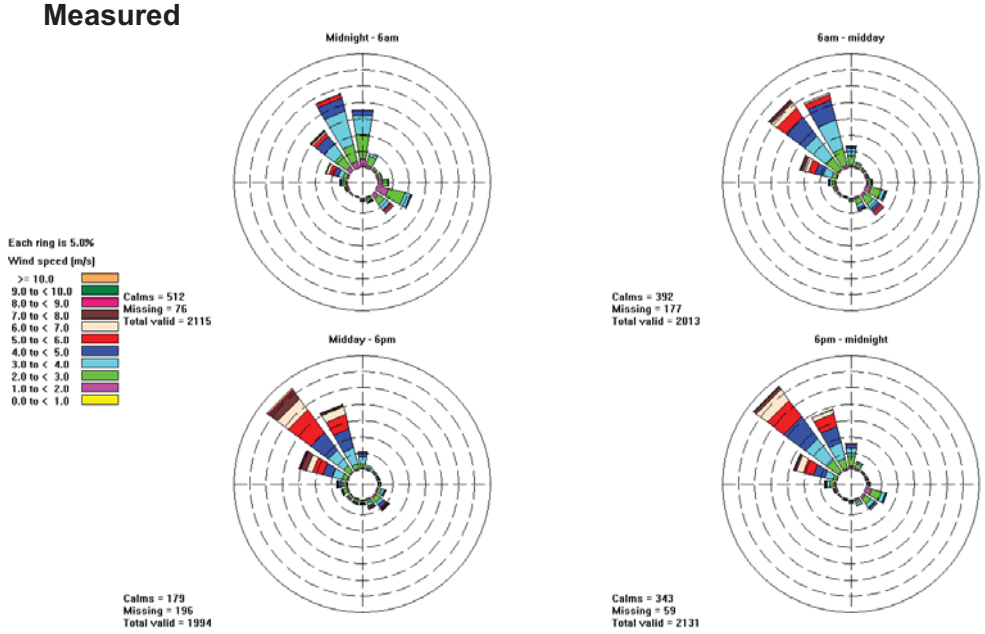


Figure 7 Wind roses for all hours (i) Measured and (ii) TAPM at the Modesto monitoring location

Location: Modesto monitoring site	**Period:** Jan 2003 – Dec 2003	**Data source:** TAPM	**Units:** m/s and °
Type: Wind rose		**Prepared by:** A. Schloss	**Date:** October 2009

(i) Measured



(ii) TAPM

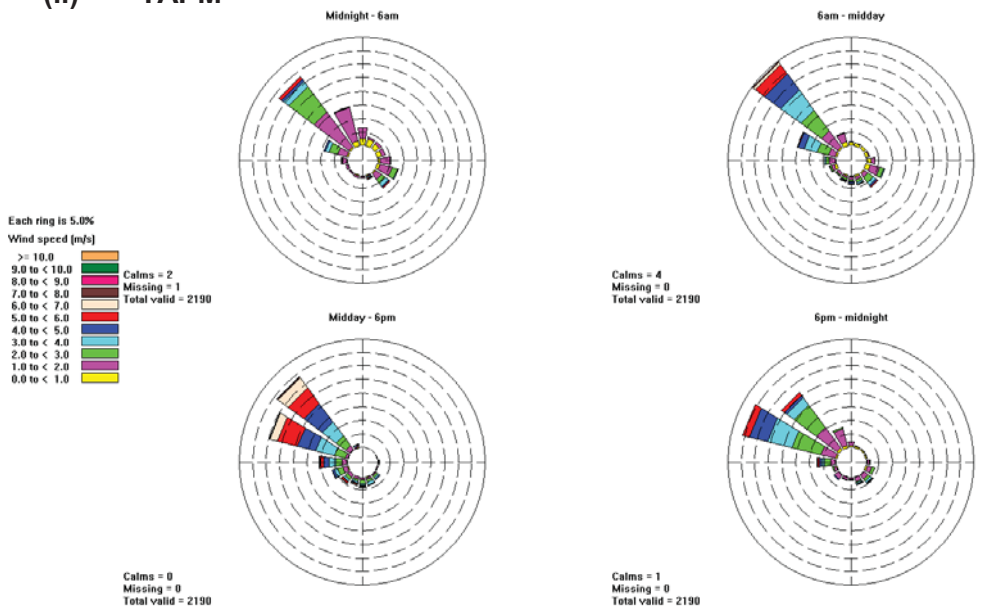


Figure 8 Diurnal wind roses for (i) Measured and (ii) TAPM at the Modesto monitoring location

Location:	**Period:**	**Data source:**	**Units:**
Modesto monitoring site	Jan 2003 – Dec 2003	TAPM	m/s and °
Type:		**Prepared by:**	**Date:**
Wind rose		A. Schloss	October 2009

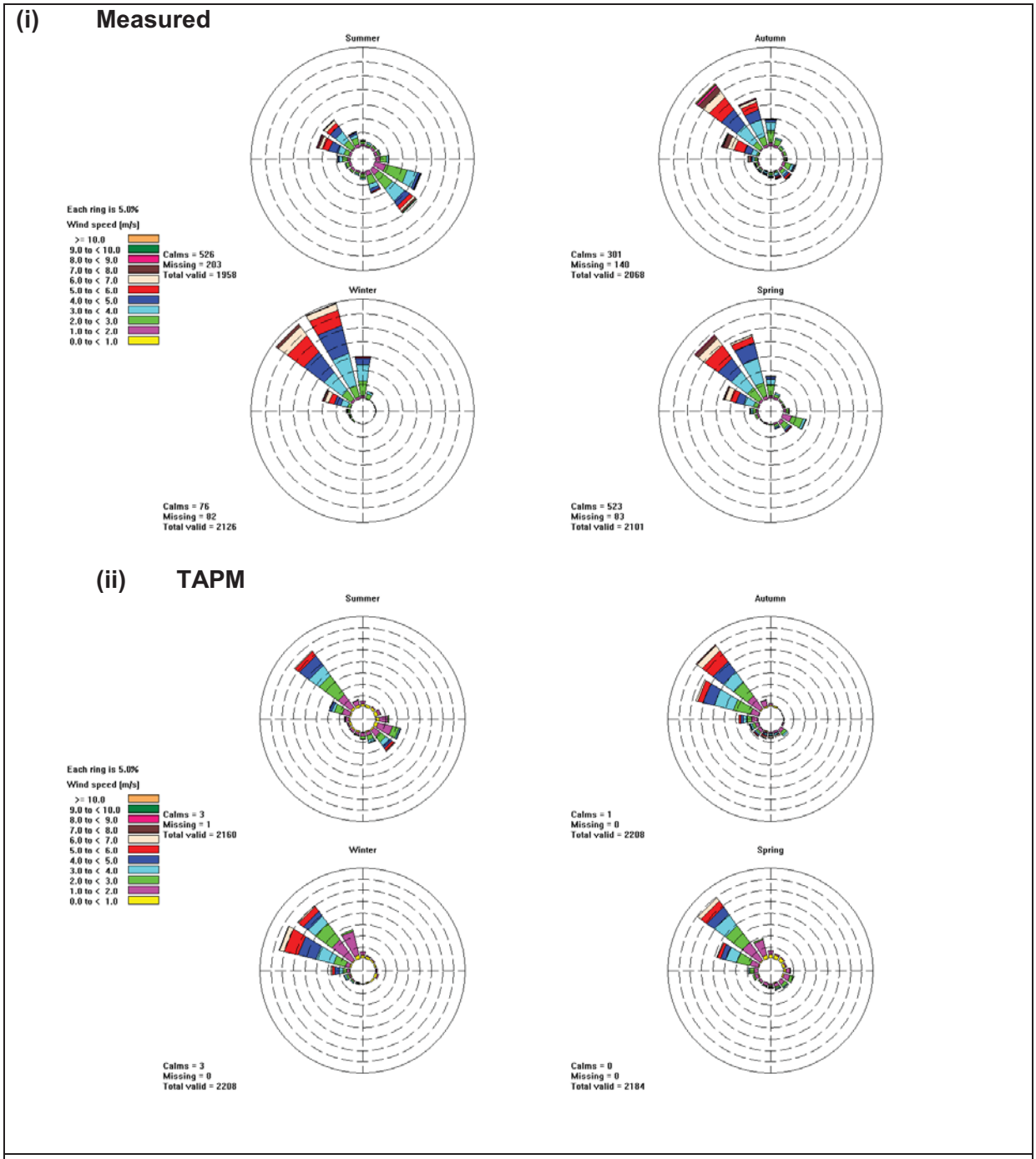


Figure 9 Seasonal wind roses for (i) Measured and (ii) TAPM at the Modesto monitoring location

Location:	**Period:**	**Data source:**	**Units:**
Modesto monitoring site	Jan 2003 – Dec 2003	TAPM	m/s and °
Type:		**Prepared by:**	**Date:**
Wind rose		A. Schloss	October 2009

Attachment DR52-5
FAA Safety Risk Analysis of Aircraft Overflight of Industrial Exhaust Plumes

Admin Notice 12

Safety Study Report
DOT-FAA-AFS-420-06-1

Safety Risk Analysis of Aircraft Overflight of Industrial Exhaust Plumes

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Flight Procedures Standards Branch
Flight Technologies and Procedures Division
Flight Standards Service

Safety Risk Analysis of Aircraft Overflight of Industrial Exhaust Plumes

Reviewed By:

1-6-06

Donald P. Pate **Date**
Manager, Flight Procedures Standards Branch, AFS-420

Released by:

1/20/06

John McGraw **Date**
Manager, Flight Technologies and Procedures Division, AFS-400

January 2006

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4. Title and Subtitle Safety Risk Analysis of Aircraft Overflight of Industrial Exhaust Plumes		5. Report Date January 2006
6. Author(s) Gary L. Powell, Mark A. Reisweber, Dr James Yates, Alan B. Jones, Paul McCarver, John Holman		7. Performing Organization Code
8. Performing Organization Name and Address Flight Procedure Standards Branch, AFS-420 6425 S. Denning, Room 104 Oklahoma City, Oklahoma 73169		9. Type of Report and Period Covered Safety Study
10. Sponsoring Agency Name and Address Federal Aviation Administration Mike Monroney Aeronautical Center P.O. Box 25082, Oklahoma City, OK 73125		
11. Supplementary Notes		

12. Abstract

The Flight Procedures Standards Branch (AFS-420), Flight Technologies and Procedures Division (AFS-400), was tasked by the Director of Flight Standards Service (AFS-1) of the Federal Aviation Administration (FAA) to perform a risk analysis of overflights of vertical plumes. These thermal *"plumes,"* visible or invisible, are generally associated with exhaust from the smoke stacks of power generating facilities, industrial production facilities, or other systems which could have the ability to release large amounts of pressurized or otherwise unstable air. AFS-420 organized and led a safety risk analysis team consisting of FAA subject matter experts (SME) and civilian contract personnel. The SME from various disciplines including: aviation safety, risk analysis/assessment, human factors, aeronautical engineering, air traffic control (ATC), statistical analysis, military/civil and commercial aviation each provided a high level of experience and expertise to examine the issue. Team members are identified in Appendix A. The team determined that the FAA Safety Risk Management (SRM) methodology contained in the FAA Safety Management System (SMS) Manual would be an appropriate vehicle to perform their analysis. The underlying presumption is that high efflux temperature or velocity from industrial facilities may cause air disturbances via exhaust plumes. Two hazards were identified during brainstorming sessions by members of the safety risk analysis team. The first hazard recognized turbulence that may be associated with plumes that could result in possible airframe damage and/or negative affects on aircraft stability in flight. The second hazard discussed was the possible adverse effects of high levels of water vapor, engine/aircraft contaminants, icing, and restricted visibilities produced by these plumes. These hazards taken individually or cumulatively, could possibly result in the loss of the aircraft or fatal injury to the crew, as well as substantial damage to ground facilities. The SME team considered these situations to be most critical for general aviation (GA) aircraft flying at low altitudes during the takeoff and/or landing phase when an aircraft is in close proximity to an airport. The safety risk analysis team performed their analysis of the predictive risks associated with the plumes and determined the effects of the hazards as low, or in the green section of the risk matrix. As a result of this assessment, the risk associated with plumes is deemed acceptable without restriction, limitation, or further mitigation. However, to further lower the already acceptable risk associated with the overflight of vertical plumes, the team recommended the continuance of training and awareness programs that have been successful with similar hazards of acceptable risk levels.

13. Key Words	14. Distribution Statement
Plumes, Smoke Stacks , Aircraft overflight of industrial exhaust plumes, Powerplants, Power generating facilities	Controlled by AFS-420
15. Security Classification of This Report Unclassified	16. Security Classification of This Page Unclassified

Executive Summary

The Flight Procedures Standards Branch (AFS-420), Flight Technologies and Procedures Division (AFS-400), was tasked by the Director of Flight Standards Service (AFS-1) of the Federal Aviation Administration (FAA) to perform a risk analysis of overflights of vertical exhaust plumes. These thermal "*plumes,*" visible or invisible, are generally associated with exhaust from the smoke stacks of power generating facilities, industrial production facilities, or other systems which could have the ability to release large amounts of pressurized or otherwise unstable air.

AFS-420 organized and led a safety risk analysis team consisting of FAA subject matter experts (SME) and civilian contract personnel. The SME from various disciplines including: aviation safety, risk analysis/assessment, human factors, aeronautical engineering, air traffic control (ATC), statistical analysis, and military/civil and commercial aviation, each provided a high level of experience and expertise to examine the issue. Team members are identified in Appendix A. The team determined that the FAA Safety Risk Management (SRM) methodology contained in the FAA Safety Management System (SMS) Manual would be an appropriate vehicle to perform their analysis.

The underlying presumption is that high efflux temperature or velocity from industrial facilities may cause air disturbances via exhaust plumes. Two hazards were identified by members of the safety risk analysis team. The first hazard recognized turbulence that may be associated with plumes that could result in possible airframe damage and/or negative effects on aircraft stability in flight. The second hazard discussed was the possible adverse effects of high levels of water vapor, engine/aircraft contaminants, icing, and restricted visibilities produced by these plumes. These hazards, taken individually or cumulatively, could possibly result in the loss of the aircraft or fatal injury to the crew, as well as substantial damage to ground facilities. The SME team considered these situations to be most critical for general aviation (GA) aircraft flying at low altitudes during the takeoff and/or landing phase when an aircraft is in close proximity to an airport.

The tools and analysis techniques that were used to review the hazards were the "What if" Technique and Preliminary Hazard Analysis (PHA). These tools are described in-depth in the *SMS Manual*. The SRM methodology used by the team to assess and identify safety hazards was to apply SME knowledge, experience, and expertise across the various disciplines during formal and informal review sessions.

The data sources which the team used to assess risks associated with the plume issue included: Aviation Safety Reporting System (ASRS), National Aviation Safety Data Analysis Center (NASDAC), Accident/Incident Data System (AIDS), National Transportation Safety Board (NTSB), Aviation Database & Synopses, and the

Australian Government Civil Aviation Safety Authority Advisory Circular (AC) 139-05(0) Guidelines for Conducting Plume Rise Assessments dated June 2004.

The analysis also included a review of a broad spectrum of the available safety data, regulations, and professional literature. The SME team also considered input from private citizens who had previously expressed concern with regard to the issue.

Historical statistical data analysis concluded that the accident/incident rate for overflights of exhaust plumes to be of the order of 10^{-9} or less. Since the target level of safety (TLS) for GA activities was determined to be 1×10^{-7}, the probability of an accident or incident from overflight of an exhaust plume is considerably less than the required TLS. Since the TLS is satisfied, the likelihood of an accident or incident caused by overflight of an exhaust plume is acceptably small.

The safety risk analysis team performed their analysis of the predictive risks associated with the plumes and determined the effects of the hazards as low, or in the green section of the risk matrix. As a result of this assessment, the risk associated with plumes is deemed acceptable without restriction, limitation, or further mitigation.

However, to further lower the already acceptable risk associated with the overflight of vertical plumes, the team recommended the continuance of training and awareness programs that have been successful with similar hazards of acceptable risk levels. The safety risk assessment team recommended the following:

- Amend the Aeronautical Information Manual (AIM) Chapter 7, Section 5 with wording to the effect that overflight at less than 1,000 feet vertically above plume generating industrial sites should be avoided.

- Publish (as appropriate) the position and nature of the present power plants located near public airports in the Airport/Facility Directory (A/FD) and issue a Notice to Airmen (NOTAM) when operationally necessary.

- Where operationally feasible, make the temporary fight restriction (TFR) that includes the overflight of power plants a permanent flight restriction.

- Amend FAA Order 7400.2 to consider a plume generating facility as a hazard to navigation when expected flight paths pass less than 1,000 feet above the top of the object. Flight Standards Service will be required to provide comment for any facility not meeting this criterion.

- Amend Advisory Circular 70/7460-2K Proposed Construction of Objects that May Affect the Navigable Airspace - Change Instructions for Completing FAA Form 7460-1 – Notice of Proposed Construction or Alteration Item # 21, add:

> *"For structures such as power plants or any industrial facility where exhaust plume discharge could reasonably be expected and reportable under the provisions of Part 77, thoroughly explain the nature of the discharge."*

These actions will serve to further enhance aviation safety within the National Airspace System.

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1.0. Introduction

The Flight Procedures Standards Branch (AFS-420), Flight Technologies and Procedures Division (AFS-400), was tasked by the Director of Flight Standards Service (AFS-1) of the Federal Aviation Administration (FAA) to perform a risk analysis of overflights of vertical plumes. AFS-420 organized and led a safety risk analysis team (hereafter referred to as the "team") consisting of FAA subject matter experts (SME). Please see Appendix A for a list of SME team participants. The SME from various disciplines including aviation safety, risk analysis/assessment, human factors, aeronautical engineering, air traffic control (ATC), statistical analysis, and military/civil and commercial aviation provided a high level of experience and expertise to examine the issue. The team determined that the FAA Safety Risk Management (SRM) methodology contained in the FAA Safety Management System (SMS) Manual would be an appropriate vehicle to perform their analysis. This methodology includes the following:

- Description of the presumed safety issue
- Identification of potential hazards
- Risk Analysis
- Risk Assessment
- Treatment (mitigation) of the risk, if required

Note: The SRM process is usually applied for risk analysis/assessment of changes to baseline (current) facilities or procedures within the (NAS). However, AFS-420 personnel determined the SRM procedural process provided the greatest flexibility and broadest analysis for determining aviation risk for the issue at hand.

<u>Section 1</u> - Description of the Presumed Safety Issue

The underlying presumption is that high efflux temperature or velocity from industrial facilities may cause air disturbances via exhaust plumes that would have the potential to cause airframe damage and/or negatively affect the stability of aircraft in flight. Associated hazards could include: high levels of water vapor, icing, restricted visibilities, engine/aircraft contaminants. These hazards taken individually or cumulatively, could possibly result in the loss of the aircraft or fatal injury to the crew, as well as substantial damage to ground facilities. The team considered these situations to be most critical for general aviation (GA) aircraft flying at low altitudes during the takeoff and/or landing phase when an aircraft is in close proximity to an airport. These thermal *"plumes,"* visible or invisible, are generally associated with exhaust from the smoke stacks of power generating facilities, industrial production facilities, or other systems which could have the ability to release large amounts of pressurized or otherwise unstable air. Research has been accomplished by the Australian Government Civil Aviation Safety Authority (CASA) on plume rise velocities versus aircraft upset. The United States Environmental Protection Agency (EPA) plume rise models are, for the most part, models of plume dispersion and heat/velocity measures that do not provide any analysis on the effect of aircraft overflight.

Section 2 - Review of Safety Data/Literature and Identification of Potential Hazards

The review of safety data and associated literature obtained from various sources included the following:

- National Aeronautics and Space Administration (NASA), Aviation Safety Reporting System (ASRS)
- Federal Aviation Administration (FAA), National Aviation Safety Data Analysis Center (NASDAC), Accident/Incident Data System (AIDS)
- National Transportation Safety Board (NTSB) Aviation Database & Synopses
- Aeronautical Information Manual (AIM), Change 3, August 4, 2005
- Title 14 Code of Federal Regulations (CFR) with specific attention to: Part(s) 77 - *Objects Affecting the Navigable Airspace,* Part 91.13 - *Careless or Reckless Operation,* and Part 91.119 - *Minimum Safe Altitudes: General*
- Federal Aviation Administration Safety Management System Manual, Version 1.1, May 21, 2004
- Australian Government Civil Aviation Safety Authority Advisory Circular (AC) 139-05(0, Guidelines for Conducting Plume Rise Assessments dated June 2004 was reviewed. (Note: this information was used as professional reference material as the FAA does not necessarily agree or disagree with the guidance contained in the AC)

2.0. Discussion

The salient points discussed during the SMS brainstorming sessions at AFS-420 in Oklahoma City, Oklahoma, by the risk analysis team included, but were not limited to:

(1) Aviation Database Queries Regarding Overflight of Vertical Plumes

A database search of NASA ASRS records using various key words such as: *plumes, power plants, smoke stacks, nuclear, industrial power plants, power plant - aircraft – turbulence, smokestack(s), updrafts, downdrafts* and similar combinations was conducted and reviewed. The results of over 671,006 NASA ASRS pilot reports gathered over 30 a year period indicated zero pilot-reported overflight incidents with exhaust plumes from facilities such as power plants.

A similar search of the NASDAC AIDS (FAA) accident/incident database records search (approximately 150,000 records) indicated no accidents and one possible, yet not confirmed, helicopter incident in 1979. Additionally, there was one incident where a flight instructor claimed that outflow from a nearby power plant smoke stack may have contributed to an accident on May 19, 2000 at the Space Coast Regional Airport in Titusville, Florida. The NTSB concluded to the contrary, citing…"*failure of the PIC (pilot-in command) to maintain control of the aircraft...*" was the probable cause.

**Note: The aforementioned databases are open to the public and similar search requests may be accessed/queried via the Internet at: http://asrs.arc.nasa.gov and http://www.nasdac.faa.gov.

(2) FAA Regulations, Orders /Notices, and Guidelines

Additionally, the FAA has knowledge of two undocumented instances where pilots of aircraft *intentionally* flew through plumes of an electrical generating power plant and experienced predicable turbulence issues, where intensity varied directly with altitude. Since the pilots were not trained in methods of data collection and the aircraft were not equipped for data collection, no creditable data were collected. Therefore, these intentional incidents were not given further consideration and deemed irrelevant to the analysis.

The team felt it significant to note that the present Notice to Airmen (NOTAM) Temporary Flight Restrictions (TFR), active at the time of the above incidents, should have precluded prudent pilots from flying through or near plumes. Primarily issued for national security reasons, the TFR is listed as follows:

> **FDC 4/0811 FDC ...SPECIAL NOTICE... THIS IS A RESTATEMENT OF A PREVIOUSLY ISSUED ADVISORY NOTICE. IN THE INTEREST OF NATIONAL SECURITY AND TO THE EXTENT PRACTICABLE, PILOTS ARE STRONGLY ADVISED TO AVOID THE AIRSPACE ABOVE, OR IN PROXIMITY TO SUCH SITES AS POWER PLANTS (NUCLEAR, HYDRO-ELECTRIC, OR COAL), DAMS, REFINERIES, INDUSTRIAL COMPLEXES, MILITARY FACILITIES, AND OTHER SIMILAR FACILITIES. PILOTS SHOULD NOT CIRCLE AS TO LOITER IN THE VICINITY OVER THESE TYPES OF FACILITIES.**

The Aeronautical Information Manual (AIM) Chapter 7, addresses Potential Flight Hazards. Section 7-5-1, which discusses the 10 most frequent cause factors for General Aviation that involve the pilot-in-command, include the following:

5. Failure to see and avoid objects or obstructions, and

7. Improper in-flight decisions or planning.

We reviewed this section for information and methods for assessment and mitigation of similar flight hazards within the NAS that are addressed later in this study.

AIM Section 7-5-3 states:

Obstructions To Flight

a. General. Many structures exist that could significantly affect the safety of your flight when operating below 500 feet AGL, and particularly below

200 feet AGL. While 14 CFR Part 91.119 allows flight below 500 AGL when over sparsely populated areas or open water, such operations are very dangerous.

At and below 200 feet AGL there are numerous power lines, antenna towers, etc., that are not marked and lighted as obstructions, and therefore may not be seen in time to avoid a collision. Notices to Airmen (NOTAMs) are issued on those lighted structures experiencing temporary light outages. However, some time may pass before the FAA is notified of these outages, and the NOTAM issued, thus pilot vigilance is imperative.

b. Antenna Towers. Extreme caution should be exercised when flying less than 2,000 feet AGL because of numerous skeletal structures, such as radio and television antenna towers, that exceed 1,000 feet AGL, with some extending higher than 2,000 feet AGL. Most skeletal structures are supported by guy wires that are very difficult to see in good weather and can be invisible at dusk or during periods of reduced visibility. These wires can extend about 1,500 feet horizontally from a structure; therefore, all skeletal structures should be avoided horizontally by at least 2,000 feet. Additionally, new towers may not be depicted in a current aeronautical chart because the information was not received prior to the printing of the chart.

c. Overhead Wires. Overhead transmission and utility lines often span approaches to runways, natural flyways such as lakes, rivers, gorges, and canyons, and cross other landmarks pilots frequently follow such as highways, railroad tracks, etc. As with antenna towers, these high voltage/power lines or the supporting structures of these lines may not always be readily visible and the wires may be virtually impossible to see under certain conditions. In some locations, the supporting structures of overhead transmission lines are equipped with unique sequence flashing white strobe light systems to indicate that there are wires between the structures.

However, many power lines do not require notice to the FAA and, therefore, are not marked and/or lighted. Many of those that do require notice do not exceed 200 feet AGL or meet the Obstruction Standard of 14 CFR Part 77 and, therefore, are not marked and/or lighted. All pilots are cautioned to remain extremely vigilant for these power lines or their supporting structures when following natural flyways or during the approach and landing phase. This is particularly important for seaplane and/or float equipped aircraft when landing on, or departing from, unfamiliar lakes or rivers.

d. Other Objects/Structures. There are other objects or structures that could adversely affect your flight such as construction cranes near an airport, newly constructed buildings, new towers, etc. Many of these structures do not meet charting requirements or may not be charted because of the charting cycle.

Some structures do not require obstruction marking and/or lighting and some may not be marked and lighted even though the FAA recommended it.

Title 14 Code of Federal Regulations (CFR) Part 91 provides the following guidance for minimum safe flight altitudes and defines careless or reckless operation. We mention these two sections, as they will become significant to the scope of our investigation.

These rules apply to all aircraft operated under 14 CFR Parts 91, 121, 135 or 137.

Sec. 91.119

Minimum safe altitudes: General

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) *Anywhere.* An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

(c) *Over other than congested areas.* An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) *Helicopters.* Helicopters may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the Administrator.

Sec. 91.13

Careless or reckless operation.

(a) *Aircraft operations for the purpose of air navigation.* No person may operate an aircraft in a careless or reckless manner as to endanger the life or property of another.

(b) *Aircraft operations other than for the purpose of air navigation.* No person may operate an aircraft, other than for the purpose of air navigation, on any part of the surface of an airport used by aircraft for air commerce (including areas used by those aircraft for receiving or discharging persons or cargo), in a careless or reckless manner as to endanger the life or property of another.

(3) Other Related Material

The Australian Government Civil Aviation Safety Authority (CASA) Advisory Circular (AC) 139-05(0), Guidelines for Conducting Plume Rise Assessments of June 2004, was reviewed as guidance to illustrate a means, but not necessarily the only means of assessing ... *"the potential hazard from plume rise to aircraft operations."* The AC further finds...

- "*Aviation authorities have established that an exhaust plume with a vertical gust in excess of 4.3 meters/second (m/s) may cause damage to an aircraft airframe, or upset an aircraft when flying at low levels.*"

- "CASA requires the proponent of a *facility with an exhaust plume, which has a vertical velocity exceeding the limiting value (4.3 m/s at the aerodrome Obstacle Limitation Surface (OLS) or at 110 meters above the ground level anywhere else) to be assessed for potential hazard to aircraft operation.*"

The FAA does not necessarily approve/disapprove or warrant the data contained in the CASA AC 139-05. The team accepts the information and data contained in AC 139-05 as a valid representation of hazardous exhaust velocities. Lacking other professional data to the contrary, the team used the CASA AC information during the risk assessment and analysis process by stipulating the measures of efflux velocities and altitudes are plausible/representative aviation community data.

However, many narrative sections of AC 139-05 do not apply as Australian laws and regulations regarding land use, hazard assessments, and procedures regarding objects affecting the navigable airspace are far different from those of the United States. A prime example of this is in paragraph 6.2 of the AC where CASA states an obstacle "*...can include the gaseous efflux, which is capable of physical definition or measurement.*" In the United States, 14 CFR Part 77 only considers the height of the structure. For these and similar reasons only quantifiable metrics of plume data will be referenced.

Statement on scope of analysis:

The tools and analysis techniques that were used to analyze the hazards were the "What if" Technique and Preliminary Hazard Analysis (PHA). These tools are described in-depth in the *SMS Manual*. The SRM methodology used by the team to assess and identify safety hazards applied SME knowledge, experience, and expertise across the various disciplines during formal and informal "brainstorming" sessions. The risk analysis team determined the greatest risk of overflight of vertical plumes to aircraft would be in the takeoff and approach/landing phase of flight. Therefore, the analysis would concentrate on these low low-level flying activities (below 1,000 feet AGL). Here, the aircraft would be in close proximity to the ground, and smoke stack/plumes and any resultant turbulence or associated risk would be of greatest consequence.

Therefore, the 4.3 m/s velocity and/or the 110 meters (approximately 360.89 feet) height above the stack CASA criteria for assessment would be most critical during the takeoff/landing phase of flight as the aircraft would be at higher altitudes during other phases, i.e., climb, enroute, and arrival.

The risk analysis team identified the following hazards:

Hazard H1 was identified by association of plumes with other convective activity such as: updrafts, downdrafts, forest fires, and/or weather related activity, and under AIM guidance Obstructions to Flight – Other Objects/Structures.

H1: High efflux temperature or velocity from industrial facilities (power plant exhaust plumes) may cause air disturbances that would have the potential to cause airframe damage and/or negatively affect the stability of aircraft in-flight.

These situations would be most critical at low altitude during the takeoff and/or landing phase when an aircraft is in close proximity to an airport and could possibly result in loss of both aircraft and crew as well as damage to ground facilities.

Hazard H2 was identified by correspondence of concerned citizens and discussion with pilots and ATC personnel.

H2: Exhaust plumes from industrial facilities (power plant, gas or coal fired furnaces, etc.) could result in restricted visibilities with high levels of water vapor, icing, and engine/aircraft contaminants that would have a detrimental effect on aircraft/aircrew performance. These individually or cumulatively could possibly result in substantial aircraft damage, and/or loss of both aircraft and crew as well as damage to ground facilities. These situations would be most critical at low altitude during the takeoff and/or landing phase when an aircraft is in close proximity to an airport.

Section 3 - Risk Analysis and Risk Assessment

Statistical Analysis of Data

In attempting to derive a target level of safety for overflight of exhaust plumes, one difficulty (although most welcome) is that accidents and incidents have been non-existent, so the basis of historical data is limited. The procedure adopted here is to derive target levels of safety for an accident and for a fatal accident due to all causes, and then to estimate what proportion of that risk to allocate to overflight of exhaust plumes. To assess the overall risk, two separate stages are involved as follows:

a) The choice of a unit for the measurement of risk.

b) The choice of a target level for the total risk due to all causes.

A target level of safety for civil aviation may be specified in a number of ways. The most common unit is the fatal accident per departure. In the case of scheduled air carrier operations, the number of departures is recorded annually and the determination of fatal accidents per departure is straightforward. In the case of general aviation, the flights are unscheduled and unrecorded making any estimate of the number of departures extremely inaccurate. However, the FAA conducts an annual survey of general aviation pilots to determine an estimate of the number of hours flown by general aviation pilots during the year in question. Since the survey is scientifically constructed and conducted, the data should be reasonably accurate. Therefore, the decision was made to use incidents per flight hour and fatal accidents per flight hour as the units in the development of the target level of safety.

Table 1 lists the number of accidents, fatal accidents, estimated hours flown, and accident rates for the years 1975 through 2004.

Table 1 - Accidents, Fatalities, Flight Hours, and Rates, 1975 through 2004, U.S. General Aviation

	Accidents		Fatalities			Accidents per 100,000 Flight Hours	
Year	**All**	**Fatal**	**Total**	**Aboard**	**Flight Hours**	**All**	**Fatal**
1975	3995	633	1252	1231	28,799,000	13.87	2.19
1976	4018	658	1216	1203	30,476,000	13.17	2.16
1977	4079	661	1276	1265	31,578,000	12.91	2.09
1978	4216	719	1556	1398	34,887,000	12.08	2.06
1979	3818	631	1221	1203	38,641,000	9.88	1.63
1980	3590	618	1239	1230	36,402,000	9.86	1.69
1981	3500	654	1282	1261	36,803,000	9.51	1.78
1982	3,233	591	1187	1171	29,640,000	10.82	1.96
1983	3,075	555	1,068	1,061	28,673,000	10.67	1.92
1984	3,017	545	1,042	1,021	29,099,000	10.28	1.84
1985	2,739	498	956	945	28,322,000	9.63	1.74
1986	2,581	474	967	879	27,073,000	9.49	1.73
1987	2,495	446	837	822	26,972,000	9.18	1.63
1988	2,388	460	797	792	27,446,000	8.65	1.66
1989	2,242	432	769	766	27,920,000	7.97	1.52
1990	2,242	444	770	765	28,510,000	7.85	1.55
1991	2,197	439	800	786	27,678,000	7.91	1.57
1992	2,111	451	867	865	24,780,000	8.51	1.82
1993	2,064	401	744	740	22,796,000	9.03	1.74
1994	2,022	404	730	723	22,235,000	9.08	1.81
1995	2,056	413	735	728	24,906,000	8.21	1.63
1996	1,908	361	636	619	24,881,000	7.65	1.45
1997	1,844	350	631	625	25,591,000	7.19	1.36
1998	1,905	365	625	619	25,518,000	7.44	1.41
1999	1,905	340	619	615	29,246,000	6.5	1.16
2000	1,837	345	596	585	27,838,000	6.57	1.21
2001	1,727	325	562	558	25,431,000	6.78	1.27
2002	1,715	345	581	575	25,545,000	6.69	1.33
2003	1,741	352	632	629	25,705,000	6.77	1.37
2004	1,614	312	556	556	25,900,000	6.22	1.2
Totals	77,874	14,222	26,749	26,236	849,291,000		
Means	2595.8	474.0667	891.6333	874.5333	28,309,700	9.012333	1.649333

From Table 1, we see that the accident rate trend has been downward. This is illustrated in Figure 1.

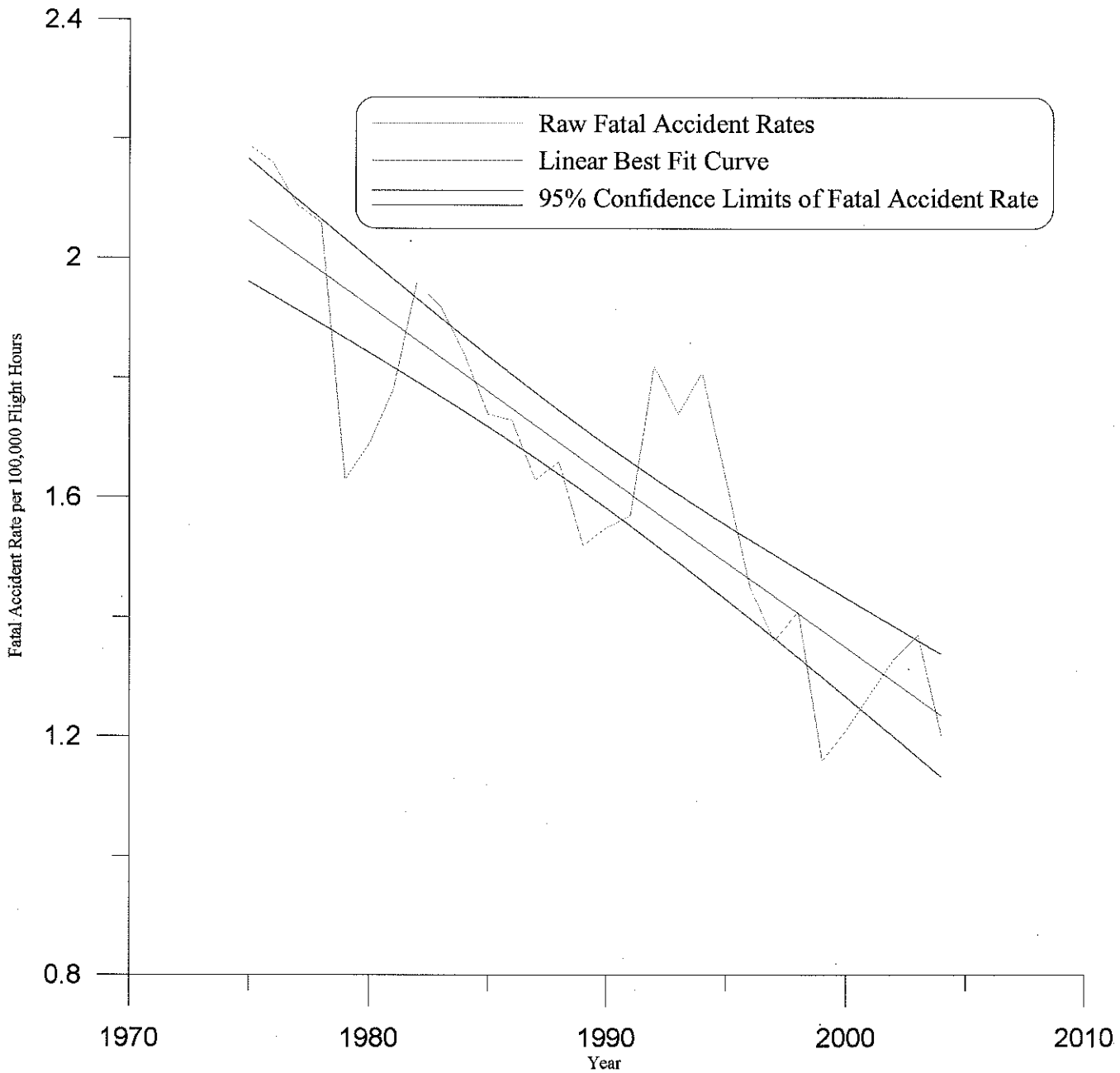


Figure 1. U.S. General Aviation Fatal Accident Rates (all causes) in Fatal Accidents per 100,000 Hours.

The confidence bands depicted in Figure 1 give an indication of the range of values the actual accident rate may fall within with a probability of 0.95. The lower confidence band in Figure 1 intersects the year 2005 at about 1.0. This indicates that a conservative estimate of the current fatal accident rate is 1 in 100,000 hours or 1×10^{-5} per flight hour.

Since the fatal accident rate is lower than the overall accident rate, we may conservatively choose 1×10^{-5} per flight hour as the overall target level of safety for flights of general aviation aircraft. An overflight of an exhaust plume is just one of many factors that could cause an accident or incident. When the number of factors that could cause a failure or accident is essentially unknown, standard engineering practice is applied.

Standard engineering practice assumes there are 100 possible causes and apportions the probability equally between the assumed factors. Therefore, since the overall target level of safety is 1×10^{-5} per flight hour, the target level of safety for overflight of an exhaust plume would be $1 \times 10^{-5}/ 10^{2} = 1 \times 10^{-7}$ per flight hour.

From Table 1 we see that there were approximately 849,291,000 flight hours by general aviation aircraft during the time period 1975 to 2004. During this time period a careful search of the available aviation databases revealed that zero accidents or incidents related to overflight of a plume have been reported. This implies that the probability of an accident or incident caused by overflight of a plume is very small. If there were just one reported accident or incident, the estimated rate would be 1/849,241,000 or 1.2×10^{-9}. If there were two reported accidents or incidents, the estimated rate would be 2/849,241,000 or 2.4×10^{-9}. Therefore, it is safe to conclude that the accident/incident rate for overflights of exhaust plumes is of the order of 10^{-9} or less. Since the target level of safety was determined to be 1×10^{-7}, the probability of an accident or incident from overflight of an exhaust plume is less than the target level of safety. Since the target level of safety is met, the likelihood of an accident or incident caused by overflight of an exhaust plume is acceptably small.

Human Factors Assessment

Power plant exhaust plumes do not present an immediate or critical increase in human mental or physical workload, resulting in any commensurate decrease in performance. However, like any phenomenon in the NAS, pilots need to be properly armed with the knowledge that it exists. This prior knowledge allows for proper flight planning of routes and avoidance strategies, thus eliminating inadvertent visual or physical contact with a plume. As in any operation in the NAS, pilot comfort levels directly impact anxiety that subsequently may cause an increase in self-induced levels of stress and mental/physical workload. The more knowledge pilots have access to regarding any respective flight, the more comfortable he/she is. It is strongly advised that the existence of plumes in a flying area be published and disseminated to pilots for the reasons mentioned above. Pilots should be prepared to see and avoid power plant exhaust plumes just as they would be prepared to see and avoid any obstacle in their flight path, expected or unexpected. We would expect that any plume encounter would be a relatively benign event. The pilot's mental and/or physical resources would not be so task-overloaded as to preclude a safe maneuver out of, and away from the condition.

Preliminary Risk Assessment

A preliminary risk assessment of the two identified hazards was completed during brainstorming sessions by the technical team consisting of the previously mentioned FAA SME. The risk associated with a hazard is the composite of predicted severity (Table 2) and likelihood (Table 3) of the potential effect or outcome of the hazard in the worst credible system state. The following SMS Manual matrixes were used to develop the risk matrix for overflight of vertical plumes. The "Flying Public" row of the "Effect On" column was utilized for Severity and the "Qualitative ATC Service/NAS Level System" column was used for Likelihood.

Table 2 - Severity definitions

Effect On: ↓	Hazard Severity Classification				
	No Safety Effect **5**	**Minor** **4**	**Major** **3**	**Hazardous** **2**	**Catastrophic** **1**
Air Traffic Control	Slight increase in ATC workload	Slight reduction in ATC capability or significant increase in ATC workload	Reduction in separation as defined by a low/moderate severity operational error (as defined in FAA Order 7210.56) or significant reduction in ATC capability	Reduction in separation as defined by a high severity operational error (as defined in FAA Order 7210.56) or a total loss of ATC Capability (ATC Zero)	Collision with other aircraft, obstacles or terrain
Flying Public	- No effect on flight crew - Has no effect on safety - Inconvenience	- Slight increase in flight crew workload - Slight reduction in safety margin or functional capabilities - Physical discomfort of occupants	- Significant increase in flight crew workload - Significant reduction in safety margin or functional capability - Physical distress possibly including injuries	- Large reduction in safety margin or functional capabilities - Serious or fatal injury to small number of occupants or cabin crew - Physical distress/ excessive workload	Outcome would result in: - Hull loss - Multiple fatalities

Table 3 - Likelihood Definitions

	NAS System			Flight Procedures	Operational	
		Qualitative				
	Quantitative[1]	Individual Item/System	ATC Service/ NAS Level System[2]		Per Facility[3]	NAS-wide[4]
Frequent A	Probability of occurrence per operation/operational hour is equal to or greater than $1x10^{-3}$	Expected to occur frequently for an item	Continuously experienced in the system	Probability of occurrence per operation/ operational hour is equal to or greater than $1x10^{-5}$	Expected to occur more than once per week	Expected to occur every 1-2 days
Probable B	Probability of occurrence per operation/operational hour is less than $1x10^{-3}$, but equal to or greater than $1x10^{-5}$	Expected to occur several times in the life of an item	Expected to occur frequently in the system		Expected to occur about once every month	Expected to occur several times per month
Remote C	Probability of occurrence per operation/operational hour is less than $1x10^{-5}$ but equal to or greater than $1x10^{-7}$	Expected to occur sometime in the life cycle of an item	Expected to occur several times in system life cycle	Probability of occurrence per operation/ operational hour is less than $1x10^{-5}$ but equal to or greater than $1x10^{-7}$	Expected to occur about once every 1 -10 years	Expected to occur about once every few months
Extremely Remote D	Probability of occurrence per operation/operational hour is less than $1x10^{-7}$ but equal to or greater than $1x10^{-9}$	Unlikely but possible to occur in an item's life cycle	Unlikely but can reasonably be expected to occur in the system life cycle	Probability of occurrence per operation/ operational hour is less than $1x10^{-7}$ but equal to or greater than $1x10^{-9}$	Expected to occur about once every 10-100 years	Expected to occur about once every 3 years
Extremely Improbable E	Probability of occurrence per operation/operational hour is less than $1x10^{-9}$	So unlikely, it can be assumed that it will not occur in an item's life cycle	Unlikely to occur, but possible in system life cycle	Probability of occurrence per operation/ operational hour is less than $1x10^{-9}$	Expected to occur less than once every 100 years	Expected to occur less than once every 30 years

Preliminary Risk

Figure 2 reflects the definition of risk being the composite of severity and likelihood. This matrix classifies risk into three levels: High, Medium, and Low. The risk levels used in the matrix are defined as:

- **High risk** – unacceptable risk.

- **Medium risk** – acceptable risk; minimum acceptable safety objective; proposal may be implemented, but tracking and management are required.
- **Low risk** – acceptable without restriction or limitation; hazards are not required to be actively managed, but are to be documented.

The safety risk team preliminary risk assessment matrix in Figure 2 indicates where the initial hazards (H1/H2) identified by overflight of vertical plumes (in the takeoff/landing phase 1,000 feet AGL and below) would be situated on the risk matrix without considering or implementing any of the mitigations previously discussed. The team performed their analysis of the predictive risks associated with the plumes and determined the effects of both H1 and H2 hazards as low, or in the green section of the risk matrix. As a result of this assessment, the risk associated with plumes is deemed acceptable without restriction, limitation, or further mitigation.

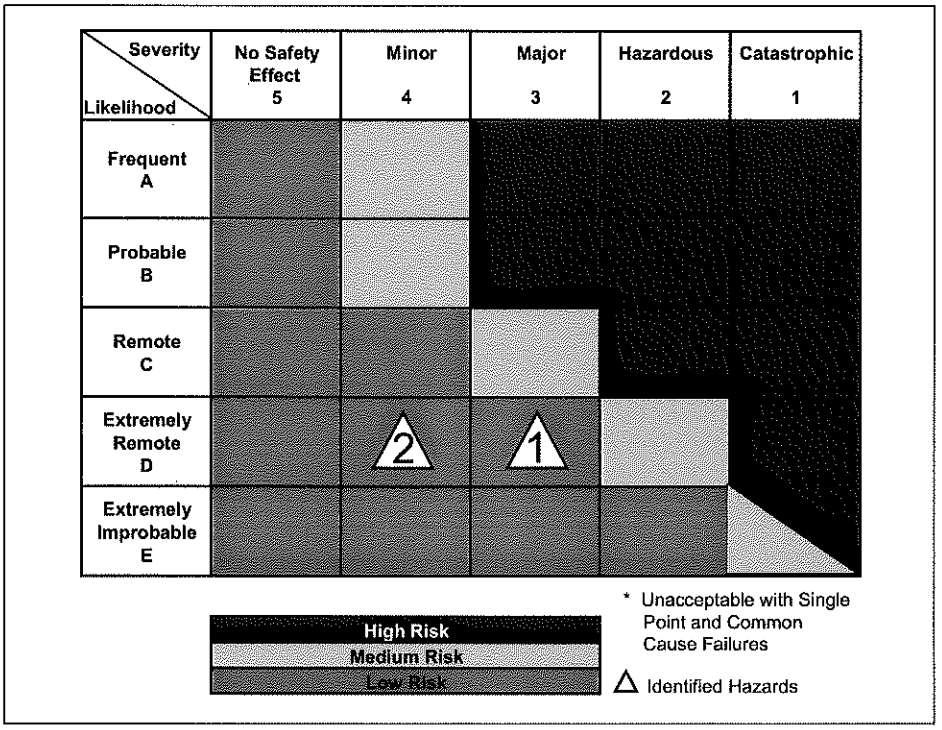


Figure 2 – Preliminary Risk Matrix Without Mitigation (current Risk)

Section 4 - Summary of Risk Analysis Team Deliberations

The review of the material in Section 2, the statistical analysis of data and the in-depth professional discussion, experience, and knowledge of SMEs on the team, led to the following preliminary observations:

- Given the virtually non-existent accident/incident safety data by either GA or commercial aviation pilots, the team was extremely confident in drawing the preliminary inference that hazard(s) associated with plume overflight represent an extremely low risk to aviation and the flying public.
- However, and in light of supporting data to the contrary, the team agreed that intentional and/or inadvertent overflight of industrial plumes at low altitudes (less than 1,000 feet above) during high velocity operation of the facility could possibly result in aircraft upset and a resultant incident or accident.
- The team determined that low, close-in operations at small to medium size airports by general aviation (GA) aircraft, particularly aircraft under 12,500 lbs. and those in the Light Sport Aircraft (LSA) category, would be of greatest potential concern.
- The SME team considered and discussed their belief that safety data which indicated few, if any accidents/incidents attributable to the issue may be a reflection of the cumulative actions over many years of prudent aviators and ATC personnel. This includes knowledge of and training in established "see-and avoid" techniques and/or mitigating operational procedures. The situation with plumes was deemed similar to many hazards present in the NAS today (see AIM Chapter 7 for further examples). Moreover, rules and regulations restricting the altitude for overflight of power plant facilities coupled with pilot training, alerting, and the common sense aviator aptitude were determined to be the major factors in the scarcity of associated data and resultant low risk factor.
- At airports where power plants could not be optimally avoided by current approach procedures or when weather resulted in plume footprints that could adversely affect airport operations, ATC past and present operational procedures were deemed more than adequate to maintain established acceptable levels of risk.
- Plume effects (H2) on aircraft, engine component function, and/or corrosion were deemed inconsequential by the SME team.
- The team noted the CASA flight restriction of 4.3m/s above OLS or 110 (meters) AGL as less restrictive than the 14 CFR Part 91 restrictions previously mentioned.

Section 5 – Conclusions, Recommendations, and Residual Risk

Safety is freedom from unacceptable risk. Everyday in the NAS aircraft and airmen operate with hazards that constantly present various levels of risk. From bird strikes, to engine failures, to runway incursions, these situations present vastly different scenarios for the pilot, crew, and ATC personnel to consider. However, these hazards all have one characteristic in common – they represent ***acceptable risk*** that is considered and mitigated as necessary to allow flight operations to proceed to a safe conclusion in the vast majority of cases.

Many of these risks represent far greater concern and thereby require a more complicated Risk Control Strategy or mitigation effort than the issue addressed by this study.

Our interpretation of available data is not so much that plumes are not hazards or present zero risk, but that pilots and controllers operating within the NAS have been and will continue to apply prudence and common sense skills to constantly "see and avoid" any potential hazard. These mitigating techniques are employed everyday throughout NAS through timely communication, training, and procedures for operating near hazardous weather, forest fires, large sporting events, volcanic ash, migratory bird activity, antenna towers, and overhead wires.

The risk assessment team offers the following conclusions and recommendations with regard to "overflight of plumes" and associated hazards:

Conclusions:

1. Given the considerably large pool of safety data available, it is safe to conclude that the accident/incident rate for overflights of exhaust plumes is of the order of 1×10^{-9} or less. Since the target level of safety was determined to be 1×10^{-7}, the probability of an accident or incident from overflight of an exhaust plume is less than the target level of safety. Since the target level of safety is met, the current likelihood of an accident or incident caused by an overflight of an exhaust plume is acceptably small.

2. Current regulations and advisories as well as the present Notice to Airmen (NOTAM) Temporary Flight Restrictions should preclude prudent pilots from flying through or near plumes, thereby making the aviation risk essentially zero.

3. Safety data and TLS notwithstanding, the FAA believes that flight over or around plume generating facilities should be avoided as there is the *potential* (however low) for aircraft upset at close proximity to high velocity plumes.

Recommendations:

Given the extremely low risk these plumes present, further mitigation is not required. However, the risk assessment team would offer that the FAA continue to enhance awareness programs that have been successful with similar hazards of acceptable risk levels. These programs include pilot and ATC personnel professional education, communication, advisement and avoidance strategies, and operational techniques. Accordingly, the safety risk assessment team recommends the FAA:

(a) Amend the Aeronautical Information Manual (AIM) Chapter 7, Section 5 with wording to the effect that overflight at less than 1,000 feet vertically of plume generating industrial sites should be avoided.

(b) Publish (as appropriate) the position and nature of the present power plants located near public airports in the Airport/Facility Directory (A/FD), and issue a Notice to Airmen (NOTAM) when operationally necessary.

(c) Make the Temporary Flight Restriction (TFR) that includes the overflight of power plants (which was issued primarily for national security purposes) - a permanent flight restriction where operationally feasible.

(d) Amend FAA Order 7400.2 to consider a plume generating facility as a hazard to navigation when expected flight paths pass less than 1,000 feet above the top of the object.

(e) Advisory Circular 70/7460-2K Proposed Construction of Objects That May Affect the Navigable Airspace - Change Instructions for Completing FAA Form 7460-1 – Notice of Proposed Construction or Alteration, Item # 21, to add:

> "For structures such as power plants or any industrial facility where exhaust plume discharge could reasonably be expected and reportable under the provisions of Part 77, thoroughly explain nature of the discharge."
>
> Amend the AC as necessary to explain this change.

Residual Risk

A risk matrix, as shown in Figure 3, indicates where the residual risk of the hazards identified with the overflight of vertical plumes are situated with the implementation of the recommendations described above.

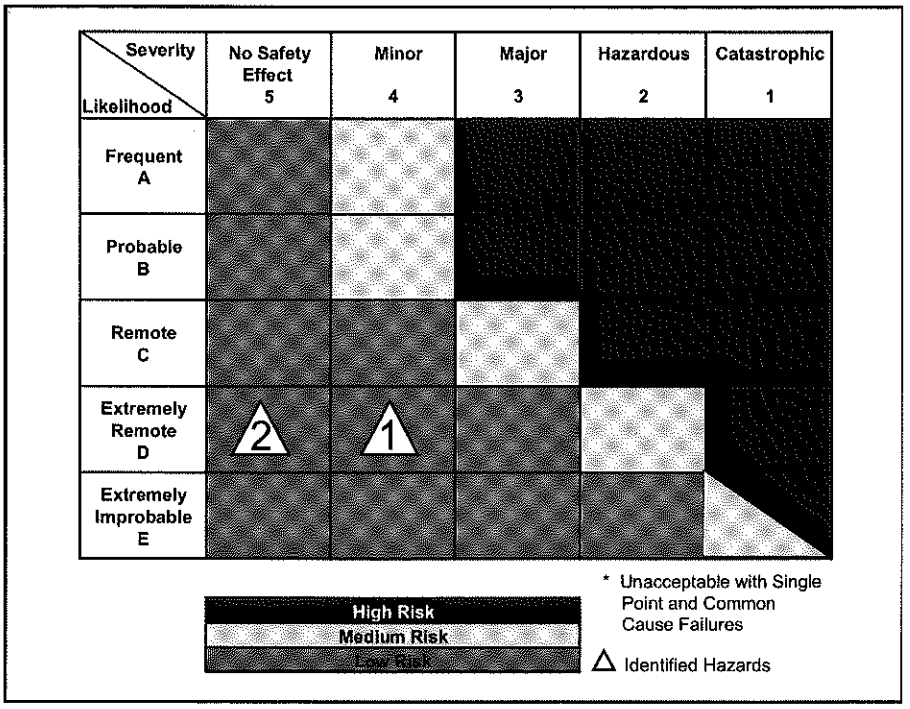


Figure 3 – Risk Matrix with Mitigation* (Residual Risk)
* Not required

Glossary of Terms

Aviation Safety Reporting System (ASRS) and Aviation Safety Reporting Program (ASRP). ASRS and ASRP are voluntary programs designed to encourage the identification and reporting of deficiencies and discrepancies in the airspace system. The National Aeronautics and Space Administration (NASA) accomplishes receipt, processing, and analysis of raw data rather than the FAA, which ensures the anonymity of the reporter and of all parties involved in a reported occurrence or incident and, consequently, increase the flow of information necessary for the effective evaluation of the safety and efficiency of the system. [Advisory Circular 00-46, *Aviation Safety Reporting Program]*

Accident. An event associated with the operation of an aircraft that takes place between the time any person boards the aircraft with the intention of flight and until all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

Accident/Incident Reporting Data System (AIDS). The FAA AIDS database contains accident and incident data records for all categories of civil aviation.

Assessment. An estimation of the size/scope of risk or quality of a system or procedure.

Effect. The effect is a description of the potential outcome or harm of the hazard if it occurs in the defined system state.

14 CFR Part 91 (General Aviation). Prescribes the operation of aircraft (other than moored balloons, manned rockets, and unmanned free balloons, which are governed by CFR Part 101, and ultralight vehicles operated in accordance with CFR Part 103) within the United States, including the waters within three nautical miles of the U.S. coast. Flights operating for recreation and training are generally carried out under CFR Part 91. Although general aviation usually involves small aircraft, the definition depends on the nature of the operation rather than the size of the aircraft.

14 CFR Part 121 (Air Carrier). Refers to scheduled domestic airlines and cargo carriers that fly large transport category aircraft.

14 CFR Part 135 (Air Taxi and Commuter). Refers to either scheduled (commuter operations) or nonscheduled (air taxi operations) flights. Scheduled CFR Part 135 operations apply to smaller aircraft carrying nine or fewer passengers on regularly scheduled routes. Nonscheduled CFR Part 135 operations apply to smaller aircraft carrying nine or fewer passengers with schedules that are arranged between the passengers and the operator. The nonscheduled operations also include cargo planes with payload capacities of 7,500 pounds or less.

14 CFR Part 137 (Agricultural). Refers to agricultural aircraft operations. Agricultural aircraft operation means the operation of an aircraft for the purpose of (1) dispensing any

economic poison; (2) dispensing any other substance intended for plant nourishment, soil treatment, propagation of plant life, or pest control; or (3) engaging in dispensing activities directly affecting agricultural, horticultural, or forest preservation, but not including the dispensing of live insects.

Fatal Injury. The NTSB defines a fatal injury as any event that results in death within 30 days of the event.

Hazard. Any real or potential condition that can result in injury, illness, or death to people; damage to, or loss of a system (hardware or software), equipment or property; and/or damage to the operating environment. A hazard is a prerequisite to an accident or incident.

Hazard Tracking. Hazard tracking is a closed-loop means of ensuring that the requirements and mitigations associated with each hazard that has associated medium and/or high risk are implemented. Hazard tracking is the process of defining safety requirements, verifying implementation, and reassessing the risk to make sure the hazard meets its risk level requirement before being accepted.

Incident. The NTSB defines an incident as an event, other than an accident, associated with the operation of an aircraft that affects or could affect the safety of operations.

Likelihood. Likelihood is an expression of how often an event is expected to occur. Severity must be considered in the determination of likelihood. Likelihood is determined by how often the resulting harm can be expected to occur at the worst credible severity, which will usually occur in the worst credible system state.

Mitigation. An action taken to reduce the risk of a hazard.

National Airspace System (NAS). An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, operational environment, usage, equipment, information, procedures, facilities, services, and other support services.

National Aviation Safety Data Analysis Center (NASDAC). The NASDAC system enables users to perform queries across multiple databases and display queries in useful formats. The NASDAC is a data warehouse and integrated database system.

Plume. Thermal updrafts generally associated with exhaust from the smoke stacks of power generating facilities, industrial production facilities, or other systems, which could have the ability to release large amounts of pressurized or otherwise unstable air. Can be visible or invisible in the air and disperse at various velocities/rates and directions for a given facility output and atmospheric conditions.

Preliminary Hazard Analysis (PHA). A risk analysis tool used in the hazard identification process for nearly all risk management applications except the most time-critical.

The broad scope of this tool provides a guide to the identification of issues. The PHA considers all of the hazards inherent to each aspect of an operation, without regard to risk. The PHA helps overcome the tendency to focus immediately on risk in one aspect of an operation, sometimes at the expense of overlooking more serious issues elsewhere in the operation.

Process. An organized group of related activities that work together to produce a desirable condition.

Qualitative Data. Subjective data is expressed as a measure of quality; nominal data.

Quantitative Data. Objective data expressed as a quantity, number or amount that allows for more rational analysis and substantiation of findings.

Risk. The risk associated with a hazard is the composite of predicted severity and likelihood of the potential effect or outcome of the hazard in the worst credible system state. The two types of risk addressed in this study are, (1) current, (2) residual:

> **Current.** Current risk is the predicted severity and likelihood of an effect associated with a hazard at the current time.
>
> **Residual.** Residual risk is the remaining risk that exists after all control/mitigating techniques have been implemented or exhausted.

Risk Assumption Strategy. To accept the likelihood, probability, and consequences associated with the risk.

Risk Avoidance Strategy. To select a different approach or to not participate in the operation, procedure, or system development to avert the potential of occurrence and/or consequence.

Risk Control Strategy. To develop options and alternatives and/or take actions to minimize or eliminate the risk.

Safety. Freedom from unacceptable risk.

Safety Management System (SMS). An integrated collection of processes, procedures, policies, and programs that are used to assess, define, and manage the safety risk in the provision of air traffic control (ATC) and navigation services.

Safety Risk Management (SRM). A formalized, proactive approach to system safety. SRM is a methodology usually applied to all (NAS) changes that ensures all risks are identified and mitigated prior to the change being made. For the purposes of this study, SRM provides a flexible "closed-loop" safety analysis framework well-suited to the analysis of presumed hazards.

Severity. Severity is the measure of how bad the results of an event are predicted to be. Severity is determined by the worst credible potential outcome.

Substantial Damage – The NTSB defines substantial damage as failure that adversely affects the structural strength, performance, or flight characteristics of the aircraft, and would normally require major repair or replacement of the affected component. Engine failure or damage limited to the engine if only one engine fails or is damaged, bent fairings or cowlings, dented skin, small puncture holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, engine accessories, brakes, or wingtips are not considered "substantial damage."

Target Level of Safety (TLS). The target level of safety is the maximum allowable probability of a hazardous event. The target level of safety is usually determined from historical data for various operations, but is sometimes developed through analysis.

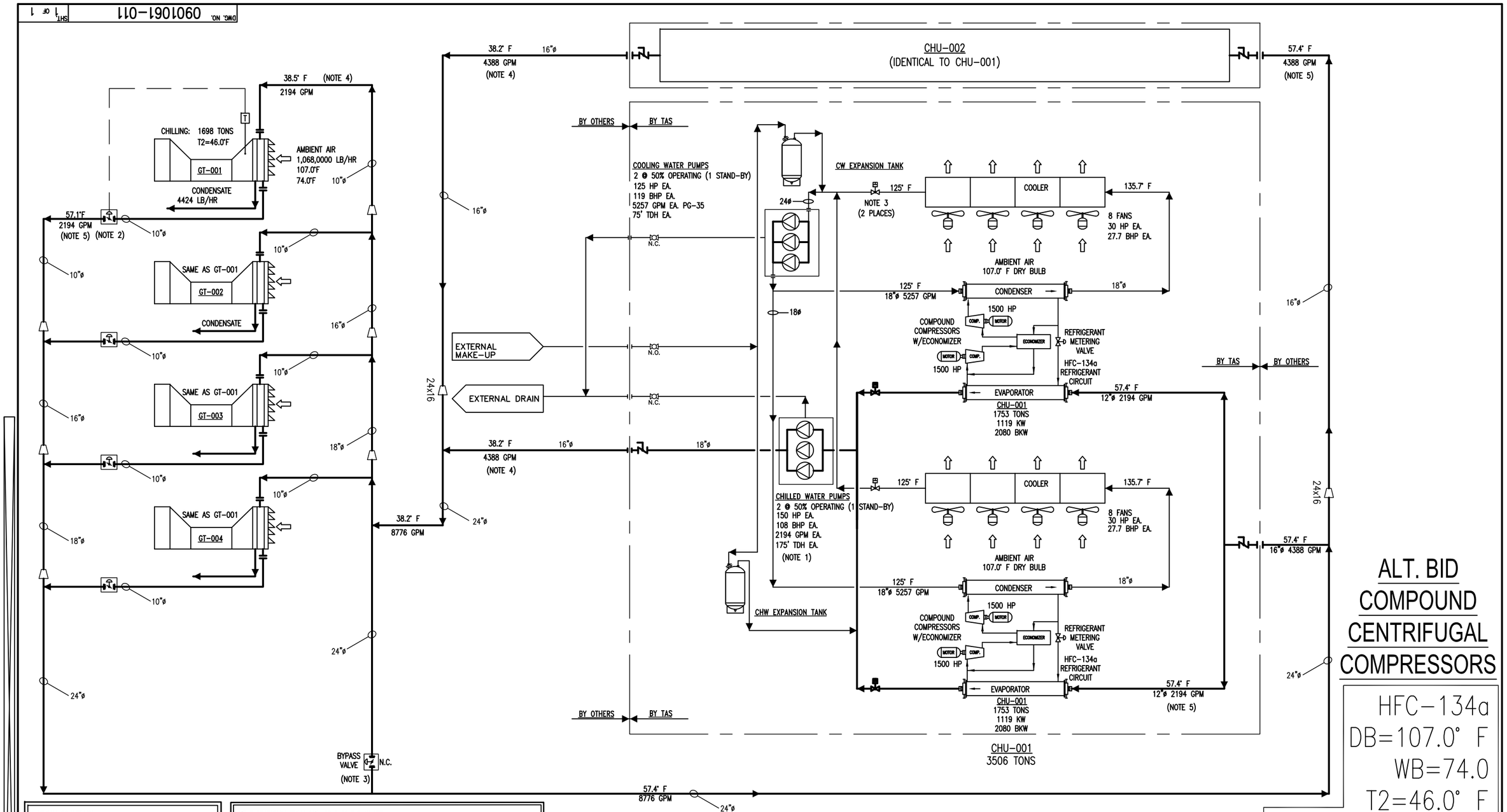
"What - if" Technique. Is a brainstorming method designed to add discipline and structure to the experiential and intuitive expertise of operational personnel.

Worst Credible System State. In this definition, "*worst*" is the most unfavorable conditions expected (e.g., extremely high levels of efflux material and velocity, extreme weather disruption, etc.); "*credible*" implies that it is reasonable to expect the assumed combination of extreme conditions will occur within the NAS.

Appendix A – Risk Assessment Team Members

Name	Organization/Position
Alan Jones	AFS-420/Operations Research Analyst
Dr. James Yates	AFS-420/FAA Contractor-ISI, Senior Engineer & Pilot
Dean Alexander	AFS-440/ Test Director & Airspace System Inspection Pilot
Rick Dunham	AFS-440/ Test Director & Airspace System Inspection Pilot
Lt. Col Paul McCarver	AFS-420/USAF Pilot & Military Liaison
Michael Werner	AFS-420/Pilot & Aviation Safety Inspector (Operations)
Gary Powell	AFS-420/Pilot & Aviation Safety Inspector (Operations)
Larry Ramirez	AFS-440/Air Traffic Control Liaison
James Nixon	AFS-420/FAA Contractor-ISI, Pilot & Approach Procedure Specialist
Mark Reisweber	AFS-440/Engineering Psychologist (Human Factors) & Pilot
John Holman	AFS-420/FAA Contractor-ISI, Pilot & Approach Procedure Specialist

Attachment DR53-1
Chiller Flow Diagram



ALT. BID
COMPOUND CENTRIFUGAL COMPRESSORS

HFC-134a
DB=107.0° F
WB=74.0
T2=46.0° F
DEMAND=10,544 kW

DESIGN CONDITIONS:

DRY BULB	=	107.0°F
WET BULB	=	74.0°F
ALTITUDE	=	120 FT
NET COIL TONS EA.	=	1698 T
NET COIL TONS TOTAL	=	6792 T
PARASITIC HEAT GAINS	=	310 T
TOTAL COOLING LOAD	=	7011 T
SYSTEM EFF.	=	1.50 KW/ton
PARASITIC DEMAND	=	10,544 KW/ton

FLUID: WATER — REFRIGERANT — CHILLED WATER

HEAT REJECTION FROM CHILLER RADIATOR SYSTEM

1) 112,460,000 BTU/HR MAX TOTAL HEAT REJECTION AT 107.3 F DRY-BULB AND 74.0 F WET-BULB
2) 80,288,934 BTU/HR TOTAL HEAT REJECTION AT 93.0 F DRY-BULB AND 67.5 F WET-BULB
3) 61,089,581 BTU/HR TOTAL HEAT REJECTION AT 75.3 F DRY-BULB AND 63.1 F WET-BULB
4) 18,379,800 BTU/HR TOTAL HEAT REJECTION AT 59.0 F DRY-BULB AND 51.5 F WET-BULB
5) 27,280,000 LB/HR MAX TOTAL AIR FLOW AT 107.3 F DRY-BULB AND 74.0 WET-BULB

NOTES:
1) 120' EXTERNAL PUMPING HEAD ALLOWED
2) EXTERNAL MODULATING TEMPERATURE CONTROL VALVES FURNISHED BY TAS
3) EXTERNAL MODULATING BYPASS VALVE FURNISHED BY TAS
4) 0.3° F ALLOWED FOR HEAT GAINS IN CHW SUPPLY PIPING
5) 0.3° F ALLOWED FOR HEAT GAINS IN CHW RETURN PIPING

* MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING U.S. PATENTS; 6318065, 6470686, 6769258, 6848267

REFERENCE DRAWINGS

PRELIMINARY

REV.	DESCRIPTION	BY	CHK.	APP.	DATE
A	ISSUED FOR PROPOSAL	MAL			4/17/09

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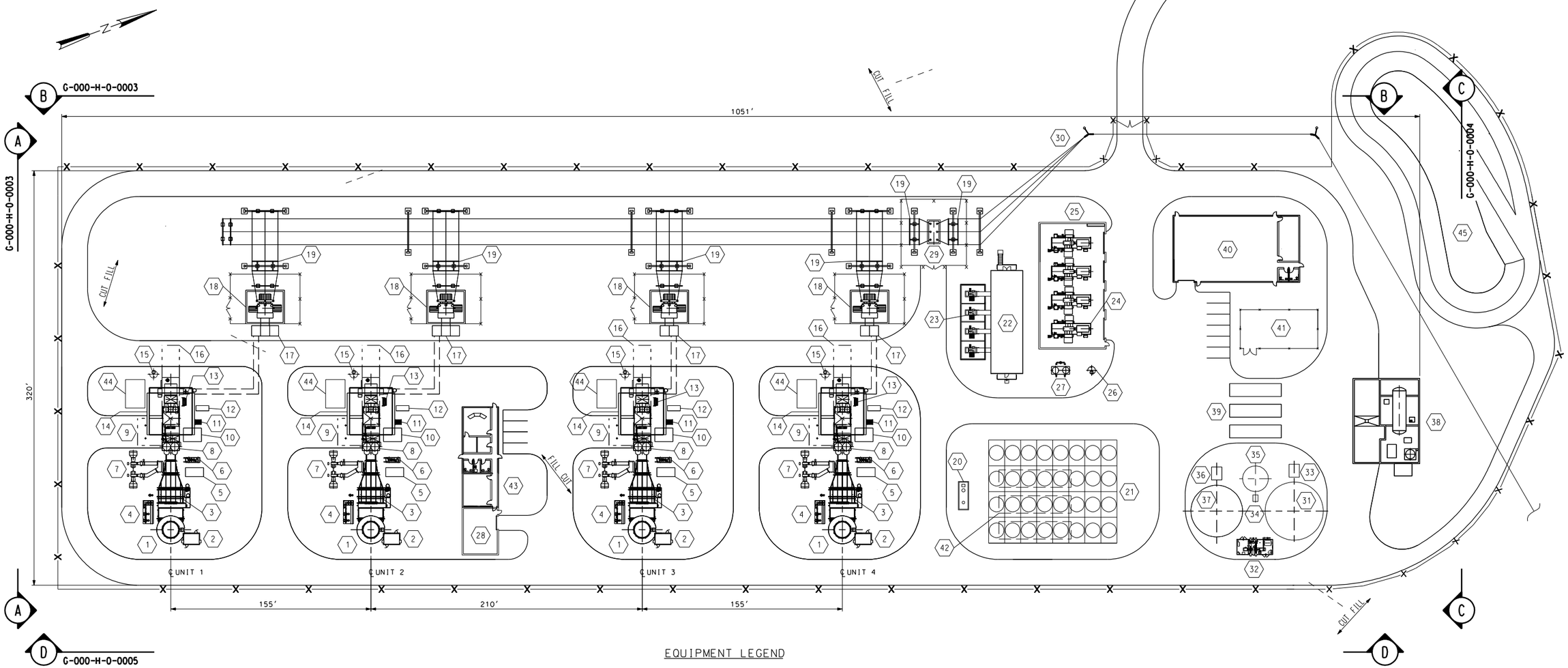
CHECKED BY: DATE:
APPROVED BY: DATE:
PROJ. MGR:
CUST. P.O. NO.
SCALE: NOT TO SCALE
SITE:
TAS JOB. NO. 0901061

TURBINE AIR SYSTEMS
4300 DIXIE DRIVE HOUSTON, TX 77021 PHONE: (713) 877-8700 FAX: (713) 877-8701

PROCESS FLOW DIAGRAM
F-SERIES CHILLER PLANT
DIAMOND GENCO MARIPOSA
TRACY, CALIFORNIA

DWG. NO. 0901061-011 | SHEET 1 OF 1 | CAT. – | REV. A

Attachment DR55-1
Equipment Plan



EQUIPMENT LEGEND

1. EXHAUST STACK
2. CEMS STATION
3. SCR/CO CATALYST
4. AMMONIA INJECTION SKID
5. LUBE OIL FIN FAN COOLER
6. WATER INJECTION SKID
7. TEMPERING AIR FANS
8. GAS TURBINE GENERATOR (CTG)
9. TURBINE REMOVAL AREA
10. AUXILIARY SKID
11. SPRINT SKID
12. FINAL GAS FUEL FILTER
13. CO2 BOTTLE STORAGE
14. CTG INLET AIR FILTER
15. WATER WASH DRAINS TANK
16. ROTOR PULL SPACE
17. SWGR. GENERATOR BREAKER (TYP OF 2 UNITS)
18. GENERATOR STEP-UP TRANSFORMER (GSU)
19. DISCONNECT
20. OIL/WATER SEPARATOR
21. CHILLER/AIR COOLED RADIATOR SYSTEM
22. POWER DISTRIBUTION CENTER (PDC)
23. AUX TRANSFORMERS
24. FUEL GAS COMPRESSORS
25. FUEL GAS COMPRESSOR ENCLOSURE
26. FUEL GAS WASTE SUMP
27. FUEL GAS COALESCING FILTERS
28. AIR COMPR/DRYER/RECEIVER ENCLOSURE
29. CIRCUIT BREAKER
30. OVERHEAD POWER LINES
31. 45' DIA. RAW WATER/FIRE WATER STORAGE TANK
32. FIRE PROTECTION WATER PUMPS
33. RAW WATER TRANSFER PUMPS
34. WASTE WATER TRANSFER PUMPS
35. 25' DIA. WASTE WATER STORAGE TANK
36. DEMIN WATER TRANSFER PUMPS
37. 40' DIA. DEMIN WATER STORAGE TANK
38. AQUEOUS AMMONIA UNLOADING/STORAGE AREA
39. DEMIN WATER TRAILERS
40. WAREHOUSE & MAINT. BUILDING
41. GAS METERING STATION
42. CHILLER SKIDS (3)
43. CONTROL/ADMIN. BUILDING
44. CTG ELECT. MODULE
45. RETENTION POND

NOTE:
FINISHED GRADE EL. 125'-6"
T.O. CONC. EL. 126'-0"

40 0 40 80
Scale: 1 INCH = 40 FEET

NO.	DATE	REVISION	BY	CHK
A	2/10/09	ISSUED FOR REVIEW	SR	
B	2/16/09	REVISED ITEM 32, RELOCATED ITEMS 34,35 & ADDED SECTION CUTS	SR	
C	2/23/09	ADDED CONFERENCE ROOM TO CONTROL / ADMIN BLDG.	SR	
D	4/01/09	REVISED ITEMS 21 & 42, RELOCATED ITEMS 22,23 & 40 & REROUTED ACCESS ROAD	SR	
E	4/22/09	RECONFIGURED POWER ISLAND AND B.O.P. EQUIPMENT LOCATIONS, ADDED CUT & FILL LINE	EC	
F	11/23/09	RECONFIGURED CHILLER FAN CELLS AND OIL/WATER SEPARATOR	EC	
	/ /			
	/ /			

RESPONSIBLE ENGINEER
PE #

REVISION APPROVAL		REV F	DATE 11/23/09
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONT.	
MECHANICAL		ARCH.	
PROCESS		GEN. ARRANG.	
PIPING			

STATUS					
ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY		/ /			
FOR REVIEW AND APPROVAL	F	11/23/09			
APPROVED FOR CONSTRUCTION		/ /			
REVISED & APPROVED FOR CONSTRUCTION		/ /			

SCALE 1" = 40'

Diamond Generating Corporation
A Subsidiary of Mitsubishi Corporation

Mariposa Energy Project

PROJECT NO. 383206

CH2MHILL
CH2MHILL Engineers

GENERAL ARRANGEMENT
EQUIPMENT PLAN
(4) GE LM 6000 PC SPRINT
COMBUSTION TURBINE GENERATORS

DWG. NO. G-000-Z-0-0001 REV. F

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: $FILENAME PLOT DATE: $PLOTDATE PLOT TIME: $PLOTTIME

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Transmission System Engineering (56-57)

Introduction

Staff needs to determine the system reliability impacts of the project interconnection and to identify the interconnection facilities including downstream facilities needed to support the reliable interconnection of the proposed Mariposa Energy Project (MEP). The interconnection must comply with the Utility Reliability and Planning Criteria, North American Electric Reliability Council (NERC) Planning Standards, NERC/Western Electricity Coordinating Council (WECC) Planning Standards, and California Independent System Operator (California ISO) Planning Standards. In addition the California Environmental Quality Act (CEQA) requires the identification and description of the "Direct and indirect significant effects of the project on the environment." For the compliance with planning and reliability standards and the identification of indirect or downstream transmission impacts, according to the previous guidelines staff so far relied on the System Impact Study (SIS) and Facilities Study (FS) as well as review of these studies by the agencies responsible for insuring the adjacent interconnecting grid meets reliability standards, in this case, the Pacific Gas & Electric (PG&E) and/or California ISO. However, the California ISO's generator Interconnection study process under the new Large Generator Interconnection Procedures (LGIP) Tariff is in transition from a queue or serial SIS to a cluster window process for the Phase 1 and Phase 2 Interconnection studies. The Phase 1 Interconnection study is almost same as the SIS except it is now performed with several queue projects in a group in the same area of a utility. The Phase 2 Interconnection study (same as the FS and Operational study, but with all the queue projects in a group as included in the Phase 1 Interconnection study) would be performed at a later date. The Interconnection studies would analyze the effect of the proposed project on the ability of the transmission network to meet reliability standards. When the studies determine that the project will cause the transmission to violate reliability requirements the potential mitigation or upgrades required to bring the system into compliance are identified. The mitigation measures often include modification (such as reconductoring of an existing transmission line or extension or remodeling of an existing substation) and construction of downstream transmission facilities. The CEQA requires environmental analysis of any downstream facilities for potential indirect impacts of the proposed project.

Background

Staff has received a copy of the Transition Cluster Group1 Phase 1 Interconnection study report dated July 28, 2009 for interconnection of the proposed MEP (DGC Kelso CT project) and the study was performed by the California ISO and PG&E. However, the Appendices A to J of the study report

have not been received for staff's analysis. The study is considered incomplete without the Appendices.

The report shows that the power flow study was conducted under 2013 summer peak and 2013 summer off-peak system conditions with and without the Group 1 twelve generation interconnection queue projects with about a total of 4,700 MW new generating power output in the greater bay area of PG&E, which also includes the proposed MEP with 193.6 MW net generation output. The cluster study identified a large number of reliability criteria violations for new overloads on the downstream transmission facilities under normal (N-0) system conditions and California ISO category B contingency conditions (N-1, L-1 & G-1). In order to eliminate the identified overloads, preferred mitigation options include reconductoring of the overloaded lines with higher size conductors and constructing a new 230 kV switching station with three switch bays. The applicant, therefore, needs to comply with the CEQA requirements for environmental analysis for modification of these downstream facilities for potential indirect impacts of the proposed interconnection projects (Transition Cluster Group 1 Phase 1 Interconnection study report, sections 1-3 and 11).

Data Requests

56. Provide a general environmental analysis sufficient to meet the CEQA requirements for indirect project impacts for the following preferred mitigation measures:

    - Reconductor 22.8 miles of the Castro Valley- Newark 230 kV line with 795 Kcmil steel supported aluminum conductor (ACSS) or equivalent conductor.
    - Reconductor 10 miles of the Contra Costa-Brentwood 230 kV line with 954 Kcmil ACSS or equivalent.
    - Reconductor 17 miles of the Contra Costa-Windmaster section of the Contra Costa-Delta Pumps 230 kV line with 1113 Kcmil ACSS or equivalent.
    - Reconductor 1.4 miles of the Windmaster-Delta Pumps section of the Contra Costa-Delta Pumps 230 kV line with 1113 Kcmil ACSS or equivalent.
    - Reconductor 4.7 miles of the Altamont-Delta Pumps section of the Delta Pumps-Tesla 230 kV line with 1113 Kcmil ACSS or equivalent.
    - Reconductor 3 miles of the Altamont-Tesla section of the Delta Pumps-Tesla 230 kV line with 1113 ACSS or equivalent.
    - Reconductor 3 miles of the Kelso-USWP RLF section of the Kelso-Tesla 230 kV line with 1113 Kcmil ACSS or equivalent.

- Reconductor 5 miles of the USWP RLF-Tesla section of the Kelso-Tesla 230 kV line with 1113 Kcmil ACSS or equivalent.
- Reconductor 21 miles of the Las Positas-Newark 230 kV line with 954 Kcmil ACSS or equivalent.
- Reconductor 12 miles of the Lonetree-USWP JRW section of the LonetreeCayetano 230 kV line with 954 Kcmil ACSS or equivalent.
- Reconductor 12 miles of the Morago-Castro Valley 230 kV line with 795 Kcmil ACSS or equivalent.
- Reconductor 1.1 miles of the Trimble-San Jose B 115 kV overhead line section with 477 Kcmil ACSS or equivalent.
- Reconductor 3 miles of the USWP JRW-Cayetano 230 kV line section with 954 Kcmil ACSS or equivalent.
- Reconductor 10 miles of the North-Dublin- Vineyard 230 kV line with 954 Kcmil ACSS or equivalent.
- Reconductor 14 miles of the Vineyard-Newark 230 kV line with 954 Kcmil ACSS or equivalent.
- Reconductor 5 miles of the Vaca Dixon-T275 No.1 230 kV line with bundled 795 Kcmil ACSS or equivalent.
- Reconductor 5 miles of the Vaca Dixon-T275 No.2 230 kV line with bundled 795 Kcmil ACSS or equivalent.
- Installing a new 230 kV switching station for three switch bays with a breaker and a half configuration and looping the Lonetree-Cayetano, Contra Costa-Las Positas, and North-Dublin-Vineyard 230 kV lines.

In addition provide a physical layout drawing of the proposed 230 kV switching station as stated above with major equipments (buses, breakers and disconnect switches) and transmission outlets.

Response:

Mariposa Energy has asked the Staff to agree (and Staff has concurred) that this general environmental analysis should be performed for those upgrades for which MEP has significant cost responsibility, which include the following:

- Reconductor 3 miles of the Kelso-USWP RLF section of the Kelso-Tesla 230 kV line with 1113 Kcmil ACSS or equivalent.
- Reconductor 5 miles of the USWP RLF-Tesla section of the Kelso-Tesla 230 kV line with 1113 Kcmil ACSS or equivalent.

Because these upgrades involve PG&E facilities, Mariposa Energy has requested that PG&E grant access to perform this general environmental analysis. PG&E has not yet authorized

access, but the environmental fieldwork will begin as soon as PG&E grants access. Our goal is to complete this general environmental analysis on or before January 29, 2010.

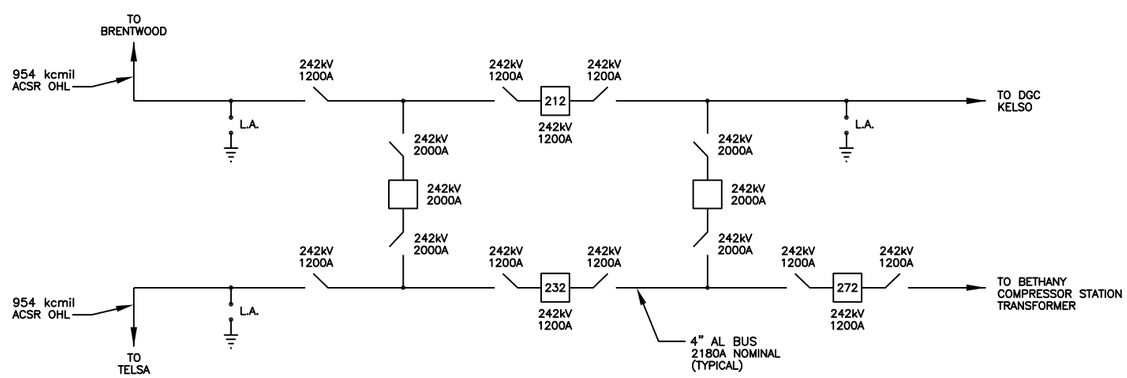
A one-line drawing of the proposed ring bus interconnection configuration is provided as Attachment DR56-1. A physical layout drawing is being prepared and will be submitted by December 11, 2009.

57. Submit the Appendices A to J of the Transition cluster Phase 1 Interconnection study report. Should you intend to file confidential documents, please provide an "Application for Confidential Designation" addressed to the Executive Director, Energy Commission for consideration.

Response:

Staff has confirmed they currently have the Appendices for the Transition Cluster Phase 1 Interconnection Study Report.

Attachment DR56-1
Proposed Ring Bus Interconnection Configuration



LEGEND

#	POWER CIRCUIT BREAKER
	DISCONNECT SWITCH
	LIGHTNING ARRESTOR
OHL	OVERHEAD LINE

NOTES:

1. THIS DESIGN IS CONSISTENT WITH PG&E GENERATION INTERCONNECTION HANDBOOK SECTION S2.
2. ADDED TWO BREAKERS AND FOUR SWITCHES TO FORM RING BUS DESIGN.
3. ACHIEVABLE WITHIN EXISTING FOOTPRINT.

FILE

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REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD	REFERENCE DRAWINGS
*	*	*	*	*	*	*	*

DSGN	*	*
DRN	*	*
CKD	*	*
SCALE:	*	

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KELSO SUBSTATION

PROPOSED INTERCONNECTION

RING BUS CONFIGURATION

JOB NUMBER **

REV

DRAWING NUMBER **

Soils and Water Resources (58-68)

Background: Water Supply and Use

Process water for the Mariposa Energy Project (MEP) would be supplied by Byron Bethany Irrigation District (BBID) Canal 45 via a new 6-inch, 1.8-mile-long pipeline. The new pipeline would be constructed adjacent to Bruns Road on BBID property until it reaches the MEP site. The applicant stated that "this source will provide water for process water, safety showers, fire protection, service water, and domestic uses." Maximum water use at MEP for an average annual temperature of 59°F (assuming 4,000 operational hours per year and 300 startup/shutdown events) would be approximately 187 acre-feet per year (AFY). The applicant has suggested that a realistic operating scenario of 600 hours per year with 200 startup/shutdown events would yield a water use of 34.8 AFY. Since MEP would have air-cooled condensers rather than evaporative cooling, water usage would decrease at higher ambient temperatures. Chiller coil condensate would be collected at the higher temperature and used for process water (approximately 19 gallons per minute could be collected at 93°F).

Data Request

58. Although alternative water supplies, such as recycled water sources, were described in Section 6.0 of the AFC, no back-up water supply was identified. Please identify a back-up water supply should BBID Canal 45 water become unavailable.

Response:

Since Canal 45 provides the fire suppression system water supply for BBID Headquarters facility, BBID was required to ensure reliability of this water source when that facility was constructed. Water for Canal 45 is provided from the delta via a pump station with multiple redundant pumping systems. Should Canal 45 be unavailable despite these measures, water could be hauled via truck from the BBID lift station that provides water to Canal 45.

Background

During construction of the MEP site, water would be required for dust suppression, concrete washout, soil compaction, and hydrostatic testing. Approximately 2,500 gallons of water per day will be required during construction. No source for water used during construction was provided.

Data Request

59. Please provide information regarding the source of the water to be used during construction of the MEP site.

Response:

Prior to construction of the water supply pipeline, the contractor will obtain water from BBID Canal 45 via fire hydrants at the BBID Headquarters facility located at 7995 Bruns Road in Byron, California.

Background: Will-Serve Letter

Section 5.15.2.1 of the AFC states that "in the unlikely event of continuous, maximum permitted operation (i.e., 4,000 hours/year) at the average expected annual temperature of 59°F, MEP would use approximately 187 acre-feet per year of water for plant uses."

The will-serve letter provided by Rick Gilmore, General Manager of Byron-Bethany Irrigation District ("BBID" or "District") suggests that Diamond Generating Corporation (DGC), the parent company of Mariposa Energy, LLC (Mariposa Energy), requested more water for the MEP (aka DGC Kelso) than the expected maximum usage that was reported in Section 5.15.2. The will-serve letter states:

> "It is the District's understanding DGC Kelso projects a water demand of 250 gallons per minute and an annual average usage of 185 acre-feet per year. In peak years, demand could be as high as 275 acre-feet per year. BBID has sufficient water to meet these projected demands of the DGC Kelso project and hereby advises DGC that the District is willing and able to provide water service to the DGC Kelso facility."

Data Request

60. Please clarify the discrepancies between statements in the AFC and the Will-Serve Letter for the values for maximum and expected average water usage at MEP.

Response:

The BBID will-serve letter dated June 30, 2008 was based on Mariposa Energy's preliminary understanding of the potential project operational water needs. The 187 acre-feet per year value presented in the AFC is a result of significant engineering analysis of MEP's potential water usage associated with the maximum permitted annual operating schedule.

Background: Wastewater

Process wastewater and contact stormwater at the proposed MEP site would be collected through a series of drains, sumps, and pipes and delivered to an onsite oil/water separator prior to treatment by an activated carbon filtration zero liquid discharge (ZLD) system. Treated ZLD reclaim water would be recycled to the raw water storage tank for process water usage. Oily waste collected from the separator, as well as wastewater from combustion turbine water washes, would be contained in an on-site drum and hauled offsite for disposal.

Data Request

61. A. Identify the offsite disposal location and identify the licensed hauler that will be used to transport the oily and combustion turbine wastewater.

    B. Estimate the anticipated frequency of offsite disposal of oily and combustion turbine wastewater.

Response:

Following testing and characterization of the oily and combustion turbine wastewater, the liquid waste may be disposed of at Altamont Landfill in Livermore or Kettleman Hills Landfill in Kettleman City. If chemical and metal concentrations do not exceed Altamont Landfill's acceptance criteria for liquid waste, the drums may be disposed of at Altamont Landfill. However, if constituent test results exceed Altamont Landfill's acceptance criteria, the waste would be disposed of at the Kettleman Hills facility. Denbeste Transportation provides waste transport services to either of these facilities. These services have not yet been contracted for MEP operations; Denbeste Transportation or another licensed hazardous waste transport provider will be used for transport of these materials.

Approximately 300 gallons per day of turbine wash water waste would be generated if the facility operated an average of 18 hours per day. Based on this wastewater generation rate, one 4,500-gallon tank-truck would be required every 15 days to transport the waste water for disposal. The quantity of oily wastewater generated during MEP operations is approximately 0.45 gallons per day, or approximately one 55-gallon drum every 122 days.

Background

The applicant states that a secondary wastewater collection system would collect sanitary wastewater from sinks, toilets, showers, etc. and "route it to an onsite septic tank for either discharge through an onsite leach field or removal for offsite treatment." The septic system would receive approximately 478 gallons per day.

Data Request

62. Please identify whether onsite leach field or offsite treatment would be utilized for sanitary wastewater disposal.

Response:

Sanitary wastes will be collected onsite in a septic tank and will be transported for offsite disposal by a local licensed sanitary waste management contractor. Based on preliminary research several sanitary waste contractors serve the project area.

Background: Stormwater Management

Stormwater from areas offsite would be diverted around the project facilities in two constructed swales. The constructed swales would require a significant excavation of the existing grade and result in steep slopes that drain toward the swales.

Data Request

63. Please describe the methods or Best Management Practices (BMPs) that will be implemented to prevent erosion on the steep finished grade slopes and verify that the BMPs would be effective for preventing sediment from discharging offsite.

Response:

Erosion and sediment control BMPs will be implemented to follow the progress of grading and construction throughout the entire construction period. Non-active areas (including all finished slopes) will be stabilized as soon as feasible after the cessation of construction activities and no later than 14 days after construction in that portion of the site has ceased.

Finished grade slopes drain into one of two swales routing upgradient stormwater around the site. To reestablish grass vegetation, finished grade slopes and swales will be hydroseeded with a native grass mixture, and mulched to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow. Controlled watering would be applied if seasonal rainfall is not sufficient. The entire area would be regularly monitored for signs of erosion; areas would be revegetated as necessary to maintain adequate soil protection. Re-vegetating disturbed soil soon after construction is the most effective way to control erosion and can also be one of the least expensive stabilization measures.

Disturbed areas that have not been re-vegetated will be stabilized with plastic covers, erosion control blankets, or mulch before rain events. In addition, linear sediment controls will be used along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths in accordance with Table DR63-1. Placement of linear sediment controls at grade breaks of exposed slopes will interrupt the length of the slope and reduce erosion by reducing runoff velocity.

TABLE DR63-1
Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Slope Percentage Sheet Not to Exceed
0 – 25%	20 feet
25-50%	15 feet
Over 50%	10 feet

The proposed facility will mitigate stormwater runoff with a series of inlets and storm drain pipes that will convey runoff to a proposed onsite extended detention basin located on the north end of the site. Storm drain inlets and outlets will be stabilized with riprap as needed. The areas around equipment, where not paved, will be graveled to minimize soil erosion and to allow for all-season use.

Background

Onsite stormwater at the proposed MEP site would be collected in a series of inlets and storm drain pipes and drained to a proposed onsite extended detention basin. The proposed extended detention basin would be sized to contain the facility site 100-year storm event and would release the volume over a minimum 48-hour period into the northeasterly-aligned constructed swale. The extended detention basin discharge would join with stormwater from offsite areas and pass through a 36" diameter culvert to discharge offsite.

Data Requests

64. Please state the basis for the proposed extended detention basin instead of an evaporation / percolation (retention) basin.

Response:

An infiltration basin was not recommended by the project geotechnical engineer for the MEP site due to the subsurface conditions. The subsurface conditions consist of soil overlying bedrock. The soil consists of stiff to hard lean clay with occasional pockets of sandy fat clay, clayey sand, and gravelly lean clay. The soil's swell potential is very high. The bedrock consists of sandstone with interbedded mudstone, mudstone, and very hard andesite.

65. According to the Alameda County Clean Water Program, Stormwater Technical Guidance, Appendix G – Infiltration Guidelines, the infiltration rates of the site's soil and bedrock are not high enough to support infiltration. Additionally, increased water infiltration could potentially cause increased uplift due to soil swelling to any adjacent structures or utilities. Please identify the receiving water (i.e. a stream, land, sewer, etc.) for the 36" diameter stormwater culvert outfall and verify that this discharge will not impact adjacent properties or affect the quality of US Waters or Waters of the State.

Response:

The unnamed drainages in the local project area are shown in Appendix 5.15A of the AFC (Preliminary Stormwater Management Design). These drainages from the project area flow north though the project parcel, and through the PG&E parcel north of Kelso Road, to a broad seasonal wetland area on the west side of Bruns Road at the Alameda-Contra Costa County Line. From this wetland, water flows approximately 0.5 mile to the north through an unnamed natural drainage channel, and then continues north through a series of constructed drainage ditches for approximately 2.5 miles, where water is pumped into the lower Delta (Italian Slough).

The MEP site drainage system has been designed to minimize the change in the rate and flow, and quality of runoff, when compared to the pre-project condition. The drainage system would convey the site's stormwater runoff through a series of inlets and storm drain pipes into an extended detention basin. An extended detention basin is a stormwater treatment measure to mitigate the effects of hydrograph changes from stormwater collected in pipes and channels before the runoff is discharged to a natural channel. In addition, the

extended detention basin is designed to release site stormwater runoff from the design storm over a 48-hour period to allow particles and associated pollutants to settle. An extended detention basin is a BMP recommended for treatment of stormwater quality (e.g., by the California Stormwater Quality Association in their BMP Handbook series). In compliance with the Clean Water Act, a schedule would be in place to monitor stormwater runoff quality to prevent an offsite discharge of pollutants. Process area and chemical storage area storm water drainage will be segregated and will be treated and recycled onsite for process water.

Background

During construction, approximately 15 acres of land associated with the MEP project would be disturbed for proposed project laydown, temporary parking, and the proposed MEP site. The General Permit for Stormwater Discharges associated with Construction Activity, administered by the State Water Resources Control Board (SWRCB), requires a Storm Water Pollution Prevention Plan (SWPPP) be prepared for the construction site. The SWPPP would include best management practices BMPs for erosion and sediment control. The SWPPP would be prepared prior to construction of the MEP project. The draft Construction SWPPP was not provided with the AFC.

Data Requests

66. Please provide a draft construction SWPPP.

Response:

A Draft Construction SWPPP is provided as Attachment DR66-1.

67. Please provide all conceptual erosion control plans and information for project construction.

Response:

Conceptual erosion control information is contained in Section K of the Draft DESCP, provided as Attachment DR68-1. In addition, reference Figure 8 for a conceptual BMP plan. The placement and details of the BMPs that will be utilized during project construction will be identified by the Contractor and updated in the Final DESCP.

Erosion control BMPs will be implemented to follow the progress of grading and construction. As the locations of soil disturbances change, erosion controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter. BMPs will be in place throughout the entire construction period. Non-active areas, and all finished slopes, open space, utility backfill, and completed lots, will be stabilized with effective soil cover as soon as feasible after construction is complete and no later than 14 days after construction in that portion of the site has temporarily or permanently ceased. Effective soil cover can consist of riprap, gravel, asphalt, mulch, erosion control blankets, or revegetation.

Sufficient erosion control materials will be maintained onsite to allow implementation of BMPs as described in the Draft DESCP. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.

Background

To mitigate potential impacts to water and soil resources from the construction of the MEP project, the Energy Commission requires preparation and implementation of a Drainage Erosion and Sediment Control Plan (DESCP). The DESCP would be updated and revised as the project moves through the design process. The DESCP is a complement to the Construction SWPPP. The DESCP submitted prior to site mobilization must be designed and sealed by a professional engineer/erosion control specialist.

Data Requests

68. Please provide a draft DESCP containing elements A through I below outlining site management activities and erosion/sediment control BMPs to be implemented during site mobilization, excavation/demolition, construction, and post-construction activities. The level of detail in the draft DESCP should be commensurate with the current level of planning for site grading and drainage.

Response:

A draft DESCP is provided as Attachment DR68-1. Mariposa Energy also believes that during project construction, it is preferable to have a single, consolidated document for construction personnel to follow related to stormwater management. Accordingly, the Mariposa Energy has an interest in seeing the SWPPP and the DESCP consolidated into a single document. (Mariposa Energy will work with the Commission's compliance staff on this issue post-approval. It need not affect the certification proceeding.)

A. **Vicinity Map** – A map(s) at a minimum scale 1"=100' indicating the location of all project elements (construction site, laydown area, pipelines, etc.) with depictions of all significant geographic features including swales, storm drains, and sensitive areas.

Response:

Reference Figure 1 in the Draft DESCP. Project elements will be further defined in the final design phases of the project and the Draft DESCP will be updated accordingly.

B. **Site Delineation** – All areas subject to soil disturbance for the MEP (project site, laydown area, all linear facilities, landscaping areas, and any other project elements) shall be delineated showing boundary lines of all construction/demolition areas and the location of all existing and proposed structures, pipelines, roads, and drainage facilities.

Response:

Reference Figures 2 and 3 in the Draft DESCP. Boundary lines of areas subject to soil disturbance and locations of proposed project elements will be further defined in the final design phases of the project and the Draft DESCP will be updated accordingly.

C. **Watercourses and Critical Areas** – The DESCP shall show the location of all nearby watercourses including swales, storm drains, and

drainage ditches. Indicate the proximity of those features to the MEP construction, laydown, and landscape areas and all transmission and pipeline construction corridors.

Response:

In the Draft DESCP, reference Figure 6 and Section C for a narrative on the watercourses and critical areas in the project area.

D. **Drainage Map** – The DESCP shall provide a topographic site map(s) at a minimum scale 1”=100’ showing all existing, interim and proposed drainage systems and **drainage** area boundaries. On the map, spot elevations are required where relatively flat conditions exist. The spot elevations and contours shall be extended off-site for a minimum distance of 100 feet in flat terrain.

Response:

Reference Figures 4 and 5 in the Draft DESCP. Proposed drainage systems and boundaries will be further defined in the final design phases of the project and the Draft DESCP will be updated accordingly.

E. **Drainage of Project Site Narrative** – The DESCP shall include a narrative of the drainage measures to be taken to protect the site and downstream facilities. The narrative should include the summary pages from the hydraulic analysis prepared by a professional engineer/erosion control specialist. The narrative shall state the **watershed** size(s) in acres that was used in the calculation of drainage measures. The hydraulic analysis should be used to support the selection of BMPs and structural controls to divert off-site and onsite drainage around or through the MEP construction and laydown areas.

Response:

The proposed facility will mitigate stormwater runoff with a series of inlets and storm drain pipes that will convey runoff to a proposed onsite extended detention basin located on the north end of the site. Two swales will route upgradient stormwater around the site. Reference Attachment C in the Draft DESCP for preliminary hydrology calculations that support the sizing of the stormwater detention basin and the two drainage swales. Additions or amendments to the hydraulic analysis and associated BMP selection and development would be incorporated in future revisions of the Draft DESCP.

F. **Clearing and Grading Plans** – The DESCP shall provide a delineation of all areas to be cleared of vegetation and areas to be preserved. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross sections or other means. The locations of any disposal areas, fills, or other special features will also be shown. Illustrate existing and proposed topography tying in proposed contours with existing topography.

Response:

Reference Figure 8 in the Draft DESCP. The site grading and drainage will be designed to comply with all applicable laws, rules, and regulations. Grading plans will be further defined in the final design phases of the project and the DESCP will be updated accordingly.

G. **Clearing and Grading Narrative** – The DESCP shall include a table with the quantities of material excavated or filled for the site and all project elements of the MEP **project** (project site, lay down area, transmission corridors, and pipeline corridors) whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported.

Response:

Reference Table 8 in the Draft DESCP. Quantities and nature of material import or export will be further defined in the final design phases of the project and the DESCP will be updated accordingly.

H. **Best Management Practices Plan** – The DESCP shall identify on the topographic site map(s) the location of the site specific BMPs to be employed during each phase of construction (initial grading/demolition, project element excavation and construction, and final grading/stabilization). BMPs shall include measures designed to prevent wind and water erosion.

Response:

Reference Figure 8 in the Draft DESCP for a conceptual BMP plan. After final site design and prior to any soil disturbance, the Contractor will prepare the Final DESCP. The Final DESCP will include the location of site-specific BMPs designed by the Contractor for all phases of construction, installation instructions, and maintenance schedules for each BMP.

I. **Best management practices narrative** – the DESCP shall show the location (as identified in H above), timing, and maintenance schedule of all erosion and sediment control BMPs to be used prior to initial grading, for all project elements (site, pipelines, etc.) related to excavations and construction, final grading/stabilization, and post-construction. Separate BMP implementation schedules shall be provided for each project element for each phase of construction. The maintenance schedule should include post-construction maintenance of structural control BMPs, or a statement provided when such information will be available. Include provisions for wet-season work.

Response:

Reference Section K in the draft DESCP for the narrative associated with BMP location, timing, and maintenance schedule for all stages of construction. After final site design and prior to any soil disturbance, the Contractor will prepare the Final DESCP. The Final DESCP will include the final selection of BMPs to be used and their locations, installation instructions, timing, and maintenance schedules for each BMP.

Attachment DR66-1
Draft Construction SWPPP

Administrative Draft

Mariposa Energy Project Construction Stormwater Pollution Prevention Plan

Prepared for

Mariposa Energy, LLC

November 2009

CH2MHILL
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833

Stormwater Pollution Prevention Plan

For:
Mariposa Energy Project

Prepared for:
[Lead Agency name, address, contact number]

Project Site Location/Address:
Southeast of the intersection of Bruns Road and Kelso Road, 6 miles south of Byron, Alameda County, California
Assessor's parcel number is 099B-7050-001-10

Contractor:
To Be Determined

Contractor's Qualified SWPPP Practitioner
To Be Determined

SWPPP Prepared by:
CH2M HILL
2525 Airpark Dr.
Redding, CA 96001
(530) 229-3340
Mieke Sheffield, CPSWQ #520

SWPPP Preparation Date:
Administrative Draft
November 2009

Estimated Project Dates:
Start of Construction: April 2011
Completion of Construction: July 2012

WDID No.: To Be Determined

CH2MHILL

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SECTION 1

SWPPP Certifications and Approval

1.1 SWPPP Certification by Preparer

Project Name Mariposa Energy Project

Project Number _____

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____	_____
Preparer's Signature	Date
_____	_____
Name and Title	Telephone Number

1.2 SWPPP Certification by Legally Responsible Person

Project Name Mariposa Energy Project

Project Number _____

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner (or Authorized Representative) Signature	Date
Name and Title	Telephone Number

1.3 Annual Report

By September 1 of each year, an Annual Report will be prepared and electronically submitted by the Legally Responsible Person (LRP) or the LRP's approved signatory.

- Each Annual Report will be certified in accordance with the Special Provisions of the General Permit.
- An electronic or paper copy of each Annual Report will be retained for a minimum of three years after the date the annual report is filed.
- The following information will be included in the Annual Report:
    1. A summary and evaluation of all sampling and analysis results, including copies of laboratory reports;
    2. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");
    3. A summary of all corrective actions taken during the compliance year;
    4. Identification of any compliance activities or corrective actions that were not implemented;
    5. A summary of all violations of the General Permit;
    6. The names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;
    7. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and
    8. The visual observation and sample collection exception records and report.
- Training information will be provided in the Annual Report consisting of:
    1. Documentation of all training for individuals responsible for all activities associated with compliance with this General Permit;
    2. Documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and
    3. Documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

SECTION 2

Introduction

State Water Resources Control Board Order No. 2009-0009-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Stormwater Runoff Associated with Construction and Land Disturbance Activities (General Permit) regulates discharges of pollutants in stormwater associated with construction activity to waters of the United States from construction sites that disturb one or more acres of land surface. This General Permit serves as an National Pollutant Discharge Elimination System (NPDES) permit in compliance with Clean Water Act § 402 and will take effect on July 1, 2010.

2.1 Objectives

This Stormwater Pollution Prevention Plan (SWPPP) was developed to address the construction activity associated with the proposed Mariposa Energy Project (MEP or project). As required by the State Water Resources Control Board (SWRCB), this SWPPP was developed and will be amended or revised, when necessary, to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;
2. Where not otherwise required to be under a Regional Water Quality Control Board (RWQCB) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated;
3. Site best management practices (BMPs) are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the BAT/BCT standard;
4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and
5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

The SWPPP will be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and maps/drawings will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

2.2 SWPPP Amendments

This SWPPP shall be amended:

- Whenever there is a change in construction or operations which may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4); or
- If any condition of the General Permit is violated or the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved. If the RWQCB determines that a General Permit violation has occurred, the SWPPP shall be amended and implemented within 14-calendar days after notification by the RWQCB;
- Annually, prior to the defined rainy season; and
- When deemed necessary by the LRP.

The following items will be included in each amendment:

- Who requested the amendment
- The location of proposed change
- The reason for change
- The original BMP proposed, if any
- The new BMP proposed

The amendments for this SWPPP, along with the Preparer's and LRP's Certifications, can be found in the following pages and Amendment Log.

2.2.1 SWPPP Amendment No.

Project Name Mariposa Energy Project

Project Number _____

2.2.2 Amendment Certification by Preparer

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____	_____
Preparer's Signature	Date
_____	_____
Name and Title	Telephone Number

2.2.3 Amendment Certification by Legally Responsible Person

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner (or Authorized Representative) Signature	Date
Name and Title	Telephone Number

2.3 Amendment Log

Project Name Mariposa Energy Project

Project Number

2.3.1 Example:

Amendment No.	Date	Brief Description of Amendment	Prepared By
001	Dec 10, 2000	Grading schedule changed to begin on Feb 10, 2001, and will include additional 2 acres. Amended plans attached to SWPPP	John Doe, Superintendent

Amendment No.	Date	Brief Description of Amendment	Prepared By

SECTION 3

Project Description

Mariposa Energy, LLC (Mariposa Energy) proposes to construct, own, and operate an electrical generating plant in an unincorporated area of northeastern Alameda County, California. The MEP will be a natural gas-fired, simple-cycle electrical generating facility rated at a nominal generating capacity of 200 megawatts (MW).The facility will be located southeast of the intersection of Bruns Road and Kelso Road on a 10-acre portion of a 158-acre parcel immediately south of the Pacific Gas and Electric Company (PG&E) Bethany Compressor Station and 230-kilovolt (kV) Kelso Substation. The Assessor's parcel number is 099B-7050-001-10. The site is located in Township 2S, Range 3E, Section 1 (Mount Diablo Base and Meridian). The proposed power plant site is located in the southern portion of the 158-acre parcel, between two small hills. The site is located approximately 7 miles northwest of Tracy, 7 miles east of Livermore, 6 miles south of Byron, and approximately 2.5 miles west of the community of Mountain House in San Joaquin County. Figure 1 shows the location of the project within Alameda County. Figure 2 shows the site location (all figures are located in Attachment A).

Access is via an access road that runs east from Bruns Road to the MEP site, within the project parcel. The current access road between the project site and Bruns Road will be upgraded. The MEP construction laydown and parking area will be located east of the project site, and will be approximately 5 acres. Two access roads (one to the north and one to the south) will be used to move between the project site and the laydown area. Natural gas and electric transmission interconnections will be less than 0.5 miles from the proposed project site. The new gas line will run approximately 580 feet northeast on the property to the point of interconnection with PG&E's high pressure gas line. The 0.7-mile electrical transmission line connection would run north, across Kelso Road to the Kelso Substation. A small laydown area (0.6 acre) just north of Kelso Road will be used during construction of the electrical transmission line. MEP service water will be provided via a new pipeline connection to the Byron Bethany Irrigation District (BBID) canal placed within and along the east side of Bruns Road. Another laydown area (1.0 acre) near the corner of Bruns Road and Bethany Lane will be utilized during the construction of the new water supply pipeline.

The project will have the following design features:

- Four General Electric (GE) LM6000 PC Sprint combustion turbine generators and associated support equipment
- Air emissions control systems including selective catalytic reduction systems for nitrogen oxides control and oxidation catalyst for carbon monoxide control
- A new approximately 0.7-mile-long, 230-kV transmission line to deliver the plant output to the electrical grid via the existing 230-kV Kelso Substation located north of the project site
- Approximately 580 feet of new 4-inch-diameter natural gas pipeline that will run directly northeast from the project site to interconnect with PG&E's existing high-pressure natural gas pipeline
- A new 6-inch-diameter, 1.8-mile water supply line from BBID Canal 45

The existing, unrelated 6.5-MW Byron Power Cogen Plant occupies 2 acres of the 158-acre parcel northeast of MEP. The remainder of the parcel is non-irrigated grazing land. There was a prior wind turbine development on the project site and the southern portion of the parcel. Minor debris from that wind development remains on site.

Project features are identified on Figure 2, including the power plant site, natural gas pipeline routes, electrical transmission lines, water supply lines, and the construction laydown and parking area.

3.1 Unique Site Features

3.1.1 Watercourses

The California Aqueduct is adjacent to the MEP site, and the Delta-Mendota Canal is less than 0.5 miles northeast of the site. Proximity of watercourses, swales, storm drains, and ditches is shown in Figure 3; pre-construction project site topography and drainage at the plant site are shown in Figure 4. The nearby watercourses including swales, storm drains, and drainage ditches to all project features will be identified in greater detail in the project construction drawings.

3.1.2 Other Critical Areas

Land developments in the MEP area are common and include agriculture to the north and east, and scattered industry and residences throughout the area. Non-native annual grassland characterizes the project area.

Table 1 lists special-status wildlife species potentially affected by project construction. This information is based on the results of the reconnaissance-level field surveys and an analysis of habitat suitability (coupled with known species' ranges).

TABLE 1
Special-status Species Potentially Affected during project Construction

Common Name	Scientific Name	Status[a]	Within 1 Mile of MEP (Y/N)
Crustacea			
Mid-valley fairy shrimp	*Branchinecta mesovallensis*	--/--	Y
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT/--	Y
Amphibians			
California tiger salamander, central population	*Ambystoma californiense*	FT/CSC	Y
California red-legged frog	*Rana draytonii*	FT/CSC	Y
Reptiles			
Western pond turtle	*Actinemys marmorata*	--/CSC	Y
Birds			
Tricolored blackbird	*Agelaius tricolor*	--/CSC	N
Western burrowing owl	*Athene cunicularia*	--/CSC	Y[b]
Grasshopper sparrow	*Ammodramus savannarum*	--/CSC	N
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	--/CSC	N

TABLE 1
Special-status Species Potentially Affected during project Construction

Common Name	Scientific Name	Status[a]	Within 1 Mile of MEP (Y/N)
Mammals			
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/CT	Y
American badger	*Taxidea taxus*	--/CSC	Y

[a]Status.

Federal Status
FE = federally listed as endangered
FT = federally listed as threatened

State Status
CT = state listed as threatened
CFP = state fully protected
CSC = state species of concern

[b] Species observed during the 2009 MEP reconnaissance survey; others recorded in project vicinity by CNDDB or other sources.

MEP falls inside the South and East San Francisco Bay California red-legged frog recovery unit and therein, the East San Francisco Bay Core Area. During consultation with Mariposa Energy, the U.S. Fish and Wildlife Service (USFWS) will require demonstration that any adverse effects of the project on the species do not threaten existing populations, and suitable habitat is created or restored, and/or protected and managed in perpetuity.

Mitigation (or protective) measures for biological resources, including special-status species that could be affected by MEP, will be taken from existing guidelines developed with the USFWS and California Department of Fish and Game. Mitigation measures developed for unavoidable project impacts that eliminate or minimize impacts to less than significant will be detailed and expanded upon in the Biological Resources Mitigation Implementation Monitoring Plan (BRMIMP). The BRMIMP also presents protection and mitigation measures issued by the natural resource agencies' in each of their permit terms and conditions.

A Biological Assessment will be prepared prior to project construction during Section 7 consultation with the USFWS, resulting in a Biological Opinion (BO) for the project. The BO will include project-specific compensatory mitigation requirements. As-needed focused surveys to support formal consultation for impacts on federally and state-listed species will occur for the project.

A formal wetland delineation for the project occurred in April 2009. The MEP plant site does not support any potential waters of the United States (including wetlands). Nor will the 230-kV transmission line and gas pipeline work impact wetlands.

The water supply pipeline intersects four intermittent and ephemeral drainages along Bruns Road that may be classified as jurisdictional wetlands by the US Army Corps of Engineers and Regional Water Quality Control Board (RWQCB). Emergent wetland vegetation, including cattail (*Typha* sp.) and sedge (*Carex* sp.) exists along the intermittent drainages. Italian ryegrass (*Lolium multiflorum*) and meadow barley (*Hordeum brachyantherum*) dominate the ephemeral drainages.

The 26 special-status plant species in Table 2 have a low to moderate potential for occurrence on the project area because of their association with annual grassland habitat or seasonal wetlands.

TABLE 2
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Plants					
Large-flowered fiddleneck	*Amsinckia grandiflora*	FE, CE,1B, ECCHCP: No, EACCS: No	Apr-May	Cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Bent-flowered fiddleneck	*Amsinckia lunaris*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Coastal bluff scrub, cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Alkali milk-vetch	*Astragalus tener var. tener*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Playas, valley and foothill grassland, vernal pools/alkaline	Low; alkaline wetland areas lacking in project area. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Heartscale	*Atriplex cordulata*	1B, ECCHCP: No, EACCS: No	Apr-Oct	Chenopod scrub, meadows and seeps, valley and foothill grassland	Moderate; there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 2
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Brittlescale	*Atriplex depressa*	1B, ECCHCP: Yes, EACCS: No	Apr-Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools	Moderate; there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
San Joaquin spearscale	*Atriplex joaquiniana*	1B, ECCHCP: Yes, EACCS: Yes	Apr-Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland/alkaline	Moderate; there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Big-scale balsamroot	*Balsamorhiza macrolepis var. macrolepis*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Chaparral, cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Big tarplant	*Blepharizonia plumosa*	1B, ECCHCP: Yes, EACCS: Yes	Jul-Oct	Valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.
Round-leaved filaree	*California macrophylla*	1B, ECCHCP: Yes, EACCS: No	Mar-May	Cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 2
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Bristly sedge	*Carex comosa*	2, ECCHCP: No, EACCS: No	May-Sep	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland	Low; potentially suitable habitat in project area is disturbed and no known records of occurrences in project area. Protocol-level surveys for this species scheduled for summer 2009.
Lemmon's jewelflower	*Caulanthus coulteri var. lemmonii*	1B, ECCHCP: No, EACCS: No	Mar-May	Valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Congdon's tarplant	*Centromadia parryi ssp. congdonii*	1B, ECCHCP: No, EACCS: Yes	May-Oct(Nov)	Valley and foothill grassland (alkaline)	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.
Hispid bird's-beak	*Cordylanthus mollis ssp. hispidus*	1B, ECCHCP: No, EACCS: No	Jun-Sep	Meadows and seeps, playas, valley and foothill grassland/alkaline	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	FE, CE,1B, ECCHCP: No, EACCS: Yes	May-Oct	Chenopod scrub, valley and foothill grassland/alkaline	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.
Livermore tarplant	*Deinandra bacigalupi*	1B, ECCHCP: No, EACCS: Yes	Jun-Oct	Meadows and seeps (alkaline)	Low; potentially suitable habitat in project area is disturbed, and there are no known records of occurrences in project area. Protocol-level surveys for this species scheduled for summer 2009.

TABLE 2
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Recurved larkspur	*Delphinium recurvatum*	1B, ECCHCP: No, EACCS: Yes	Mar-Jun	Chenopod scrub, cismontane woodland, valley and foothill grassland/alkaline	Moderate; CNDDB occurrence in an alkaline meadow located less than 1,000 feet from the water supply pipeline. However, this species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Diamond-petaled California poppy	*Eschscholzia rhombipetala*	1B, ECCHCP: No, EACCS: No	Mar-Apr	Valley and foothill grassland (alkaline)	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Diablo helianthella	*Helianthella castanea*	1B, ECCHCP: No, EACCS: No	Mar-Jun	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Contra Costa goldfields	*Lasthenia conjugens*	FE, 1B, ECCHCP: No, EACCS: No	Mar-Jun	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Showy golden madia	*Madia radiata*	1B, ECCHCP: No, EACCS: No	Mar-May	Cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 2
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status[a]	Season[b]	Primary Habitat[c]	Potential Occurrence in Project Area
Little mousetail	*Myosurus minimus ssp. apus*	2, ECCHCP: No, EACCS: No	Mar-Jun	Valley and foothill grassland, vernal pools (alkaline)	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Hairless popcorn-flower	*Plagiobothrys glaber*	1B, ECCHCP: No, EACCS: No	Mar-May	Meadows and seeps (alkaline)	Low; there are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Marsh skullcap	*Scutellaria galericulata*	2, ECCHCP: No, EACCS: No	Jun-Sep	Meadows and seeps (mesic), marshes and swamps	None; this species generally associated with Delta water bodies (i.e., sloughs). There are no known records of occurrence in the project area.
Saline clover	*Trifolium depauperatum var. hydrophilum*	1B, ECCHCP: No, EACCS: No	Apr-Jun	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools	Low; there are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Caper-fruited tropidocarpum	*Tropidocarpum capparideum*	1B, ECCHCP: No, EACCS: No	Mar-Apr	Valley and foothill grassland (alkaline hills)	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.

Protocol-level rare plant surveys occurred during spring and summer of 2009, for all proposed project impact areas. No special-status plant species were observed within the project impact areas.

3.2 Construction Site Estimates

3.2.1 Precipitation

The MEP site is arid to semiarid, with hot summers and mild winters. Most of the yearly precipitation falls between October and May. Table 3 lists the average monthly maximum temperatures, the average monthly minimum temperatures, and the average monthly rainfall recorded at the Tracy Pumping Plant weather station from 1955 through 2007. Average annual rainfall is 12.19 inches. Additional preliminary hydrology calculations are located in Attachment B.

TABLE 3
Monthly Climate Summary at Tracy Pumping Plant Weather Station (February 1, 1955 to December 31, 2007)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	54.6	61.2	66.4	72.2	79.7	87.2	92.6	91.9	87.5	78.4	64.7	55.2	74.3
Average Min. Temperature (°F)	38.2	41.8	44.6	47.7	53.3	57.6	60.4	60.4	58.1	52.2	44.0	38.5	49.8
Average Total Precipitation (inches)	2.62	2.15	1.59	0.84	0.41	0.11	0.03	0.06	0.24	0.62	1.60	1.93	12.19

Source: Western Regional Climate Center, 2008.

°F = degrees Fahrenheit

3.2.2 Drainage

Figure 3 shows the location of nearby drainages and watercourses in relation to MEP. Figure 4 shows general pre-construction drainage at the plant site, and Figure 5 shows post-construction drainage. Site drainage will be further defined in the final design phase of the project and its features incorporated into the SWPPP. Preliminary hydrology calculations are provided in Attachment B.

The MEP site is located in the San Joaquin Basin. The principal streams in the basin are the San Joaquin River and its larger tributaries: the Cosumnes, Calaveras, Mokelumne, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno rivers. The MEP site is not located near any of these surface water features.

Surface water is imported to the basin through several main canals via the State Water Project (SWP) and the federal Central Valley Project (CVP). These canals include the Delta-Mendota Canal (CVP) and the California Aqueduct (SWP). The California Aqueduct is adjacent to the MEP site, and the Delta-Mendota Canal is less than 0.5 miles northeast of the site (Figure 3).

Currently there is no active stormwater management system on the project area; drainage is generally via percolation or sheetflow to the north into ephemeral drainages that converge

into a single man-made linear channel. The channel's waters eventually discharge into Italian Slough, located 2.5 miles downstream of the project site.

The grading and drainage of the MEP plant was designed in accordance with the Alameda County Flood Control and Water Conservation District *C.3 Stormwater Technical Guidance*. Attachment B provides the preliminary stormwater management design for the project, which includes stormwater calculations and the pre- and post-development drainage plans.

The MEP plant will mitigate storm runoff with a series of inlets and storm drain pipes that will convey runoff to a proposed onsite extended detention basin located on the north end of the site. Figures 4 and 5 show pre- and post-construction drainage conditions for the site. The extended detention basin is designed to release site stormwater runoff from the design storm over a 48-hour period to allow particles and associated pollutants to settle. The multi-stage discharge structure will discharge to one of the swales routing upgradient stormwater around the site, as shown in Figure 5.

The drainage from the MEP plant extended detention basin will then flow through the PG&E parcel north of Kelso Road, to a broad seasonal wetland area on the west side of Bruns Road at the Alameda-Contra Costa County line. From this wetland, water flows approximately 0.5 miles to the north, through an unnamed natural drainage channel, and then continues north through a series of constructed drainage ditches for approximately 2.5 miles, where it is pumped into the lower Delta (Italian Slough).

Areas of potential oily water contamination will be sited within containment to prevent oily water from mixing with stormwater flowing to the extended detention basin. Impervious areas will be limited to paved loop and equipment access roads and the equipment to operate the plant. Forty-four percent of the MEP site will have impervious surfaces for equipment siting and roads.

Table 4 presents the pre-development and post-development runoff peak for the site.

TABLE 4
Pre- and Post-development Runoff for the MEP Plant Site

Scenario	Area (acres)	Runoff Peak (cfs) 2-year event	Runoff Peak (cfs) 100-year event
Pre-Development (Zone CM-5)	8.65	0.58	7.05
Post-Development Uncontrolled[a] (Zone S-1&2)	8.12[b]	5.4	17.8
Post Development Discharge Rate[c]	8.65	0.58	6.58

cfs = cubic feet per second

[a]Post-development runoff rate to the extended detention basin

[b]Post-develoment acreage is shown less than pre-development because the detention pond surface acreage is not considered in the hydrologic routing model.

[c]Post-development Discharge from extended detention basin to natural drainage.

The peak runoff for the two-year and one hundred-year storm events for the site in the pre- and post-development conditions was determined and compared. As shown in Table 4, overall runoff will increase between pre-development and post-development due to the proposed impervious surfaces (structures and asphalt paving of the facility roads) and the

shortened drainage basin time of concentration (time for runoff to occur). The predevelopment basin is described as grass land and has capability to absorb the runoff more efficiently than the post-development case with structures and paved or gravels surfacing. Also, runoff occurs over a longer period of time in the pre-developed case. In the developed site, runoff will have a shorter time of concentration; the runoff will occur over a shorter time period due to the site drainage system. This decrease in concentration time causes the increase in peak flow rates for the developed site (higher flow rates for a shorter period of time). The extended detention basin outfall discharge rates will not be greater than pre-development site stormwater discharge rates. Additionally, the extended detention basin will improve the water quality by allowing sediments to settle out prior to discharge.

Although road paving will increase site runoff, this measure will improve both the air and water quality by minimizing dust during the dry season and sedimentation of runoff during rain events.

3.3 Project Schedule/Water Pollution Control Schedule

Table 5 lists the project's milestones. Construction of the generating facility, from site preparation and grading to commercial operation, is expected to take place from April of 2011 to July of 2012, 14 months total. Table 5 will be updated with project milestones when this information becomes available.

TABLE 5
Project Milestones

Activity	Date
Begin Construction	April 2011
Completion of Construction Activities	July 2012

The project construction schedule is provided in Table 6, and will be updated after final project design.

TABLE 6
Project Construction Schedule

Event Description	Expected Dates
Date of Certification by CEC	TBD
Rainy Season	October 15 – April 15
Mobilization	April 2011
Delineate and mark the boundaries of the construction zone	Prior to construction
Implement perimeter erosion and sediment controls; protect interior and downgradient inlets, waterways, and sensitive areas	Prior to construction
Stabilize construction entrance/exit and roadway	TBD
Establish laydown and parking area	TBD

TABLE 6
Project Construction Schedule

Event Description	Expected Dates
Clear and Grub	Second quarter 2011
Rough Grading	1 to 4 months
Implement concrete waste BMP	TBD
Install generators and associated equipment	TBD
Construct switchyard and transmission line corridors	TBD
Install water supply line	TBD
Install natural gas supply line	TBD
Construction of extended detention pond	TBD
Completion of Construction	July 2012

3.4 Clearing and Grading Narrative

The information provided in this section is preliminary and will be updated and expanded upon once the clearing and grading plans are completed and prior to the start of construction. Site grading design will comply with applicable land development regulations. The general site grading will establish a working surface for construction and plant operating areas, and will provide positive drainage from buildings and structures, as well as adequate ground coverage for subsurface utilities. Graded areas will be smooth, compacted, free from irregular surface changes, and sloped to drain to onsite drainage features and the stormwater extended detention basin when constructed.

During construction, approximately 10 acres of land associated with the plant will be disturbed. Figure 6 shows the limits of grading at the plant site. Additional soil disturbance areas will include the project linear features and laydown areas. Temporary construction facilities will include a 5-acre worker parking and laydown area immediately east of the project site, a 1-acre water supply pipeline parking and laydown area located at the BBID headquarters facility on Bruns Road, and a 0.6-acre laydown area along the transmission line route adjacent to the PG&E Kelso Substation and Bethany Compressor Station.

Soil-disturbing activities will include clear and grub operations, grading operations, and excavation and fill operations. For all areas where earthwork will be executed, materials suitable for compaction will be stockpiled in designated onsite locations. Materials not suitable for compaction will be stored in separate stockpiles for reuse onsite or disposed of at a licensed facility. If needed, only licensed, commercial fill will be used onsite. Any contaminated materials encountered during excavation will be disposed of in accordance with applicable laws, ordinances, regulations, and standards.

Construction equipment anticipated to be used onsite include scrapers, graders, vibrating rollers, front loaders, dump trunks, trenching machines, concrete mixers, water trucks, and fuel trucks (list is not all inclusive).

Table 7 outlines the amount of cut and fill planned for specific components of the project (the SWPPP will be updated once this information becomes available).

TABLE 7
Clearing and Grading

Description	Stockpile (yd^3)	Total Cut (yd^3)	Total Fill (yd^3)
To be determined (TBD).			
Total			

yd^3 = cubic yards

The following subsections provide a discussion of clearing and grading associated with each of the major construction elements of the project.

Construction Laydown and Parking Area

Construction laydown and parking areas will require grading before use. It is likely that these areas will be graveled immediately thereafter to minimize soil erosion and to allow for wet season use. Once construction is complete, the gravel will either be removed from the site or incorporated into site paving.

Linear Areas

Using the open-cut trenching method, installation of linear project elements will be installed within a 4-foot wide trench and a likely 10-foot construction corridor. After the new pipe is laid, the open trench will be backfilled with suitable material.

The overhead transmission lines will likely have poles with a 4 ft by 4 ft footprint.

After final site design and prior to any soil disturbance, the Contractor will prepare the Final SWPPP. The Final SWPPP will include the location of BMPs to be used, installation instructions, and maintenance schedules for each BMP.

3.5 Contact Information/List of Responsible Parties

Table 8 lists the individuals responsible for stormwater pollution prevention.

TABLE 8
List of Responsible Individuals

Name/Company	Responsibility	Phone Number	Address
TBD	Project Manager		
TBD	Qualified SWPPP Developer		
TBD	Qualified SWPPP Practitioner		

The Qualified SWPPP Practitioner (QSP) shall have primary responsibility and significant authority for the implementation, maintenance, and inspection of the BMPs detailed in the SWPPP. Duties of the QSP include but are not limited to:

- Ensuring full compliance with the SWPPP and the General Permit
- Implementing all elements of the SWPPP, including but not limited to:
  - Implementation of prompt and effective erosion and sediment control measures
  - Implementing all non-stormwater management, and materials and waste management activities such as: monitoring discharges (dewatering, diversion devices); general site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than stormwater are discharged in quantities which will have an adverse effect on receiving waters or storm drain systems; etc.
- Pre-storm inspections
- Storm event inspections
- Post-storm inspections
- Routine inspections as specified in the project's specifications or described in the SWPPP
- Ensuring elimination of all unauthorized discharges
- The QSP shall be assigned authority by the Contractor to mobilize crews in order to make immediate repairs to the control measures
- Coordinate with the Contractor to assure all of the necessary corrections/repairs are made immediately, and that the project complies with the SWPPP, the General Permit and approved plans at all times

SECTION 4

References

The following documents are made a part of this SWPPP by reference:

- State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity
- State Water Resources Control Board Order No. 2009-0009-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Stormwater Runoff Associated with Construction and Land Disturbance Activities
- California Stormwater BMP Handbook – Construction, January 2003

USDA-NRCS. 2008a. Soil Survey Geographic (SSURGO) database for Alameda Area, California (Online). Available at: http://soildatamart.nrcs.usda.gov (verified March 19, 2009).

USDA-NRCS. 2008b. Soil Survey Geographic (SSURGO) database for Contra Costa County, California (Online). Available at: http://soildatamart.nrcs.usda.gov (verified March 19, 2009).

SECTION 5

Body of SWPPP

This SWPPP conforms to the required elements of the State Water Resources Control Board Order No. 2009-0009-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Stormwater Runoff Associated with Construction and Land Disturbance Activities.

5.1 Vicinity Map

The project site is in an unincorporated area of northeastern Alameda County. The Assessor's parcel number is 099B-7050-001-10. The site is located in Township 2S, Range 3E, Section 1 (Mount Diablo Base and Meridian). Access is via an access road that runs east from Bruns Road to the MEP site, within the project parcel. The 6.5-MW Byron Power Cogen Plant currently occupies 2 acres of the 158-acre parcel. The remainder of the parcel is non-irrigated grazing land. There was prior wind turbine development on the project site and the southern portion of the parcel. Minor debris from that development remains on site.

Project features are identified on Figure 2, including the power plant site, natural gas pipeline routes, electrical transmission lines, water supply lines, and the construction laydown and parking area.

Figure 2 shows the project features and associated areas subject to soil disturbance. Figure 6 shows the limits of grading at the plant site. Figure 4 shows general pre-construction drainage at the plant site, and Figure 5 shows post-construction drainage. Boundary lines of all construction areas, including the construction laydown and parking area and linear facilities, will be further defined in the final design phase of the project and the SWPPP will be updated accordingly.

5.2 Existing Data Describing the Soil

As shown on Figure 7, most of the project site lies in mapping unit RdB - Rincon clay loam (3 to 7 percent slopes). The remainder of the project site lies in mapping units AaC - Altamont clay (3 to 15 percent slopes), LaD - Linne clay loam (15 to 30 percent slopes), and Sa - San Ysidro loam (0 to 2 percent slopes). The project site laydown area lies completely in mapping unit AaC, as do the access roads connecting the project site to the project site laydown area. The linear features (and associated laydown areas) cross soil map units AaC, LaD, Sa, LaC - Linne clay loam (3 to 15 percent slopes), LbDcc - Linne clay loam (5 to 15 percent slopes), Sccc - San Ysidro (0 to 2 percent slopes), and Sfaa - Solano fine sandy loam (0 to 2 percent slopes). Free groundwater was not encountered within 100 feet bgs during the project geotechnical investigation; the groundwater depth is not known. Soil map unit characteristics for the area potentially affected by project construction are summarized in Table 9.

TABLE 9
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
AaC	**Altamont clay, 3 to 15 percent slopes:** Portions of the project site, project laydown area and access road, natural gas pipeline, and electrical transmission line cross this soil unit. Parent Material: Residuum weathered from sandstone and shale Typical profile: 0 to 28 inches: clay 25 to 50 inches: clay, silty clay 50 to 54 inches: weathered bedrock Shrink-swell capacity: High Depth and drainage: 40 to 60 inches to paralithic bedrock; well drained Permeability: Slow Runoff: Medium to very high Farmland Class: Farmland of Statewide Importance Storie Index: Grade 4, Poor Capability class: 3e irrigated, 4e nonirrigated Taxonomic class: Fine, smectitic, thermic Aridic Haploxererts
LaC	**Linne clay loam, 3 to 15 percent slopes:** A portion of the water supply pipeline crosses this soil unit. Parent Material: Residuum weathered from sandstone and shale Typical profile: 0 to 36 inches: clay loam 36 to 40 inches: weathered bedrock Shrink-swell capacity: Moderate Depth and drainage: 20 to 40 inches to paralithic bedrock; well drained Permeability: Moderately slow Runoff: Medium to very rapid Farmland Class: Farmland of Statewide Importance Storie Index: Grade 3, Fair Capability class: 3e irrigated; 4e nonirrigated Taxonomic class: Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
LaD	**Linne clay loam, 15 to 30 percent slopes:** Portions of the water supply pipeline and site access road cross this soil unit. Parent Material: Residuum weathered from sandstone and shale Typical profile: 0 to 36 inches: clay loam 36 to 40 inches: weathered bedrock Shrink-swell capacity: Moderate Depth and drainage: 20 to 40 inches to paralithic bedrock; well drained Permeability: Moderately slow Runoff: Medium to very rapid Farmland Class: None Storie Index: Grade 3, Fair Capability class: 4e Taxonomic class: Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls

TABLE 9
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
LbDcc	**Linne clay loam, 5 to 15 percent slopes:** A portion of the water supply pipeline crosses this soil unit. Parent Material: Residuum weathered from calcareous shale and/or sandstone Typical profile: 0 to 29 inches: clay loam 29 to 33 inches: weathered bedrock Shrink-swell capacity: Moderate Depth and drainage: 20 to 40 inches to paralithic bedrock; well drained Permeability: Moderately slow Runoff: Medium to very rapid Farmland Class: Farmland of Statewide Importance Storie Index: Grade 3, Fair Capability class: 3e irrigated; 4e nonirrigated Taxonomic class: Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
RdB	**Rincon clay loam, 3 to 7 percent slopes:** Most of the project site falls within this soil unit. Parent Material: Alluvium derived from sandstone and shale Typical profile: 0 to 16 inches: clay loam 16 to 52 inches: sandy clay 52 to 60 inches: stratified sandy loam to clay loam Shrink-swell capacity: High Depth and drainage: Very deep; well drained Permeability: Slow Runoff: Slow to rapid Farmland Class: Prime Farmland if irrigated Storie Index: Grade 1, Excellent Capability class: 2e irrigated; 4e nonirrigated Taxonomic class: Fine, smectitic, thermic, Mollic Haploxeralfs
Sa	**San Ysidro loam, 0 to 2 percent slopes:** Portions of the project site, site access road, natural gas pipeline, electrical transmission line, and water supply pipeline cross this soil unit. Parent Material: Alluvium from sedimentary rocks Typical profile: 0 to 16 inches: loam 16 to 34 inches: clay 34 to 60 inches: silty clay loam Shrink-swell capacity: High Depth and drainage: Very deep; moderately well drained Permeability: Very slow Runoff: Slow to medium Farmland Class: None Storie Index: Grade 1, Excellent Capability class: 4s Taxonomic class: Fine, smectitic, thermic, Typic Palexeralfs

TABLE 9
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
Sa/Sccc	**San Ysidro loam, 0 to 2 percent slopes:** Portions of the water supply line and water supply line laydown area fall within this soil unit. Parent Material: Alluvium derived from sedimentary rock Typical profile: 0 to 15 inches: loam 15 to 54 inches: clay 54 to 80 inches: silty clay loam Shrink-swell capacity: High Depth and drainage: Very deep; moderately well drained Permeability: Very slow Runoff: Slow to medium Farmland Class: None Storie Index: Grade 1, Excellent Capability class: 4s Taxonomic class: Fine, smectitic, thermic, Typic Palexeralfs
Sf/Sfaa	**Solano fine sandy loam, 0 to 2 percent slopes:** Portions of the water supply pipeline, electrical transmission line, and transmission line laydown area fall within this soil unit. Parent Material: Alluvium derived from sandstone and shale Typical profile: 0 to 6 inches: fine sandy loam 6 to 60 inches: clay loam Shrink-swell capacity: Moderate Depth and drainage: Very deep; somewhat poorly drained Permeability: Very slow Runoff: Very slow or slow Farmland Class: None Storie Index: Grade 2, Good Capability class: 3w irrigated; 4w nonirrigated Taxonomic class: Fine-loamy, mixed, superactive, thermic Typic Natrixeralfs

Soil descriptions provided above are limited to those soil units that could be affected by MEP. Other soil mapping units, which are well outside of the project area but shown on Figure 7, include the following: AaD – Altamont clay (15 to 30 percent slopes), ArD – Altamont rocky clay, moderately deep (7 to 30 percent slopes), Bb - Brentwood clay loam (0 to 2 percent slopes), LbEcc - Linne clay loam (15 to 30 percent slopes), RdA – Rincon clay loam (0 to 3 percent slopes), Sh - Solano loam (0 to 2 percent slopes), and W - Water.

As indicated, the soil mapping units in the project area vary from finer soils formed in residuum to coarser soils formed in alluvium. The finer soils are generally on residual hills, with the coarser soils formed in the more level areas in between the hills. The soils range from well drained in the upland rolling portions of the project area, to moderately well and somewhat poorly drained in the more level areas of the project area.

The project area soils have been previously disturbed. The project site contains remnants of previous wind turbine development, as well as buried natural gas pipelines that run through the project area (and under the proposed transmission line and water supply pipeline). Because the site and project area have previously been disturbed it is possible that soil conditions may vary slightly from those shown in the USDA-NRCS soil survey due to local grading.

Soils in the adjoining areas are not expected to be contaminated (i.e. past spills or leaks, non-stormwater discharges). No existing site features have, as a result of past usage, contributed pollutants to stormwater (e.g., toxic materials that have been treated, stored, disposed of, spilled, or leaked onto the construction site).

5.3 Soil Loss Estimates

The factors that have the largest effect on soil loss include steep slopes, lack of vegetation, and erodible soils composed of large proportions of fine sands. The soils found in the MEP area are rolling, and range from 0 to 30 percent slopes, according to the soil survey (USDA-NRCS, 2008a, USDA-NRCS, 2008b). The area is vegetated with pasture grasses. Soil textures throughout the project area are medium to fine grained with textures ranging from fine sandy loam to clay (USDA-NRCS, 2008a, USDA-NRCS, 2008b).

An estimate of soil loss during construction by water erosion was developed using the Revised Universal Soil Loss Equation (RUSLE2), and is summarized in Table 10. Detailed calculations for the soil loss estimates, including assumptions and conditions, are found in Attachment C.

With the implementation of appropriate BMPs outlined in the SWPPP, the total project soil loss is estimated to be 0.51 ton. This amount is considered to be minimal.

The potential for wind erosion of surface soil was estimated by calculating the total suspended particulates (TSP) that could be emitted as a result of grading and the wind erosion of exposed soil; reference Attachment C for detailed calculations for the soil loss estimates, including assumptions and conditions.

Table 11 summarizes the mitigated TSP predicted to be emitted from the site from grading and the wind erosion of exposed soil. The maximum predicted erosion of material from the site is estimated at 0.45 ton over the course of the project construction cycle when implementing basic mitigation measures such as water application (see mitigation measures below), which will be identified in the SWPPP. Impacts related to soil erosion from wind will be less than significant.

5.4 Assessment of Overall Risk Level

The General Permit requires assessment of the risk level of a site based on both sediment transport and receiving water risk during periods of soil exposure.

5.4.1 Sediment Risk

Sediment Risk was manually calculated using the RUSLE equation (reference Attachment D for the Risk Determination Worksheet).

The Site Sediment Risk Factor is less than 15 tons/acre, which is considered **low** sediment risk.

TABLE 10
Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

			Estimates Using Revised Universal Soil Loss Equation[a]		
Feature (acreage)[b]	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/year) No Project**
Site (9.7 acres estimated)	Grading	2	16.0	0.02	0.300
	Construction	14	5.2	0.15	—
Site Cut and Fill Area (3.59 acres estimated)	Grading	3	13.0	0.17	0.15
	Construction	2	4.1	0.12	
Site Access Road (1.2 acres estimated)	Grading	1	1.8	0.0	0.058
(1.2 acres exposed; will be paved or graveled after grading)	Construction	14	0.0	0.0	—
Site Laydown Area (4.6 acres estimated)	Grading	1	1.5	0.0	0.124
	Construction	14	0.0	0.0	—
Site Laydown Area Access Roads (0.44 acre estimated)	Grading	1	0.3	0.0	0.012
	Construction	14	0.0	0.0	—
Transmission Line (5.15 acres for construction; 0.0020 acre for pole footprints)	Grading	3	0.003	0.010	0.00004
	Construction	6	0.68	0.019	—
Transmission Line Laydown Area (0.6 acre estimated)	Grading	0	0.000	0.000	0.009
	Construction	6	0.000	0.000	—
Water Supply Pipeline (1.38 acres for construction; 0.44 acre for trench)	Grading	6	1.806	0.010	0.0112
	Construction	8	0.458	0.013	—
Water Supply Laydown Area (1.0 acre estimated)	Grading	0	0.000	0.000	0.030
	Construction	8	0.000	0.000	—

TABLE 10
Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

			Estimates Using Revised Universal Soil Loss Equation[a]		
Feature (acreage)[b]	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/year) No Project**
Natural Gas Pipeline (0.99 acre for construction; 0.04 acre for trench)	Grading	2	0.05	0.0016	0.00258
	Construction	6	0.17	0.0049	—
Project Soil Loss Estimates	All activities	14	45.16	0.51	0.69

[a]Soil losses (tons/acre/year) are estimated using RUSLE2 software available online (http://fargo.nserl.purdue.edu/rusle2_dataweb/) as the RUSLE2 soil loss times the duration and the affected area. The No Project Alternative estimate does not have a specific duration, so loss is given as tons/year.

- The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit.
- Soil loss (R-factors) were estimated using 2-year, 6-hour point precipitation frequency amount for the MEP site found at http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm.

[b]Acreages assume a 30-foot corridor for the transmission line and 100-foot corridors for the natural gas and water pipeline construction. Trenches for the natural gas and water pipelines are assumed to be 4 feet wide. The transmission line pole holes each have a 4-foot by 4-foot excavation footprint.

TABLE 11
Total Suspended Particulate Emitted from Grading and Wind Erosion with and without Mitigation

Emission Source	Duration (months)	Unmitigated TSP (tons)[a]	Mitigated TSP (tons)[b]
Grading Dust:			
Project Site	2	0.333	0.117
Site Cut and Fill Area	3	0.185	0.065
Project Site Access Road	1	0.020	0.007
Project Site Laydown Area	1	0.040	0.014
Project Site Laydown Area Access Road	1	0.008	0.003
Transmission Line Pole Holes	3	0.00010	0.00004
Transmission Line Laydown Area	0	0.000	0.000
Water Supply Line Trench	6	0.045	0.016
Water Supply Line Laydown Area	0	0.000	0.000
Natural Gas Pipeline Trench	2	0.00137	0.00048
Wind-blown Dust:			
Project Site	12	0.368	0.129
Site Cut and Fill Area	2	0.227	0.080
Project Site Access Road	14	0.000	0.000
Project Site Laydown Area	14	0.000	0.000
Project Site Laydown Area Access Road	14	0.000	0.000
Transmission Line Pole Holes	6	0.00038	0.00013
Transmission Line Laydown Area	6	0.000	0.000
Water Supply Line Corridor	8	0.035	0.012
Water Supply Line Laydown Area	8	0.000	0.000
Natural Gas Pipeline Corridor	6	0.0189	0.0066
Estimated Total		**1.281**	**0.448**

Notes:
All linear feature impacts noted above are for portions outside of the project area footprints.

Sources:
[a]PM_{10} Emission Factor Source: Midwest Research Institute, 1996

[b]PM_{10} to TSP Conversion Factor: BAAQMD, 1999.
SCAQMD, 1993 (Table 11-4 for mitigation efficiency rates (as summarized in Table 8.9-4)

5.4.2 Receiving Water Risk

Drainage from the project site flows to the north into ephemeral drainages that converge into a single man-made linear channel. The channel's waters are pumped into Italian Slough, located 2.5 miles downstream of the project site. Italian Slough discharges into the Delta.

Water quality objectives and beneficial uses for waters in the project area are contained in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan; RWQCB, 1998). The Basin Plan has no listing of beneficial uses for Italian

Slough. It does list the existing beneficial uses of SPAWN, COLD, & MIGRATORY for the Sacramento San Joaquin Delta; however, beneficial uses would be evaluated on a case-by-case basis. Considering the ephemeral nature of the receiving drainages, the physical barrier to fish passage at Italian Slough, and the physical distance of the project site to Italian Slough and the Delta, the project's discharge is considered to have a very low potential to impact Delta fishes; thus, beneficial uses of SPAWN, COLD, & MIGRATORY would not be applicable to the receiving waters.

Italian Slough and the Delta are not listed as impaired by sediment, nor do they have an applicable US EPA-approved TMDL implementation plan for sediment.

Since the disturbed area would not discharge to a 303(d)-listed waterbody impaired by sediment or to a waterbody that has a USEPA approved TMDL implementation plan for sediment, nor discharge to receiving waters where designated beneficial uses of SPAWN & COLD & MIGRATORY would be applicable, a **low** risk factor to the receiving water was calculated.

5.4.3 Combined Risk Level

- Project Sediment Risk: Low
- Project Receiving Water Risk: Low
- Project Combined Risk: Level 1

5.5 Pollutant Source Identification and BMP Selection

5.5.1 Inventory of Materials and Activities that May Pollute Stormwater

The following is a list of construction materials that will be used and/or expected to be used and the end products that are produced and/or expected to be produced during the project[1], and activities that will be performed that will have the potential to contribute pollutants, other than sediment, to stormwater runoff (control practices for each activity are identified in the Water Pollution Control Drawings (WPCDs) and/or in Section 5.6):

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with asphalt-concrete paving operations
- Cement materials associated with portland cement concrete (PCC)
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, acids
- BMP materials
- Treated lumber (materials and waste)

[1] This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

- PCC rubble
- General litter

Construction activities that have the potential to contribute sediment to stormwater discharges include:

- Clear and grub operations
- Grading operations
- Paving operations
- Boring operations
- Delivery/transportation operations
- Utility excavation operations
- Foundation/structure construction operations
- Vehicle and equipment cleaning, fueling, and maintenance
- Painting

5.6 Existing (Pre-Construction) Control Measures

None

5.7 Best Management Practices

The placement and details of the BMPs that will be utilized during project construction will be identified during project design and incorporated into the SWPPP. Potential impacts from construction activities will be controlled through implementation of the BMPs (including erosion and sediment control measures) outlined in the Final SWPPP. The SWPPP is a living document and will be amended during the life of the project, as needed.

The following sections present standard construction BMPs, most of which are described in the *California Storm Water Best Management Practice Handbook* (2003) and the *Caltrans Storm Water Quality Handbook* (2003). These resource handbooks provide comprehensive details on BMP implementation and will be obtained and reviewed by managers for all construction contractors that may have an impact on implementation of the SWPPP.

Attachment E lists BMPs that have been selected for implementation in this project. Figure 8 is a hypothetical construction BMP plan and will be further developed during the final project design phase. The Final SWPPP will include locations and details of all BMPs to be used during the construction, including for linear features, such as roads and pipelines. Narrative descriptions of BMPs to be used during the project are listed by category in each of the following SWPPP sections. Attachment F contains the CASQA Handbook BMP factsheets with detailed descriptions of the BMPs discussed in the following sections. The fact sheets also include the maintenance practices for each BMP. Attachments E and F will be updated by the Contractor and included in the Final SWPPP.

Stormwater discharges and authorized non-stormwater discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate

NPDES Permit has been issued to regulate those discharges.

The dischargers minimizes or prevents pollutants in stormwater discharges and authorized non-stormwater discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

Run-on from offsite shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in the General Permit.

5.7.1 Erosion Control

Erosion control, also referred to as soil stabilization, is a source control measure that is designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protect the soil surface by covering or binding soil particles. The project will incorporate erosion control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor.

BMPs will be implemented to follow the progress of grading and construction. As the locations of soil disturbances change, erosion and sedimentation controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter. BMPs will be in place throughout the entire construction period.

Sufficient erosion control materials will be maintained onsite to allow implementation in conformance with Permit requirements and described in this SWPPP. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.

Non-active areas (including all finished slopes) will be stabilized as soon as feasible after construction is complete and no later than 14 days after construction in that portion of the site has temporarily or permanently ceased.
The use of plastic materials will be limited when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the plastic materials will be resistant to solar degradation.

Maintenance of BMPs will be according to measures outlined in the applicable CASQA Handbook BMP factsheets.

Site-specific BMPs will be selected by the Contractor and associated figures are to be included in Attachment A. Attachment E is to be updated by the Contractor and lists the BMPs selected for this project. Attachment F contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. The following general erosion control measures may be used during various phases of the project:

- Proper scheduling and sequencing of activities (EC-1)
- Preservation of existing vegetation (EC-2)
- Hydraulic mulch (EC-3)
- Hydroseeding (EC-4)
- Soil Binders (EC-5)
- Straw mulch (EC-6)
- Placement of geotextiles, plastic covers, and erosion control blankets/mats (EC-7)

- Wood Mulching (EC-8)
- Earth dikes and drainage swales (EC-9)
- Velocity dissipation devices (EC-10)
- Slope drains (EC-11)
- Streambank Stabilization (EC-12)

5.7.2 Sediment Control

Sediment controls are intended to complement and enhance the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water. The project will incorporate sediment control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor.

Effective sediment perimeter controls will be established and maintained.

Linear sediment controls will be used along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[2] in accordance with Table 12.

TABLE 12
Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Slope Percentage Sheet Not to Exceed
0 – 25%	20 feet
25-50%	15 feet
Over 50%	10 feet

Sediment basins, if applicable at the site, will, at a minimum, be designed according to the method provided in CASQA's Construction BMP Guidance Handbook.

All storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) will be maintained and protected from activities that reduce their effectiveness.

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, sedimentation controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter.

Sufficient quantities of temporary sediment control materials will be maintained onsite throughout the duration of the project, to allow implementation of temporary sediment controls in the event of predicted rain, and for rapid response to failures or emergencies, in conformance with other Permit requirements and as described in this SWPPP. This includes implementation requirements for active areas and non-active areas before the onset of rain.

[2] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Maintenance of BMPs will be according to measures outlined in the applicable CASQA Handbook BMP factsheets.

Site-specific BMPs will be designed by the Contractor and associated figures are to be included in Attachment A. Attachment E is to be updated by the Contractor and lists the BMPs selected for this project. Attachment F contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. The following general sediment control measures may be used during various phases of the project:

- Silt fences (SE-1)
- Sediment basin (SE-2)
- Sediment trap (SE-3)
- Check dams (SE-4)
- Fiber Rolls (SE-5)
- Gravel bag berm (SE-6)
- Street Sweeping and Vacuuming (SE-7)
- Sandbag Barrier (SE-8)
- Storm Drain Inlet Protection (SE-10)

5.7.3 Tracking Control

All construction entrances and exits will be stabilized to sufficiently control erosion, sediment, and other loose construction materials discharges from being tracked off the project site.

All immediate access roads will be inspected daily. At a minimum, daily (when necessary) and prior to any rain event, the any sediment or other construction activity related materials that are deposited on the roads shall be removed (by vacuuming or sweeping). Streets will be cleaned in such a manner as to prevent unauthorized non-stormwater discharges from reaching surface water or MS4 drainage systems.

Construction activity traffic to and from the project will be limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

Site-specific BMPs will be designed by the Contractor and associated figures are to be included in Attachment A. Attachment E is to be updated by the Contractor and lists the BMPs selected for this project. Attachment F contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. The following control methods will be considered for offsite vehicle tracking, as necessary:

- Stabilized construction entrance/exit (TC-1)
- Stabilized construction roadway (TC-2)
- Tire wash (TC-3)
- Street sweeping and vacuuming (SE-7)

5.7.4 Wind Erosion Control

During construction of the project and the related linear facilities, dust erosion control measures would be implemented to minimize the wind-blown loss of soil from the site.

Disturbed soil areas of the project site will be regularly watered to control dust and maintain optimum moisture levels for compaction as needed, but will not be excessively watered so as to generate runoff. Sediment controls may be used at edges of these areas, as necessary to minimize sediment discharge.

Site-specific BMPs will be designed by the Contractor and associated figures are to be included in Attachment A. Attachment E is to be updated by the Contractor and lists the BMPs selected for this project. Attachment F contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. The following control method will be considered for dust suppression, as necessary:

- Wind erosion control (WE-1)

5.7.5 Non-Stormwater Control

Hazardous materials, such as vehicle fluids, including oil, grease, petroleum, and coolants, paints, solvents and curing compounds will be used during construction. The project will comply with good engineering practices, applicable laws and regulations for the storage and use of these materials to minimize the potential for a release of hazardous materials, and will conduct emergency response planning to address public health concerns regarding hazardous materials use and storage.

A dedicated fueling, maintenance and vehicle storage area will be protected with berms and/or dikes to prevent runon, runoff, and to contain spills. Self-propelled vehicles will be fueled offsite or at the temporary fueling area. Fuel trucks will be used for onsite fueling, whether at the temporary fueling area or for mobile fueling elsewhere on the site. Drip pans will be used for mobile fueling. Each fuel truck will be equipped with absorbent spill cleanup materials and a spill containment boom at all times. Drip pans or absorbent pads will be used for vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids.

Vehicles will be washed in such a manner as to prevent non-stormwater discharges to surface waters or MS4 drainage systems.

Vehicles and equipment will be inspected daily and before coming onsite for signs of leaks and be on a regular maintenance schedule.

Drip pans or absorbent materials will be placed under paving equipment when not in use; paving equipment will be parked over plastic to prevent soil contamination.

If during dewatering activities any contamination is detected via odors or visible sheens, the collected stormwater will be handled and properly disposed of in a manner consistent with federal, state, and local regulations.

Site-specific BMPs will be designed by the Contractor and associated figures are to be included in Attachment A. Attachment E is to be updated by the Contractor and lists the BMPs selected for this project. Attachment F contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. The following control methods will be considered for non-stormwater controls, as necessary:

- Water Conservation Practices (NS-1)
- Dewatering Operations (NS-2)
- Paving and Grinding Operations (NS-3)
- Temporary Stream Crossing (NS-4)
- Clear Water Diversion (NS-5)
- Illicit Connection/Illegal Discharge Detection and Reporting (NS-6)
- Potable Water/Irrigation (NS-7)
- Vehicle and Equipment Cleaning (NS-8)
- Vehicle and Equipment Refueling (NS-9)
- Vehicle and Equipment Maintenance (NS-10)
- Concrete Curing (NS-12)
- Concrete Finishing (NS-13)
- Material Over Water (NS-14)

5.7.6 Waste Management and Materials Pollution Control

Loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, landscaping materials) will be covered and bermed. Stockpiled waste material will be contained and protected from wind and rain at all times unless actively being used.

Chemicals will be stored in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

Exposure of construction materials (not including materials designed to be outside such as equipment pads) to precipitation will be minimized.

Rinse or wash waters or materials will be collected and disposed of offsite in accordance with applicable regulations.

Waste disposal containers will be covered at the end of every business day and during a rain event. Drainage from the waste disposal containers, if any, will be captured and not allowed to enter the stormwater drainage system.

Concrete washout areas and other washout areas that may contain additional pollutants will be provided with an impermeable containment, so there is no discharge into the underlying soil and onto the surrounding areas.

No erodible landscape material will be applied within 2 days before a forecasted rain event or during periods of precipitation. Erodible landscape material will be applied at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel. Erodible landscape material will be stored on pallets and covering when not being used or applied.

All hazardous materials will be handled and stored in accordance with applicable codes and regulations. A Hazardous Materials Business Plan will be prepared if it is required by Title 19 California Code of Regulations and the Health and Safety Code (Section 25504). In accordance with these regulations, the Hazardous Materials Business Plan would include an inventory and location map of hazardous materials onsite and an emergency response pan for hazardous materials incidents. Specific topics to be covered in the plan include:

- Facility identification
- Emergency contacts
- Chemical inventory information (for every hazardous material above threshold limits)
- Site map
- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

Cover and secondary containment will be provided for the storage of hazardous materials (i.e., oil drums, solvents, grease). Temporary containment facilities for hazardous materials will provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater. It will be impervious to the materials stored therein for a minimum contact time of 72 hours.

Spill cleanup materials, material safety data sheets (MSDS), a material inventory, and emergency contact numbers will be maintained at the laydown area. Site personnel will be instructed on spill cleanup procedures and the contractor's site manager will be responsible for implementing these practices.

Spill prevention and cleanup practices will be as follows:

- MEP's site manager or appointee is responsible for informing construction personnel of the manufacturer's recommended spill cleanup methods, and the location of that information and cleanup supplies.

- Materials and equipment for the cleanup of a relatively small spill will be kept in the laydown and parking area. These facilities may include brooms, rags, gloves, shovels, goggles, sand, sawdust, absorbent, plastic or metal trash containers, and protective clothing.

- All containers will be labeled, tightly sealed, and stacked or stored neatly and securely.

Spill response procedures will be as follows:

- Step 1: Upon discovery of a spill, stop the source of the spill.

- Step 2: Cease all spill material transfer until the release is stopped and waste removed from the spill site.

- Step 3: Initiate containment to prevent spill from reaching State waters.

- Step 4: Notify supervisor and MEP's site manager of the spill.

- Step 5: MEP's site manager will immediately notify the MEP emergency coordinator, and coordinate further cleanup activities

- Step 6: Any significant spill of hazardous material will be reported to the appropriate state and/or local agencies by MEP personnel or qualified contractors. Table 13 lists the project's environmental emergency contacts.

- Step 7: Record a description of the spill, cause, and cleanup measures taken.
- Step 8: Review and amend the SWPPP to address the violation of the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved.

TABLE 13
Environmental Emergency Telephone List

Company/Organization	Telephone Numbers
Primary Facility Emergency Coordinator:	TBD
24-Hour Telephone Number:	TBD
Alternate Facility Emergency Coordinator:	TBD
Other Resources	
3E Company (MSDS by FAX):	(800) 451-8346
Chemtrec (emergency chemical information):	(800) 424-9300
Poison Control Center:	(800) 662-9886
Federal Agency	
U.S. Coast Guard/National Response Center:	(800) 424-8802
State Agencies	
California Office of Emergency Services (OES):	(800) 852-7550
California Department of Toxic Substances Control (DTSC)*:	(800) 852-7550
California Department of Fish and Game*:	(800) 852-7550
California State Lands Commission:	(562) 590-5201
Regional Water Quality Control Board (RWQCB)*:	(800) 852-7550
Local Contacts	
Alameda County Environmental Health Department:	
Fire –:	911
Police –:	
Hospital –:	
Ambulance/Paramedics:	

* DTSC, RWQCB and California Department of Fish and Game have requested that emergency notifications to these offices be made through the OES 800 number.

The Contractor will implement BMP WM-9, Sanitary and Septic Waste Management. Weekly maintenance will be provided and wastes will be disposed of offsite. The toilets will be located away from concentrated flow paths and traffic flow, and containment will be provided as needed to prevent the offsite discharge of pollutants.

During construction, the primary waste generated will be solid nonhazardous waste. However, some nonhazardous liquid waste and hazardous waste (solid and liquid) will also be generated. Most of the hazardous wastes will be generated at the plant site. The types of waste are described below.

5.7.6.1 Nonhazardous Solid Waste

Listed below are nonhazardous waste streams that could potentially be generated from construction activities.

Paper, Wood, Glass, and Plastics. Paper, wood, glass, and plastics will be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers

during project construction. These wastes will be recycled where practical. Waste that cannot be recycled will be disposed of weekly in a Class III landfill. Onsite, the waste will be placed in dumpsters.

Concrete. Waste concrete will be disposed of in a Class III landfill or at clean fill sites, if available or will be recycled and disposed of at a construction and demolition site. Dumping of excess concrete and washing out of delivery vehicles will be prohibited at other locations onsite. Notices will be posted to inform all drivers.

Metal. Waste metal, including steel from welding/cutting operations, packing materials, and empty nonhazardous chemical containers, and aluminum waste from packing materials and electrical wiring will be recycled where practical and nonrecyclable waste will be deposited in a Class III landfill.

5.7.6.2 Wastewater

Depending on the chemical quality of wastewaters potentially generated during construction, they could be classified as hazardous or nonhazardous. The waste waters would be sampled and if they are hazardous would be disposed of in accordance with applicable regulations.

5.7.6.3 Hazardous Waste

Most of the hazardous waste generated during construction will consist of liquid waste, such as water from flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. Some hazardous solid waste, such as welding materials, batteries, and dried paint, may also be generated.

Flushing and cleaning waste liquid will be generated as pipes are cleaned and flushed. The volume of flushing and cleaning liquid waste generated is estimated to be one to two times the internal volume of the pipes cleaned. The quantity of welding, solvent, batteries, and paint waste is expected to be minimal. Wastewaters generated during construction could also be considered hazardous, if demonstrated so by sampling.

The construction contractor will be considered the generator of hazardous construction waste and will be responsible for proper handling of hazardous waste in compliance with all applicable federal, state, and local laws and regulations. This responsibility will include licensing, personnel training, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. It will be moved daily to the contractor's 90-day hazardous waste storage area located at the site construction laydown area. The waste will be removed from the site by a certified hazardous waste collection company and delivered to an authorized hazardous waste management facility, before expiration of the 90-day storage limit.

5.7.6.4 Potential Contaminated Soil

It is unlikely that contaminated soil will be encountered during construction. However, operators and construction personnel will be asked to report unusual conditions to the appropriate personnel and the area and/or material will be properly contained during investigative actions. If soils require temporary stockpiling, piles will be placed on and covered with plastic sheeting or tarps that are secured safely with sand bags and bermed

with fiber rolls or silt fencing to prevent runoff from leaving the area. Samples will be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste will be handled and properly disposed of in an authorized waste management facility. In addition, the appropriate local, State (including the RWQCB), and federal agency(ies) shall be notified. Any contaminated soils resulting from spills will be dug up as quickly as possible, and then removed from the site for proper disposal.

Site-specific BMPs will be designed by the Contractor and associated figures are to be included in Attachment A. Attachment E is to be updated by the Contractor and lists the BMPs selected for this project. Attachment F contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. The following BMPs will be considered for waste management and materials pollution control:

- Material delivery and storage (WM-1)
- Material use (WM-2)
- Stockpile management (WM-3)
- Spill prevention and control (WM-4)
- Solid waste management (WM-5)
- Hazardous waste management (WM-6)
- Contaminated Soil Management (WM-7)
- Concrete Waste Management (WM-8)
- Sanitary/Septic Waste Management (WM-9)

5.8 Cost Breakdown for Water Pollution Control

A cost breakdown itemizing the contract lump sum for water pollution control for this project will be developed and included in the Final SWPPP as Attachment G. The cost breakdown will reflect the items of work, quantities and costs for BMPs shown in the SWPPP, except for those construction site BMPs and permanent BMPs that are shown on the project plans and for which there is a contract item of work.

5.9 Water Pollution Control Drawings

Figure 8 is a hypothetical construction BMP plan and will be further developed during the final project design phase. The Final SWPPP will include locations and details of all BMPs to be used during the construction, including for linear features, such as roads and pipelines.

5.10 Post-Construction Stormwater Management

Finished grade slopes drain into one of two swales routing upgradient stormwater around the site. To reestablish grass vegetation, finished grade slopes and swales will be hydroseeded with a native grass mixture, and mulched to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow. Controlled watering would be applied if seasonal rainfall is not sufficient. The entire area would be regularly monitored for signs of erosion; areas would be revegetated as necessary to maintain adequate soil protection. Re-vegetating disturbed soil soon after construction is the

most effective way to control erosion and can also be one of the least expensive stabilization measures.

Other disturbed areas that are substantially complete will be stabilized with permanent erosion control (aggregate, paving, or vegetation). Re-vegetated areas will be monitored until a minimum of 70% ground coverage has been established. Areas where no vegetation grew will be reseeded. Once vegetation has established onsite and a Notice of Termination can be submitted to the RWQCB, drain inlet protection and temporary sediment and erosion control measures will be removed.

The MEP plant will mitigate storm runoff with a series of inlets and storm drain pipes that will convey runoff to a proposed onsite extended detention basin located on the north end of the site. Figures 4 and 5 show pre- and post-construction drainage conditions for the site. The extended detention basin is designed to release site stormwater runoff from the design storm over a 48-hour period to allow particles and associated pollutants to settle. The multi-stage discharge structure will discharge to one of the swales routing upgradient stormwater around the site, as shown in Figure 5.

Areas of potential oily water contamination will be sited within containment to prevent oily water from mixing with stormwater flowing to the extended detention basin. Impervious areas will be limited to paved loop and equipment access roads and the equipment to operate the plant. Forty-four percent of the MEP site will have impervious surfaces for equipment siting and roads.

5.10.1 Operation/Maintenance of Post-Construction Control Practices

The post-construction BMPs described above will be funded and maintained by Mariposa Energy, LLC.

5.11 Training

Qualified SWPPP Developer (QSD): This Administrative Draft SWPPP was prepared by CH2M HILL under the direction of Mieke Sheffield, CPSWQ #520. The Final SWPPP and all future amendments to the SWPPP will be prepared by a QSD.

The designated QSD is: To Be Determined

The designated QSD can be contacted at: To Be Determined

Qualified SWPPP Practitioner (QSP): All the BMPs outlined in the project's SWPPP and required by the General Permit will be implemented by a QSP.

The designated QSP is: To Be Determined

The designated QSP can be contacted at: To Be Determined

Prior to project startup, all designated onsite representatives will participate in a pre-project stormwater training workshop. The workshop will cover basic stormwater information, the requirements of the General Permit, and the SWPPP. Specifically, the workshop will focus on implementation, inspection, and maintenance of stormwater controls.

- Contractors are responsible for familiarizing their personnel with the information contained in the SWPPP. Contractors will be informed of this obligation.
- All new employees will be trained by staff familiar with these topics.
- Contractors are responsible for familiarizing subcontractors with information contained in the SWPPP.

Ongoing, formal training sessions will be selected from one of the following organizations:

- California Regional Water Quality Control Board
- International Erosion Control Association
- U.S. Environmental Protection Agency (EPA)
- Recognized municipal stakeholder organizations throughout California
- Professional organizations and societies in building and construction

Informal training will include tailgate site briefings to be conducted bi-weekly and will address proper installation methods and maintenance for the following topics:

- Erosion control BMPs
- Sediment control BMPs
- Tracking control BMPs
- Wind erosion control BMPs
- Non-stormwater BMPs
- Waste management and materials pollution control BMPs
- Emergency procedures specific to the construction site stormwater management

The training log showing formal and informal training of various Contractor personnel is shown in Attachment H.

Documentation of all training for persons responsible for implementing the requirements of the General Permit in will be provided in the Annual Reports.

5.12 List of Subcontractors

Contractors and subcontractors will be notified of the requirements for stormwater management measures during the project. A list of contractors, subcontractors, and individuals who will be directed by the QSP will be maintained and included in the SWPPP. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall be included. The list will be updated as needed. The subcontractor notification letter and log is included in Attachment I.

5.13 Other Plans/Permits

Attachment J includes copies of the following local, state, and federal plans and permits:

- State Water Resources Control Board Order No. 2009-0009-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Stormwater Runoff Associated with Construction and

Land Disturbance Activities (General Permit) regulates discharges of pollutants in stormwater associated with construction activity to waters of the United States from construction sites that disturb one or more acres of land surface.

Other Plans and Permits will be included as applicable.

SECTION 6

Monitoring Program and Reports

6.1 Site Inspections

All inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a QSP. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

The QSP or designated representative will perform weekly inspections and observations, prior to a forecast storm, after a rain event that cause runoff from the construction site, at 24-hour intervals during extended rain events, and as specified in the contract documents. SWPPP inspections may be conducted in conjunction with other facility inspections. For instance, if a regulated amount of petroleum materials is onsite and there is a Spill Prevention, Control and Countermeasures Plan (SPCC), the SWPPP inspections may be conducted in conjunction with SPCC inspections.

The goals of these inspections are: (1) to identify areas contributing to a stormwater discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate, properly installed and functioning in accordance with the terms of the General Permit; and (3) whether additional control practices or corrective maintenance activities are needed.

Upon identifying failures or other shortcomings, as directed by the QSP, repairs or design changes to BMPs will be started within 72 hours of identification and completed as soon as possible.

The results of inspections and assessments will be documented. Copies of the completed inspection checklists will be maintained with the SWPPP; a copy will be provided to the Project Manager within 24 hours of the inspection. Site inspections conducted for monitoring purposes will be performed using the inspection checklist shown in Attachment K. A tracking or follow-up procedure shall follow any inspection that identifies deficiencies in BMPs. A Maintenance, Inspection, and Repair Program of BMPs is to be completed by the Contractor; a template is shown in Attachment L.

6.2 Construction Site Monitoring Program

The Construction Site Monitoring Program (CSMP) was developed and implemented to address the following objectives:

1. To demonstrate that the site is in compliance with the Discharge Prohibitions;
2. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

3. To determine whether immediate corrective actions, additional BMP implementation, or SWPPP revisions are necessary to reduce pollutants in stormwater discharges and authorized non-stormwater discharges.
4. To determine whether BMPs included in the SWPPP/REAP are effective in preventing or reducing pollutants in stormwater discharges and authorized non-stormwater discharges.

The CSMP will be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions.

6.2.1 Visual Monitoring

1. Stormwater discharges at all discharge locations will be visually observed (inspected) within two business days (48 hours) after each qualifying rain event.
2. The discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge will be visually observed (inspected). Stored or contained stormwater that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.
3. Visual observations (inspections) will be conducted during business hours only.
4. Visual observations (inspections) will not be conducted during dangerous weather conditions, such as flooding and electrical storms.
5. The time, date and rain gauge reading of all qualifying rain events will be recorded.
6. Within 2 business days (48 hours) prior to each qualifying rain event, the QSP or designated representative will visually observe (inspect) for the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants:

   6.1. All stormwater drainage areas will be visually observed (inspected) to identify any spills, leaks, or uncontrolled pollutant sources. If needed, appropriate corrective actions will be implemented.

   6.2. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, appropriate corrective actions will be implemented.

   6.3. Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
7. Within two business days (48 hours) after each qualifying rain event, a post rain event visual observation (inspection) will be conducted to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

Records of all visual observations (inspections), personnel performing the observations, visual observation procedures, observation dates, weather conditions, locations observed, corrective actions taken in response to the observations, and tracking procedures will be maintained onsite.

6.3 Non-Stormwater Discharge Monitoring

6.3.1 Visual Monitoring

- Each drainage area will be visually observed for the presence of (or indications of prior) unauthorized and authorized non-stormwater discharges and their sources.
- One visual observation (inspection) will be conducted quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) will be conducted only during daylight hours (sunrise to sunset).
- Visual observations (inspections) will document the presence or evidence of any non-stormwater discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source.
- Records will be maintained onsite of the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-stormwater discharge was observed, and the response taken to eliminate unauthorized non-stormwater discharges and to reduce or prevent pollutants from contacting non-stormwater discharges.

6.4 Sampling and Analysis Plan for Non-Visible Pollutants

This section describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in stormwater discharges from the project site and offsite activities directly related to the project.

6.4.1 Monitoring Activities

The following construction materials, wastes, or activities are potential sources of non-visible pollutants to stormwater discharges from a project. Identification, storage, use, and operational locations of potential sources of non-visible pollutants at this project site will be updated, identified on site maps, and incorporated into the Final SWPPP by the Contractor.

- Vehicle batteries
- Concrete curing
- Sealants
- Adhesives
- Cleaning products
- Solvents; Thinners
- Fertilizers; Herbicides
- Dust palliatives
- Soil binders
- Painting products
- Line flushing products
- Masonry products

No soil amendments are anticipated to be used on the project site that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil.

Stormwater runon to this site does not have the potential to contribute non-visible pollutants to stormwater discharges from the project.

Sampling for non-visible pollutants will be conducted when (1) a breach, leakage, malfunction, or spill is observed; and (2) the leak or spill has not been cleaned up prior to the rain event; and (3) there is the potential for discharge of non-visible pollutants to surface waters or drainage system.

6.4.2 Monitoring Strategy

6.4.2.1 Sampling Schedule

Samples for the applicable non-visible pollutant(s) and a sufficiently large uncontaminated background sample will be collected during the first two (2) hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples will be collected during daylight hours (sunrise to sunset) and will be collected regardless of the time of year, status of the construction site, or day of the week.

In conformance with the EPA definition, a minimum of 72 hours of dry weather will be used to distinguish between separate rain events.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during inspections conducted before or during rain events:

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) storage protected by temporary cover and containment that prevents stormwater contact and runoff from the storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- An operational activity with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) applicable BMPs were observed to be breached, malfunction, or be improperly implemented, and (3) there is the potential for discharge of non-visible pollutants to surface waters.
- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters.
- Stormwater runoff from an area contaminated by historical usage of the site has been observed to combine with stormwater runoff from the site, and there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.

6.4.2.2 Sampling Locations

Sampling locations will be based on proximity to planned non-visible pollutant storage, occurrence, or use; accessibility for sampling; personnel safety; and other factors in accordance with the applicable requirements in the General Permit. Sampling locations will be chosen by the Contractor as appropriate to discharges and shown on the WPCDs in Attachment A in the Final SWPPP.

- [TBD] sampling locations have been identified for the collection of samples of runoff that drain areas where soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil will be applied.
  - If applicable: Sample location number(s) is located
- [TBD] sampling locations have been identified for the collection of samples of runoff that drain areas contaminated by historical usage of the site.
  - If applicable: Sample location number(s) is located
- [TBD] sampling locations have been identified for the collection of samples of run-on to the project site with the potential to combine with discharges being sampled for non-visible pollutants. These samples are intended to identify sources of potential non-visible pollutants that originate off the project site.
  - If applicable: Sample location number(s) is located
- [TBD] A location has been identified for the collection of an uncontaminated sample of runoff as a background sample for comparison with the samples being analyzed for non-visible pollutants. This location was selected such that the sample will not have come in contact with (1) operational or storage areas associated with the materials, wastes, and activities identified in Section 500.3.1; (2) potential non-visible pollutants due to historical use of the site as identified in Section 500.3.3; (3) areas in which soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied; or (4) disturbed soils areas.
  - If applicable: Sample location number(s) is located

If an operational activity or stormwater inspection conducted 24 hours prior to or during a rain event identifies the presence of a material storage, waste storage, or operations area with spills or the potential for the discharge of non-visible pollutants to surface waters that was an unplanned location and has not been identified on the WPCDs, sampling locations will be selected using the same rationale as that used to identify planned locations.

6.4.3 Monitoring Preparation

Samples on the project site will be collected by the following Contractor sampling personnel:

Name/Telephone Number: TBD

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the project site prior to a sampling event. Monitoring

supplies and equipment will be stored in a cool-temperature environment that will not contact rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule.

Supplies maintained at the project site will include surgical gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, Sampling Activity Log forms, and Chain of Custody forms. The Contractor will obtain and maintain the field-testing instruments for analyzing samples in the field by sampling personnel.

Safety practices for sample collection will be in accordance with the Contractor's Health and Safety Plan.

The QSP will contact sampling personnel 24 hours prior to a predicted rain event and if one of the triggering conditions is identified during an inspection before, during, or after a storm event. This will ensure that adequate sample collection personnel, supplies, and field test equipment for monitoring non-visible pollutants are available and mobilized to collect samples on the project site in accordance with the sampling schedule.

6.4.4 Analytical Constituents

6.4.4.1 Identification of Non-Visible Pollutants

Table 14 lists specific sources and types of potential non-visible pollutants anticipated to be on the project site and the applicable water quality indicator constituent(s) for that pollutant. This table will be updated by the Contractor as appropriate and shown in the Final SWPPP.

TABLE 14
Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Batteries	Acid, Lead	pH. Lead, Sulfuric acid
Cleaners	Acid, Phosphate, Solvents	pH, Phosphate, VOC, SVOC
Painting Products	Paint strippers, Solvents, Thinners	COD, VOC, SVOC
Thinners	VOC, COD	COD, VOC
Sealant	Sealants	COD
AC and PCC	Curing compounds	pH, Alkalinity, VOC, SVOC
Adhesives	Adhesives	COD, Phenols, SVOC

6.4.5 Sample Collection and Handling

6.4.5.1 Sample Collection Procedures

Samples of discharge will be collected at the designated sampling locations for observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and/or historical site usage areas that triggered the sampling event.

Grab samples will be collected and preserved in accordance with the methods identified in Table 15. Only personnel trained in proper water quality sampling will collect samples.

TABLE 15
Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
VOCs-solvents	EPA 8260B	3 × 40 mL	VOA-glass	Store at 4˚ C, HCl to pH<2	1 µg/L	14 days
SVOCs	EPA 8270C	1 × 1 L	Glass-amber	Store at 4˚ C	10 µg/L	7 days
Pesticides	EPA 8081A	1 × 1 L	Glass-amber	Store at 4˚ C	0.1 µg/L	7 days
Herbicides	EPA 8151A	1 × 1 L	Glass-amber	Store at 4˚ C	Check lab	7 days
COD	EPA 410.4	1 × 250 mL	Glass-amber	Store at 4˚ C, H_2SO_4 to pH<2	5 mg/L	28 days
TDS	EPA 160.1 (TDS)	1 × 100 mL	Polypropylene	None	ppm	Immediate
pH	EPA 150.1	1 × 100 mL	Polypropylene	None	Unitless	Immediate
Alkalinity	SM 2320B	1 × 250 mL	Polypropylene	Store at 4˚ C	1 mg/L	14 days
Nitrate	EPA 353.2	1 × 125 mL	Polypropylene	Store at 4˚ C, H_2SO_4 to pH<2	Check lab	28 days
Phosphate	EPA 365.3	1 × 125 mL	Polypropylene	Store at 4˚ C	Check lab	28 days
Organic nitrogen	TKN – NH_3	1 × 1 L	Glass-amber	Store at 4˚ C, H_2SO_4 to pH<2	Check lab	28 days
TOC	EPA 415.1	1 × 250 mL	Glass	Store at 4˚ C, H_2SO_4 to pH<2	Check lab	28 days
Potassium	EPA 200.7	1 × 250 mL	Polypropylene	Store at 4˚ C, HNO_3 to pH<2	0.1 mg/L	6 months
Phenols	EPA 8270C	1 × 1 L	Glass-amber	Store at 4˚ C	Check lab	7 days
Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Na, Th, Va, Zn)	EPA 6010B/ 7470A	1 × 250 mL	Polypropylene	Store at 4˚ C, HNO_3 to pH<2	0.1 mg/L	6 months
Metals (chromium VI)	EPA 7199	1 × 500 mL	Polypropylene	Store at 4˚ C	1 µg/L	24 hours

Notes:
°C = degree(s) Celsius
µg/L = microgram(s) per Liter
COD = chemical oxygen demand
DO = dissolved oxygen
EPA = Environmental Protection Agency
HCl = hydrogen chloride
H_2SO_4 = hydrogen sulfide
HNO_3 = nitric acid
L = liter
mg/L = milligrams per liter
mL = milliliter(s)
ppm = parts per million
PCB = polychlorinated biphenyl
SVOC = semi-volatile organic compound
TDS = total dissolved solids
VOA = volatile organic analysis
VOC = volatile organic compound

Samples will be collected by placing a separate lab-provided sample container directly into a stream of water downgradient and close to the potential non-visible pollutant discharge location. This separate lab-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The upgradient and uncontaminated background samples will be collected prior to collecting the downgradient sample to minimize cross-contamination. Sampling personnel will collect the water

upgradient of where they are standing. Once the separate lab-provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of surgical gloves prior to the collection and handling of each sample at each location.
- Prevent the inside of the sample bottle from contacting any material other than the water sample.
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection.
- Prevent the cooler lid from remaining open for an extended period of time once samples are placed inside.
- Avoid sampling near a running vehicle where exhaust fumes may affect the sample.
- Avoid touching the exposed end of a sampling tube, if applicable.
- Prevent rainwater from rain gear or other surfaces from dripping into sample bottles.
- Avoid eating, smoking, or drinking during sample collection.
- Avoid sneezing or coughing in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample to take place.
- Decontaminate sampling equipment prior to sample collection using a TSP-soapy water wash, distilled water rinse, and final rinse with distilled water.
- Dispose of decontamination water/soaps appropriately; i.e., avoid discharge to the receiving water.

6.4.5.2 Sample Handling Procedures

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, documented on a chain-of-custody form provided by the analytical laboratory; sealed in a re-sealable storage bag; placed in an ice-chilled cooler, as close to 4°C as practicable; and delivered within 24 hours to the California-certified laboratory:

Laboratory Name: TBD

Address: TBD

Telephone Number: TBD

Point of Contact: TBD

Immediately following collection, samples for field analysis will be tested in accordance with the field instrument manufacturer's instructions and results will be recorded on the Sampling Activity Log (Attachment M).

6.4.6 Sample Documentation Procedures

Original data documented on sample bottle identification labels, chain-of-custody forms, Sampling Activity Logs, and Inspection Checklists will be recorded using waterproof ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated.

Sampling and field analysis activities will be documented using the following:

- **Sample Bottle Identification Labels:** Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label:
  - Project name
  - Project number
  - Unique sample identification number and location:
    a. [Project Number]-[Six digit sample collection date]-[Location](*Example:* 0G5304-081801-Inlet472)
    b. QA/QC samples will be identified similarly using a unique sample number or designation (*Example:* 0G5304-081801-DUP1)

  Collection date/time (no time applied to QA/QC samples)
  Analysis constituent
- **Sampling Activity Logs:** A log of sampling events will identify:
  - Sampling date
  - Separate times for collected samples and QA/QC samples recorded to the nearest minute
  - Unique sample identification number and location
  - Analysis constituent
  - Names of sampling personnel
  - Weather conditions (including precipitation amount)
  - Field analysis results
  - Other pertinent data

- **Chain of Custody Forms:** Samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.
- **Stormwater Quality Construction Inspection Checklists:** When applicable, the Contractor's stormwater inspector will document on the checklist that samples for non-visible pollutants were taken during a rain event.

6.4.7 Sample Analysis

Samples will be analyzed for the applicable constituents using the analytical methods identified in Table 15. For samples collected for field analysis, collection, analysis, and equipment calibration will be in accordance with the field instrument manufacturer's specifications.

6.4.8 Quality Assurance/Quality Control

For an initial verification of laboratory or field analysis, duplicate samples will be collected at a rate of 10 percent or 1 duplicate per sampling event. The duplicate sample will be collected, handled, and analyzed using the same protocols as primary samples. A duplicate sample will be collected at each location immediately after the primary sample has been collected. Duplicates will be collected where contamination is likely, not on the background sample. Duplicate samples will not influence evaluations or conclusions; however, they will be used as a check on laboratory quality assurance.

6.4.9 Data Management and Reporting

A copy of water quality analytical results and QA/QC data will be submitted to the Project Manager and TID within 5 days of sampling (for field analyses) and within 30 days (for laboratory analyses).

Lab reports and chain-of-custody will be reviewed for consistency between lab methods, sample identifications, dates, and times for both primary samples and QA/QC samples. Data, including chain-of-custody forms and Sampling Activity Logs, shall be kept with the SWPPP.

6.4.10 Data Evaluation

An evaluation of the water quality sample analytical results, including figures with sample locations, the water quality analytical results, and the QA/QC data, will be included in the onsite SWPPP.

Should the runoff/downgradient sample show an increased level of the tested analyte relative to the background sample, the BMPs, site conditions, and surrounding influences will be assessed to determine the probable cause for the increase. As determined by the site and data evaluation, appropriate BMPs will be repaired or modified to mitigate discharges of non-visual pollutant concentrations. Any revisions to the BMPs will be recorded as an amendment to the SWPPP.

6.5 Change of Conditions

Whenever SWPPP monitoring indicates a change in site conditions that might affect the appropriateness of sampling locations or introduce additional non-visible pollutants of concern, testing protocols will be revised accordingly. All such revisions will be recorded as amendments to the SWPPP.

6.6 Notice of Non-Compliance

If a discharge occurs or if the project receives a written notice of non-compliance, the Contractor will immediately notify the Project Manager, and file a written report to the RWQCB within 30 days of identification of non-compliance. Corrective measures will be implemented immediately following the discharge, notice, or order. A sample Notice of Non-Compliance form is provided in Attachment N. Discharges will be documented on a Discharge Reporting Log using the example form in Attachment O.

The report will contain the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge, including the cause or nature of the notice or order
- The BMPs deployed before the discharge event, or prior to receiving the notice or order
- The date of deployment and type of BMPs deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence
- An implementation and maintenance schedule for any affected BMPs.

6.7 Record Keeping and Reports

Records of all stormwater monitoring information and copies of all reports (including Annual Reports) will be retained for a period of at least three years. All records will be maintained onsite while construction is ongoing.

These records include:

a) The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b) The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c) The date and approximate time of analyses.

d) The individual(s) who performed the analyses.

e) A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f) Rain gauge readings from site inspections.

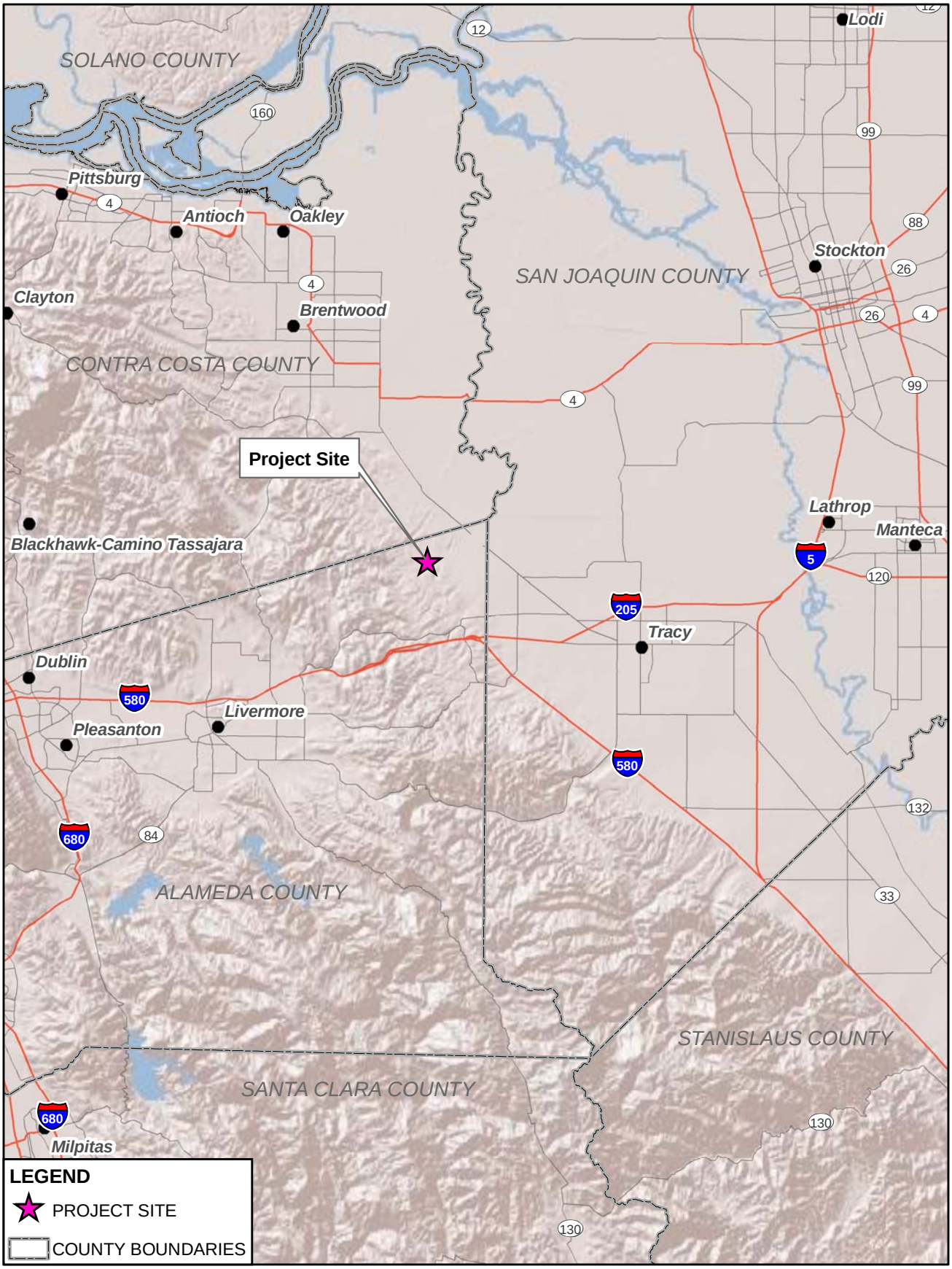
g) Quality assurance/quality control records and results.

h) Non-stormwater discharge inspections and visual observation (inspections) and stormwater discharge visual observation records.

i) The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

j) Visual observation and sample collection exception records.

Attachment A
Figures



N

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Miles

FIGURE 1
PROJECT VICINITY
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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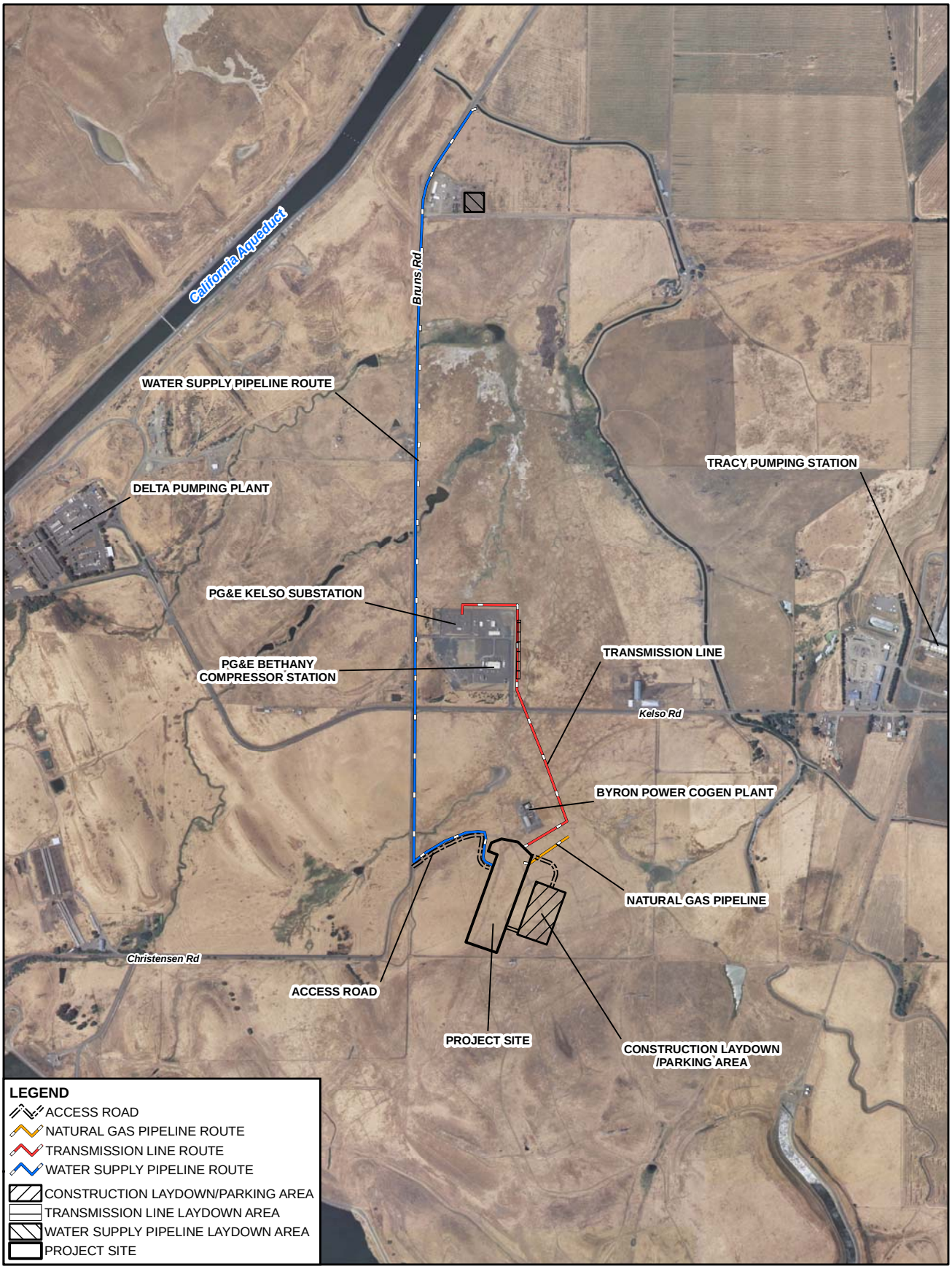

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 750 1,500

Feet

FIGURE 2
SITE LOCATION

MARIPOSA ENERGY PROJECT

ALAMEDA COUNTY, CALIFORNIA

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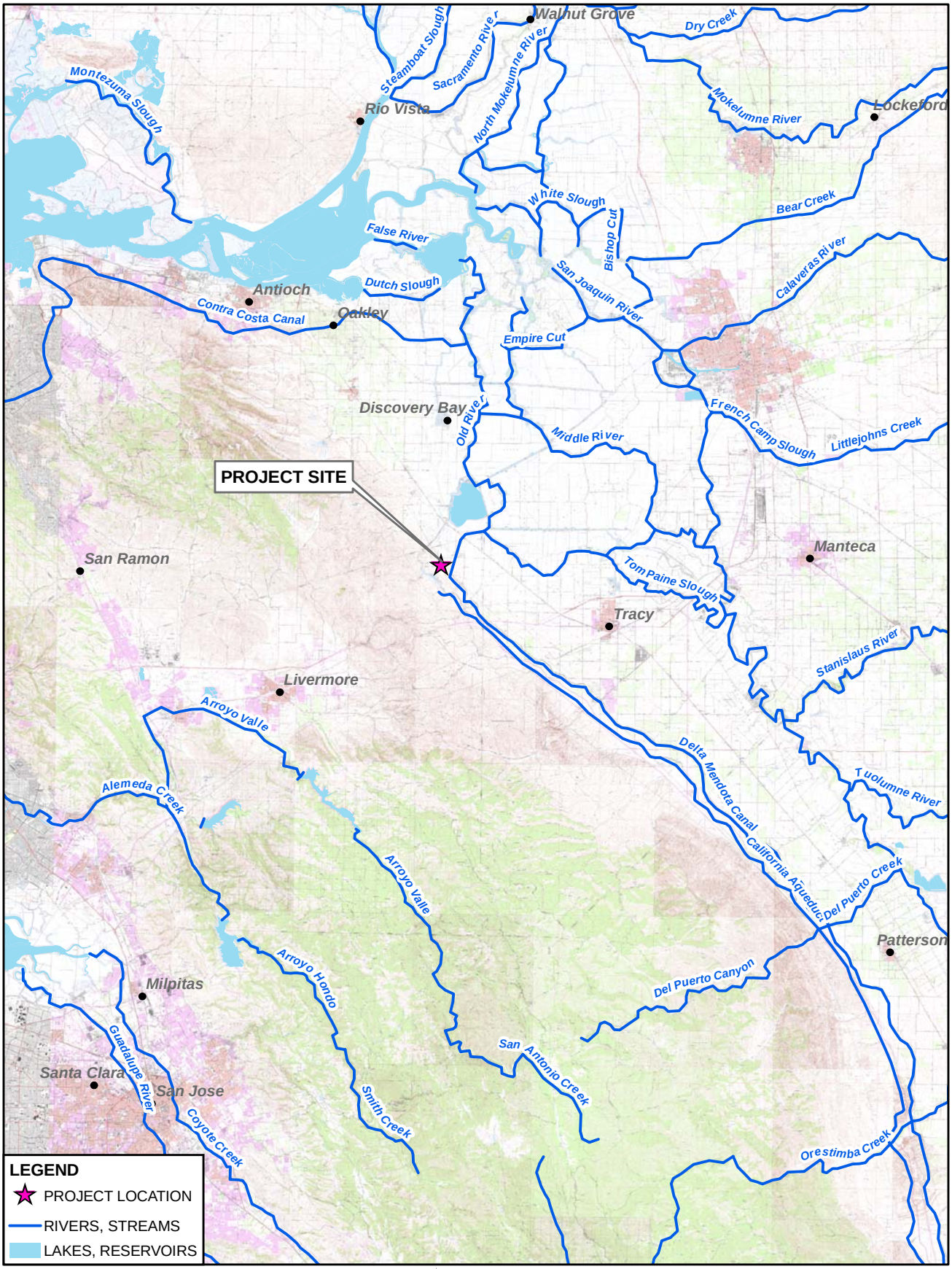

Notes:
1. Source: USGS, the National Atlas of the United States, Environmental Systems Research Institue (ESRI). Water Bodies - 2004, River and Streams - 2006.

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 4 8
Miles

FIGURE 3
SURFACE WATER RESOURCES
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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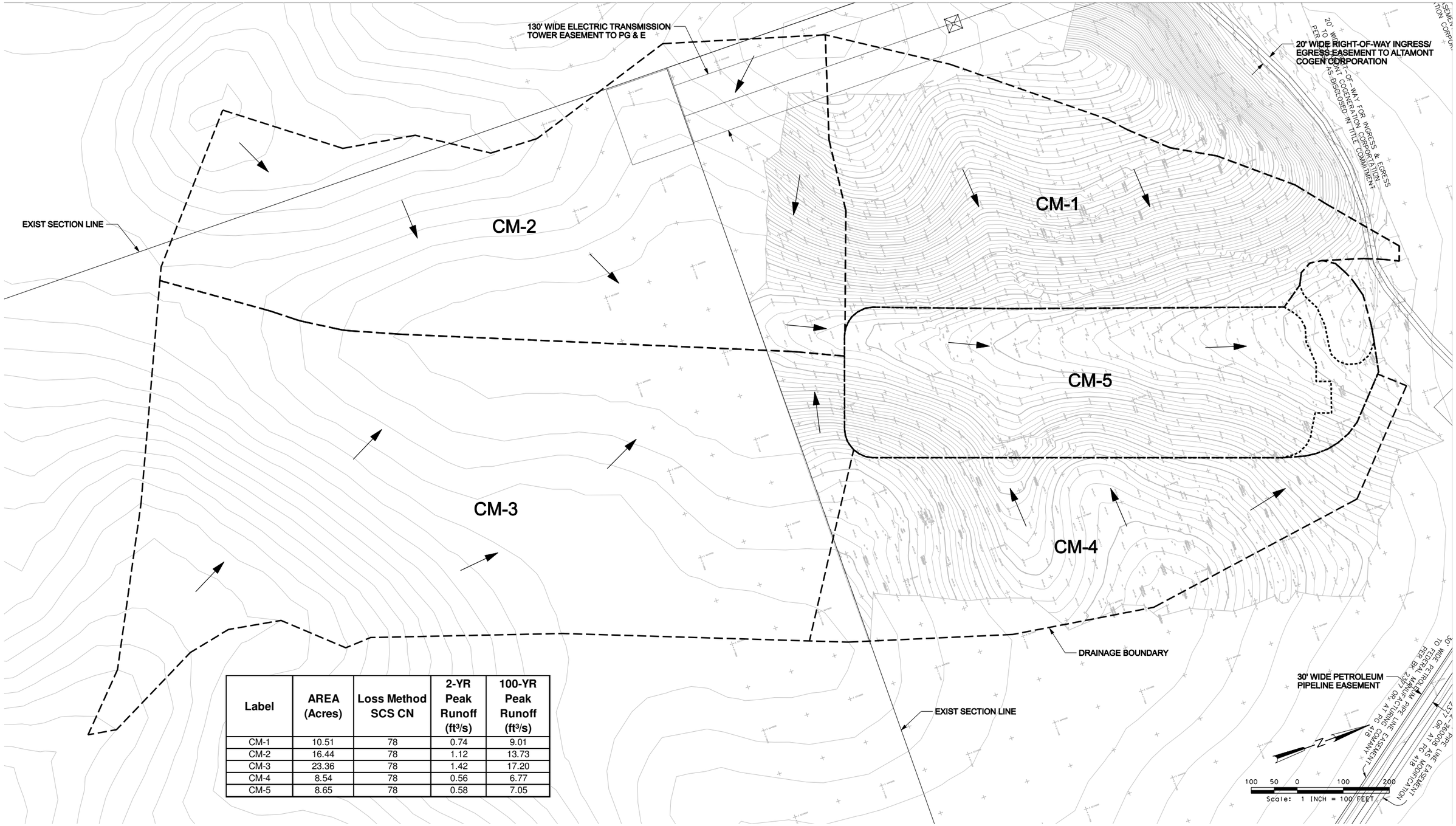


Label	AREA (Acres)	Loss Method SCS CN	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
CM-1	10.51	78	0.74	9.01
CM-2	16.44	78	1.12	13.73
CM-3	23.36	78	1.42	17.20
CM-4	8.54	78	0.56	6.77
CM-5	8.65	78	0.58	7.05

FIGURE 4
PRE-CONSTRUCTION DRAINAGE CONDITION
Mariposa Energy Project
Alameda County, California

Label	Loss Method SCS CN	Area (acres)	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
S-1	93	7.53	5.09	16.51
S-2	93	0.59	0.45	1.49

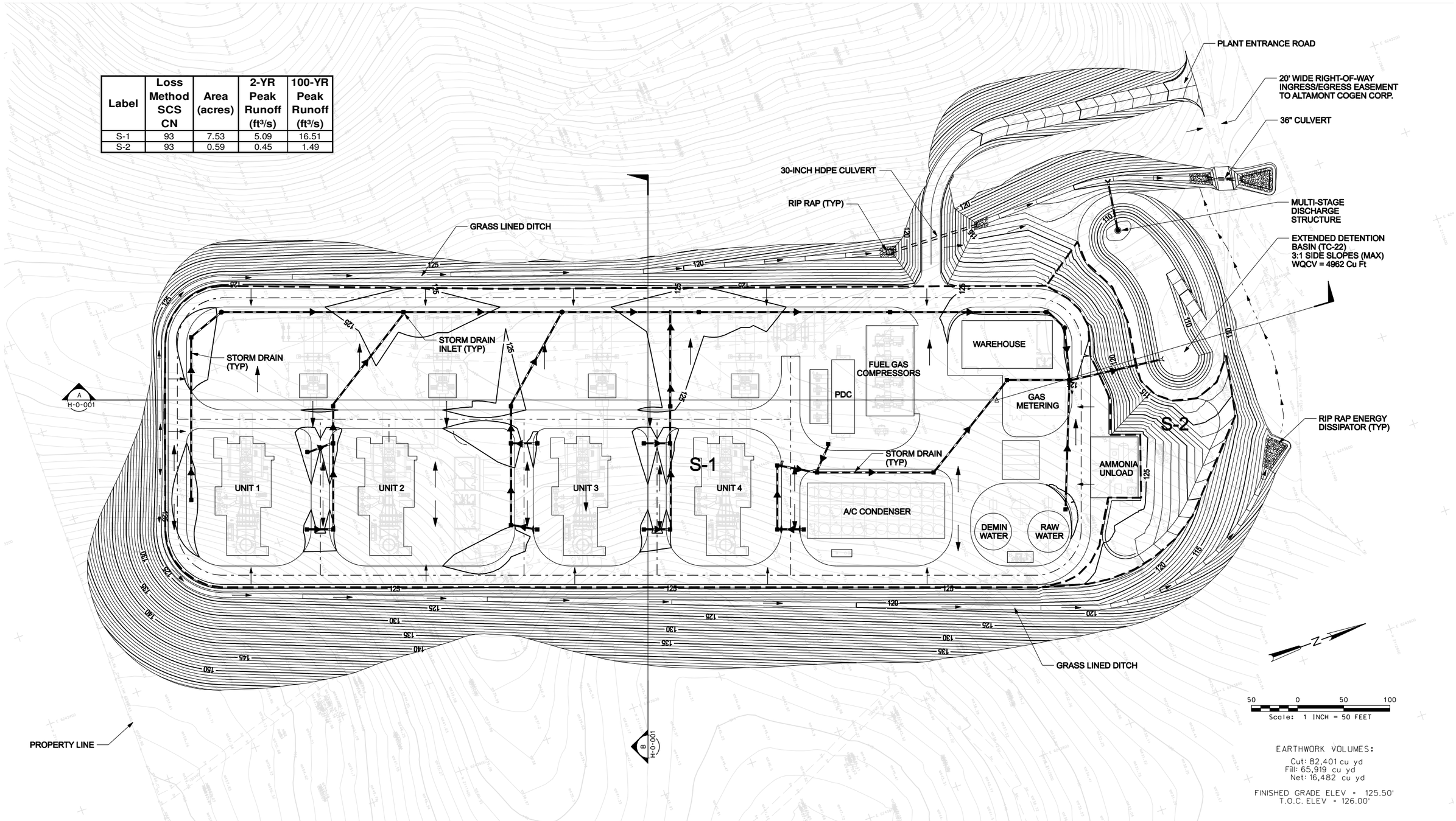
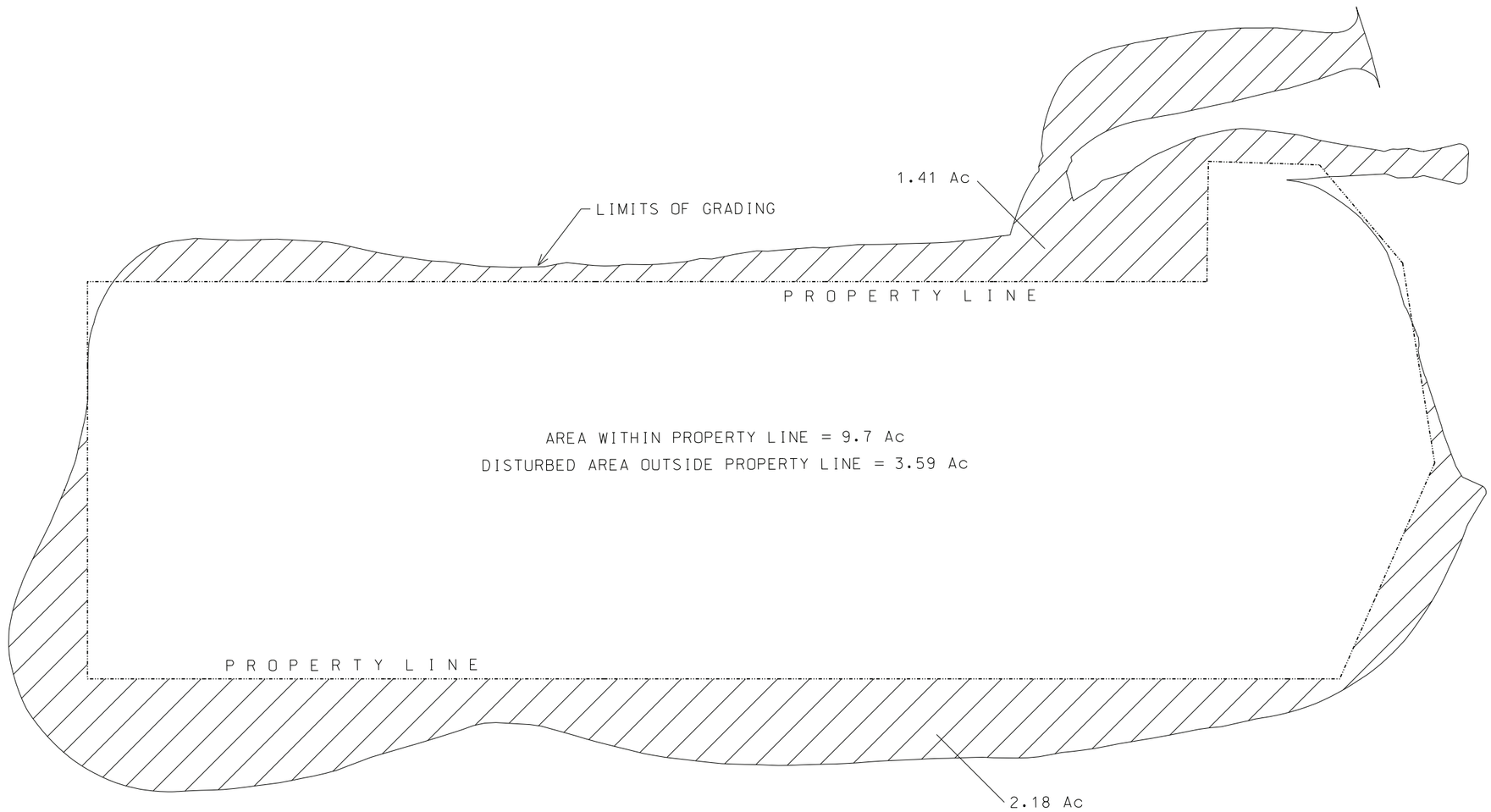


FIGURE 5
POST-CONSTRUCTION DRAINAGE CONDITION
Mariposa Energy Project
Alameda County, California

EY012009005SAC Figure_5.15-2b.ai 05.22.09 tdaus

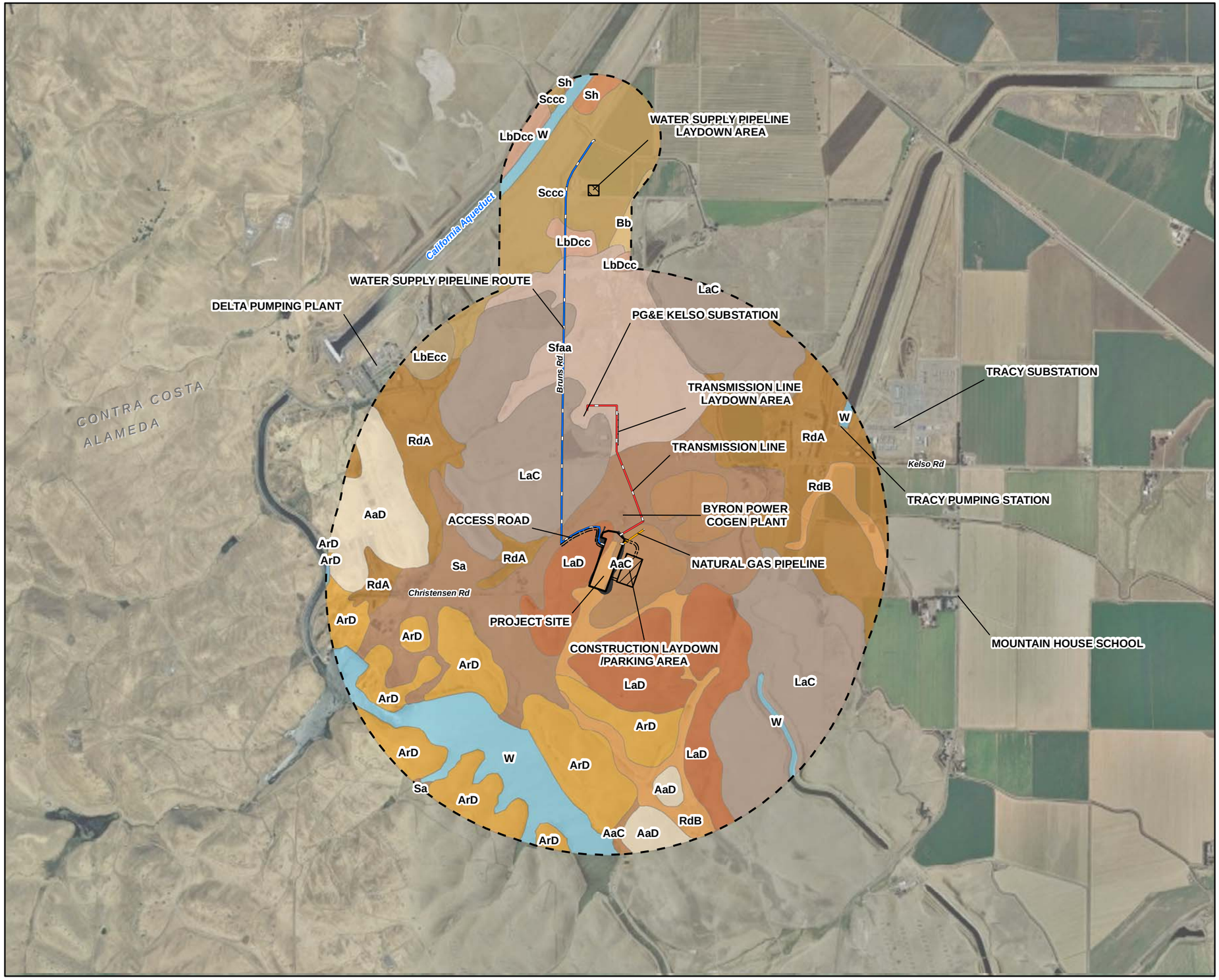
CH2MHILL



DISTURBANCE ACREAGE

SK-000-W-0-001

FIGURE 6
PLANT LIMITS OF GRADING
Mariposa Energy Project
Alameda County, California



LEGEND

- ACCESS ROAD
- NATURAL GAS PIPELINE ROUTE
- TRANSMISSION LINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- DISTURBED AREA
- BUFFER

SOIL TYPE

- AaC, ALTAMONT CLAY, 3 TO 15 PERCENT SLOPES
- AaD, ALTAMONT CLAY, 15 TO 30 PERCENT SLOPES
- ArD, ALTAMONT ROCKY CLAY, 7 TO 30 PERCENT SLOPES
- Bb, BRENTWOOD CLAY LOAM
- LaC, LINNE CLAY LOAM, 3 TO 15 PERCENT SLOPES
- LaD, LINNE CLAY LOAM, 15 TO 30 PERCENT SLOPES
- LbDcc, LINNE CLAY LOAM, 5 TO 15 PERCENT SLOPES
- LbEcc, LINNE CLAY LOAM, 15 TO 30 PERCENT SLOPES
- RdA, RINCON CLAY LOAM, 0 TO 3 PERCENT SLOPES
- RdB, RINCON CLAY LOAM, 3 TO 7 PERCENT SLOPES
- Sa, SAN YSIDRO LOAM
- Sccc, SAN YSIDRO LOAM
- Sf, SOLANO FINE SANDY LOAM
- Sfaa, SOLANO FINE SANDY LOAM
- Sh, SOLANO LOAM
- W, WATER

Notes:
1. 1 Mile Buffer around Project Site, 1/4 Mile Buffer around all Linears.
2. Source: U.S. Department of Agriculture, Natural resources Conservation Service, Soil Survey Geographic (SSURGO) Database for Contra Costa and Alamenda County, California, 2005.

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

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Feet

FIGURE 7
SOIL TYPES
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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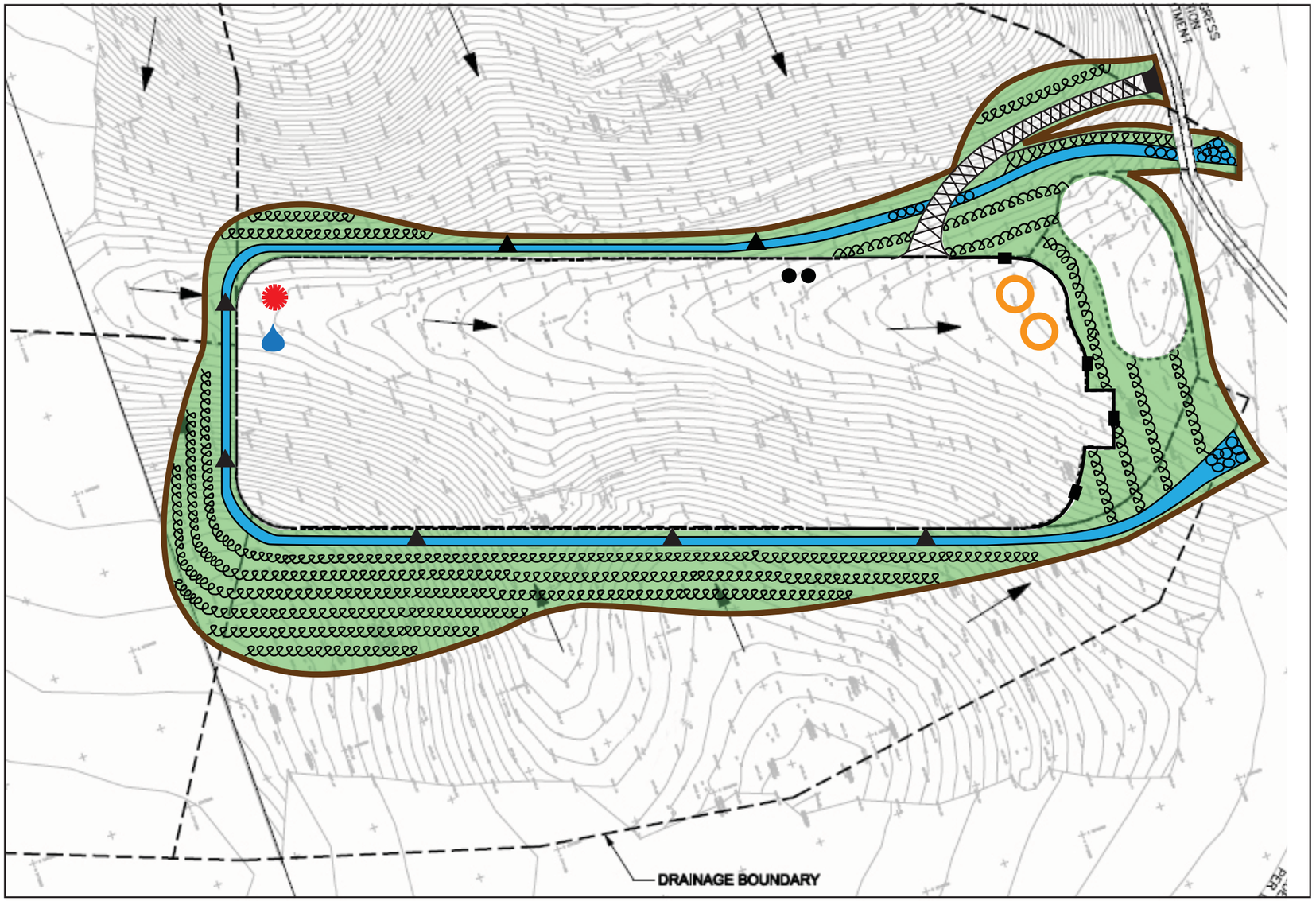


LEGEND

- TR-1 STABILIZED CONSTRUCTION ENTRANCE/EXIT
- TR-2 STABILIZED CONSTRUCTION ROADWAY
- EC-9 GRASS-LINED DRAINAGE SWALE
- EC-4 HYDROSEEDING/RE-VEGETATION AND/OR EC-3 HYDRAULIC MULCH
- EC-10 VELOCITY DISSIPATION DEVICES/RIPRAP
- DIRECTIONAL FLOW
- WM-9 SANITARY/SEPTIC WASTE MANAGEMENT
- SE-4 CHECK DAMS
- SE-1 SILT FENCE
- LIMITS OF GRADING
- WM-3 STOCKPILE MANAGEMENT
- COMPLETED AREAS STABILIZED WITH AGGREGATE OR PAVING, DISTURBED AREAS STABILIZED WITH MULCH OR EROSION CONTROL BLANKETS PRIOR TO RAIN EVENTS AS NEEDED
- USE OF FIBER ROLLS AND SILT FENCE AT THE TOE OF SLOPES AND PERIMETER OF DRAINAGE AREAS
- WE-1 WIND EROSION CONTROL, DISTURBED AREAS WATERED AS NEEDED
- SE-5 FIBER ROLL

CRITICAL SLOPE/SHEET FLOW LENGTH COMBINATIONS

Slope Percentage	Slope Percentage Sheet Not to Exceed
0 – 25%	20 feet
25-50%	15 feet
Over 50%	10 feet

FIGURE 8
CONCEPTUAL BMP PLAN
Mariposa Energy Project
Alameda County, California

Attachment B
Preliminary Stormwater Management Design

CALCULATION SET NO. 383206-CE-01

CH2MHILL

CALCULATION SUMMARY & CONTROL SHEET

PRELIM.	FINAL	VOID	REVISION
X			C

Sheet	1	of	19
Discipline	Civil		
Project No	383206		

CLIENT: Diamond Generating Corporation (DGC)

PROJECT TITLE: Kelso CT Project

SUBJECT: Drainage calculations for Peak Runoff and Detention Pond sizing.

COMPLETED BY: *John Purdy, P.E.* JMP DATE: 5/19/09

CHECKED BY: *Matthew Cannizzaro, P.E.* MMC DATE: 5/19/09

APPROVED BY: DATE:

REVISION SUMMARY: *General Revision*

TOTAL NUMBER OF SHEETS IN THIS ISSUE: 19

SHEETS REVISED, ADDED, or DELETED: pgs 3 & 4

PROBLEM STATEMENT: *Calculate subbasin peak runoff flows and confirm the size of the site stormwater detention pond.*

RESULTS & CONCLUSIONS: *See Calculation Summary Sheet Page 2*

DESIGN BASIS & ASSUMPTIONS: *See Calculation Summary Sheet Page 2*

UNVERIFIED ASSUMPTIONS/OPEN ITEMS: N/A

REFERENCES: NOAA Atlas 2, Volume XI; Alameda County Flood Control & Water Conservation District, C.3 Stormwater Technical Guidance, V1.0, 8/2006

ATTACHMENTS (Including number of pages): *Drainage System Schematic (2p), Bentley CivilStorm Output Report (6p), Detention Pond Stage-Storage & Flow In / Out Graphs (2p), Water Quality Capture Volume (WQCV) Calculation (1p) California Precipitation Frequency Data Output (1p), Hydrologic Soil Group (4p), Alameda County Mean Annual Precipitation Map (1p)*

COMPUTER PROGRAM DISCLOSURE INFORMATION:

Program Used	Rev No./Issue Date	CH2M Verified
Bentley Civil Storm	*V8 XM /*	X Yes ___ No

Site hydrology will be based on the following criteria:

Method: SCS Unit Hydrograph Method
Rainfall Distribution: SCS Type I
Hydrologic Soil Group: Group D (See Attachment from NRCS)
Curve Number: 78 – Existing Condition – Meadow – cont. grass, HSG D
Curve Number: 93 – Proposed Plant - Urban industrial, HSG D
Water Quality Capture Volume (WQCV): Per Alameda County, C.3 Storm Water Technical Guidance, 8/2006
Proposed Project Drainage Area: 8.12 Acres
Tributary Off-Site Drainage Area: 67.50 Acres (Diverted around the Proposed Project Site)
Minimum Time of Concentration (Tc): 5-minutes
Minimum Pipe Size for Storm Drain Main Line: 18-inches

Design Storms:

2-year 24 hour - 1.64 inches (Prec. Freq. Data Output, NOAA Atlas 2, See Attachment)
100-year 24 hour – 4.00 inches Prec. Freq. Data Output, NOAA Atlas 2, See Attachment)

Existing Condition Peak Runoff (CM-5):

2-year 24 hour – 0.21 Acre-ft, Q=0.58 cfs
100-year 24 hour – 1.36 Acre-ft, Q=7.05 cfs

Computed runoff volume tributary to the On-Site Detention Pond (S-1 &S-2):

2-year 24 hour – 0.28 Acre-ft, Qout=0.58 cfs, peak elevation 108.63 ft
100-year 24 hour – 0.79 Acre-ft, Qout=6.58 cfs, peak elevation 110.96 ft with 2.04 ft of freeboard
Water Quality Capture Volume (WQCV): 4962 CuFt, outlet designed for 48-hour drawdown

System Description:

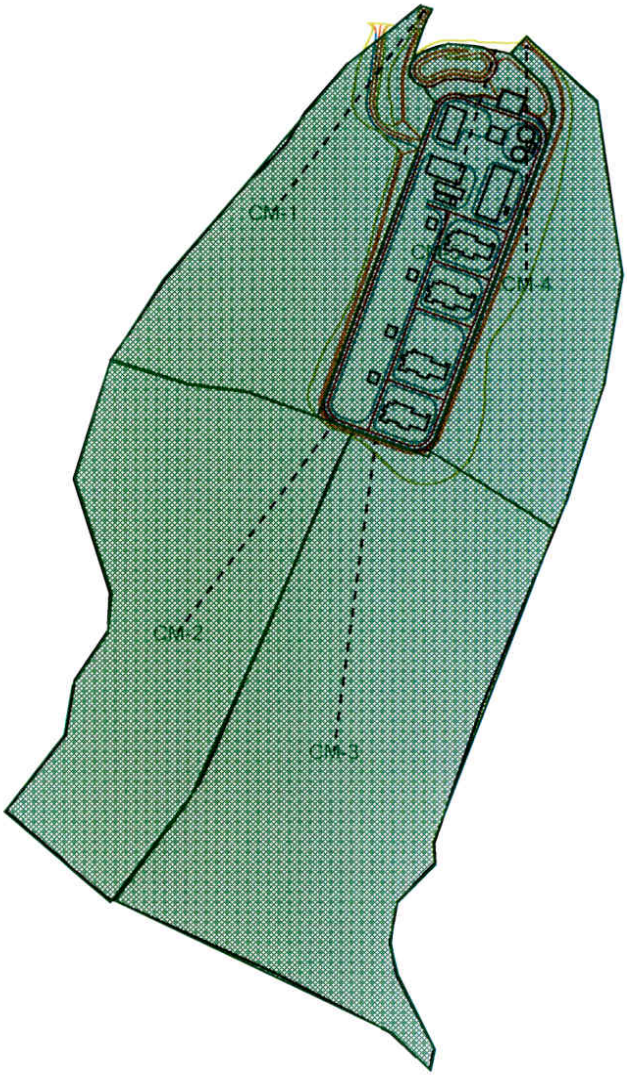
The Kelso Power Plant is a proposed facility in Alameda County, California.

The proposed facility will mitigate storm runoff with a series of inlets and storm drain pipes which will convey the runoff to a proposed on-site Extended Detention Basin (TC-22) located on the north end of the site. Areas of potential oil contamination will be sited inside containments which will prevent potential contaminates from being conveyed to the storm system. Storm water that is contained will be treated and disposed of per the regulatory requirements. The implementation of these containments will enable for the balance of site runoff to be conveyed directly to the Extended Detention Basin without prior treatment through an oil water separator.

Impervious areas will be limited to paved loop and equipment access roads and the equipment required to operate the plant. The remainder of the site will gravel surfaced. The proposed plant is 44% impervious.

EXISTING CONDITION

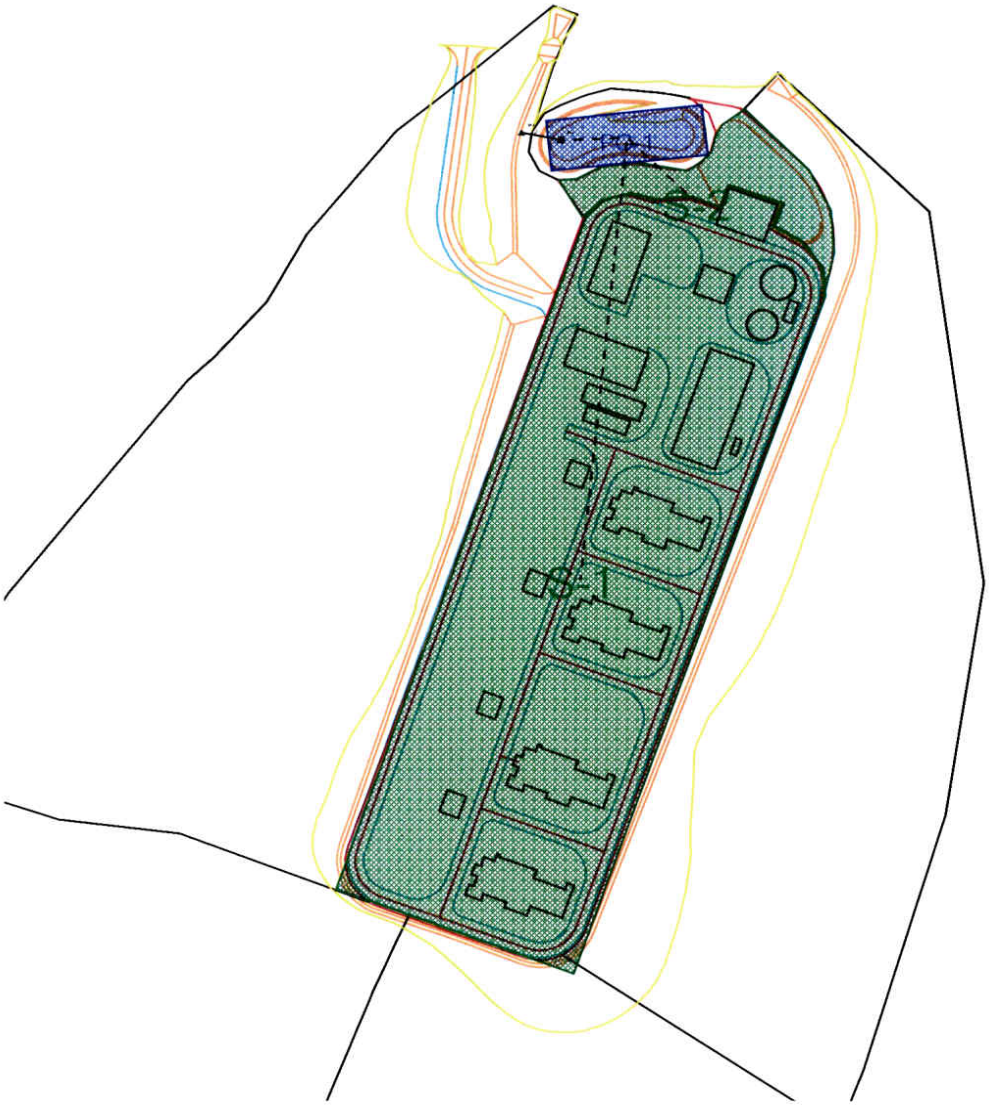
Scenario: Base



REV C

PROPOSED CONDITION

Scenario: Base



REV C

2-YR EXISTING

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		

Calculation Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	2880.00 min

Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft^3/s)	Time To Peak (min)
CM-5	Unit Hydrograph	SCS CN	1.640	8.650	0.21	0.58	618.00
CM-1	Unit Hydrograph	SCS CN	1.640	10.510	0.26	0.74	615.00
CM-2	Unit Hydrograph	SCS CN	1.640	16.440	0.41	1.12	615.00
CM-4	Unit Hydrograph	SCS CN	1.640	8.540	0.21	0.56	618.00
CM-3	Unit Hydrograph	SCS CN	1.640	23.360	0.58	1.42	621.00

General Calculation Summary N/A

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft^3/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)

100 YR EXISTING

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		
Calculation Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	2880.00 min
Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft³/s)	Time To Peak (min)
CM-5	Unit Hydrograph	SCS CN	3.995	8.650	1.36	7.05	612.00
CM-1	Unit Hydrograph	SCS CN	3.995	10.510	1.65	9.01	609.00
CM-2	Unit Hydrograph	SCS CN	3.995	16.440	2.58	13.73	609.00
CM-4	Unit Hydrograph	SCS CN	3.995	8.540	1.34	6.77	612.00
CM-3	Unit Hydrograph	SCS CN	3.995	23.360	3.66	17.20	615.00

General Calculation Summary

N/A

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft³/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)

24R PROPOSED

7

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		

Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	4800.00 min

Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft^3/s)	Time To Peak (min)
S-1	Unit Hydrograph	SCS CN	1.640	7.530	0.62	5.09	600.00
S-2	Unit Hydrograph	SCS CN	1.640	0.590	0.05	0.45	594.00

General Calculation Summary

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft^3/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)
CO-1	Conduit	2	727.48	0.58	4.52	105.94
PO-1	Pond	1	---	---	---	108.63

Node Calculation Summary

Label	Element Type	Branch	Time to Maximum Inflow (min)	Flow (Total In Maximum) (ft^3/s)	Time To Maximum Inlet Flow (min)	Flow (Surface Maximum) (ft^3/s)	Time To Maximum Captured Flow (min)	Flow (Captured Maximum) (ft^3/s)	Time to Maximum Overflow (min)	Flow (Overflow Maximum) (ft^3/s)
OF-7	Outfall	2	(N/A)	(N/A)	---	---	---	---	(N/A)	(N/A)
PO-1	Pond	1	598.48	5.42	---	---	---	---	0.00	0.00

Gutter Calculation Summary

Label	Open Cross Section	Flow (Maximum) (ft^3/s)	Time to Maximum Flow (min)	Velocity (Maximum) (ft/s)

100 YR PROPOSED

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		
Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	4800.00 min
Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft^3/s)	Time To Peak (min)
S-1	Unit Hydrograph	SCS CN	4.000	7.530	2.02	16.51	600.00
S-2	Unit Hydrograph	SCS CN	4.000	0.590	0.16	1.49	594.00

General Calculation Summary

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft^3/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)
CO-1	Conduit	2	613.48	6.58	9.44	106.38
PO-1	Pond	1	---	---	---	110.96

Node Calculation Summary

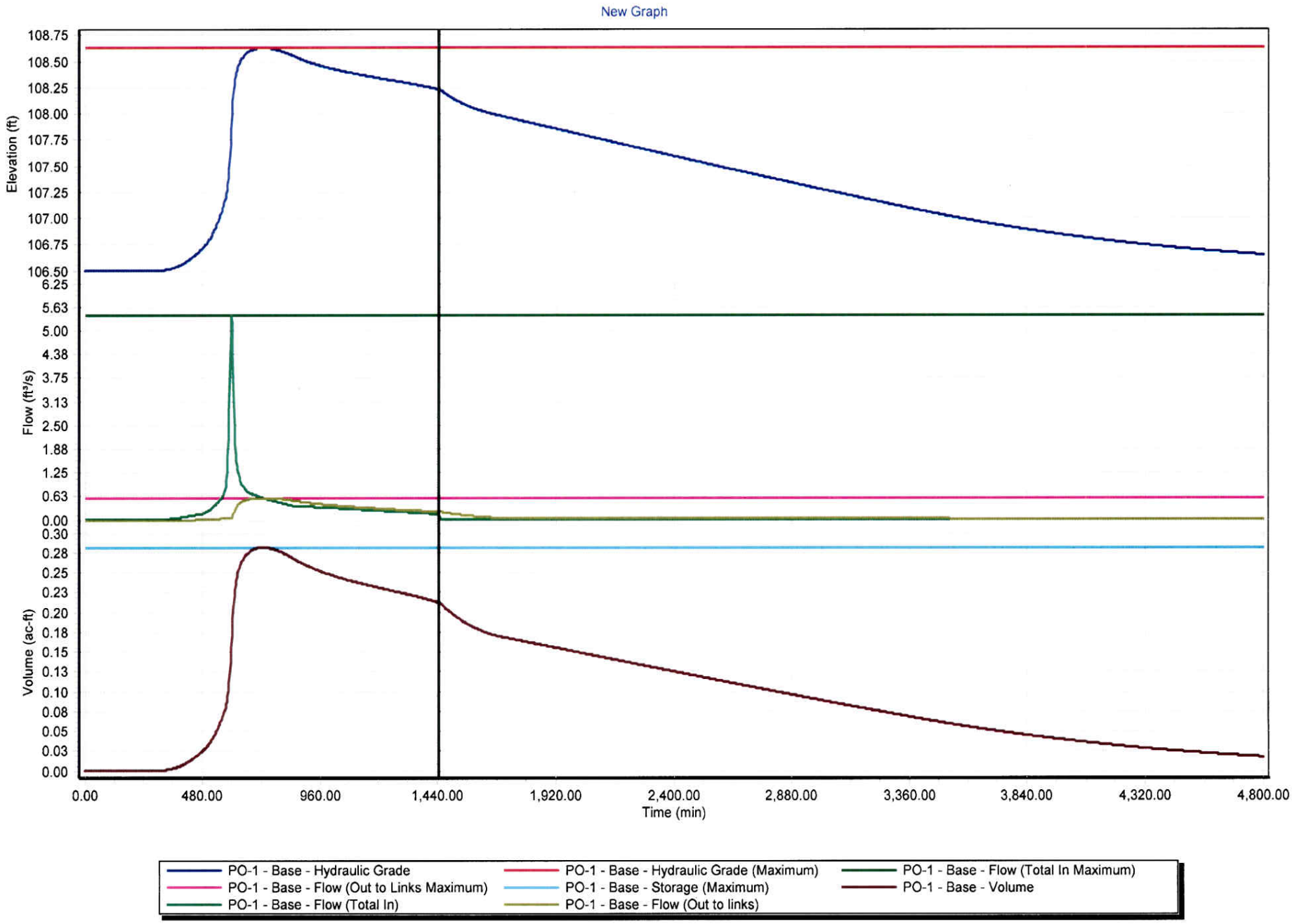
Label	Element Type	Branch	Time to Maximum Inflow (min)	Flow (Total In Maximum) (ft^3/s)	Time To Maximum Inlet Flow (min)	Flow (Surface Maximum) (ft^3/s)	Time To Maximum Captured Flow (min)	Flow (Captured Maximum) (ft^3/s)
OF-7	Outfall	2	(N/A)	(N/A)	---	---	---	---
PO-1	Pond	1	598.48	17.73	---	---	---	---

Time to Maximum Overflow (min)	Flow (Overflow Maximum) (ft^3/s)
(N/A)	(N/A)
0.00	0.00

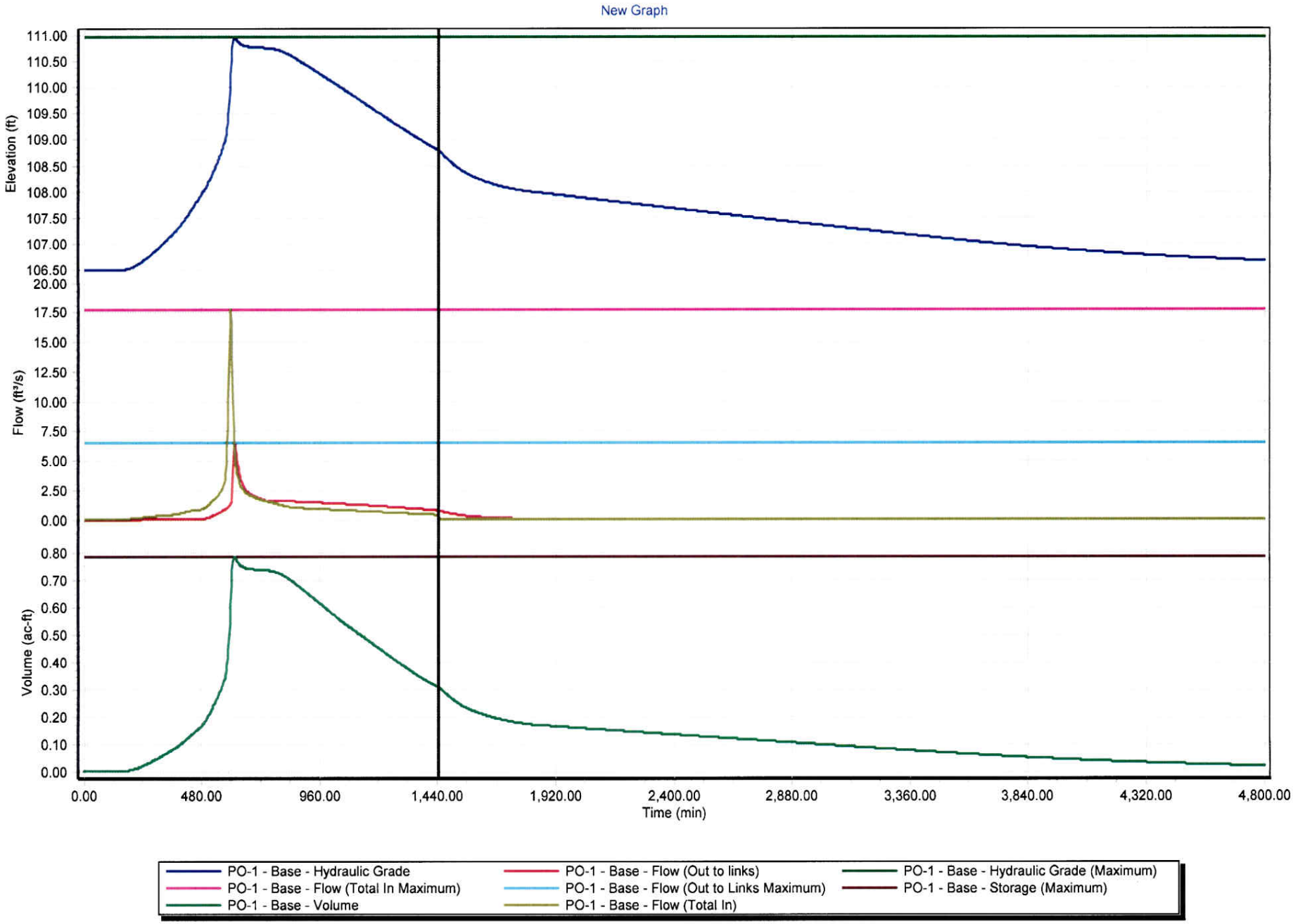
Gutter Calculation Summary

Label	Open Cross Section	Flow (Maximum) (ft^3/s)	Time to Maximum Flow (min)	Velocity (Maximum) (ft/s)

2 YR STORM


New Graph
Elevation (ft)
108.75
108.50
108.25
108.00
107.75
107.50
107.25
107.00
106.75
106.50
Flow (ft³/s)
6.25
5.63
5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
Volume (ac-ft)
0.30
0.28
0.25
0.23
0.20
0.18
0.15
0.13
0.10
0.08
0.05
0.03
0.00
0.00
480.00
960.00
1,440.00
1,920.00
2,400.00
2,880.00
3,360.00
3,840.00
4,320.00
4,800.00
Time (min)
PO-1 - Base - Hydraulic Grade
PO-1 - Base - Hydraulic Grade (Maximum)
PO-1 - Base - Flow (Total In Maximum)
PO-1 - Base - Flow (Out to Links Maximum)
PO-1 - Base - Storage (Maximum)
PO-1 - Base - Volume
PO-1 - Base - Flow (Total In)
PO-1 - Base - Flow (Out to links)

100 YR STORM


New Graph
Elevation (ft)
111.00
110.50
110.00
109.50
109.00
108.50
108.00
107.50
107.00
106.50
Flow (ft³/s)
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
Volume (ac-ft)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
480.00
960.00
1,440.00
1,920.00
2,400.00
2,880.00
3,360.00
3,840.00
4,320.00
4,800.00
Time (min)
PO-1 - Base - Hydraulic Grade
PO-1 - Base - Flow (Total In Maximum)
PO-1 - Base - Volume
PO-1 - Base - Flow (Out to links)
PO-1 - Base - Flow (Out to Links Maximum)
PO-1 - Base - Flow (Total In)
PO-1 - Base - Hydraulic Grade (Maximum)
PO-1 - Base - Storage (Maximum)

Kelso CT Project
Water Quality Capture Volume (WQCV)
Calculation Sheet
Reference: Alameda County Flood Control &
Water Conservation District
C.3 Stormwater Technical Guidance, V1.0, 8/2006

Perimeter Site

ft^2	Acres
323761	7.43

Total Infield ft^2						
211412	117222	17461	17832	26399	16485	16013

Road ft^2	Road SqYd	Road Acres	Rational C	CA
112348.60	12483.18	2.58	0.70	1.81

Bldg & Equip ft^2		
10535	4	2633.69
3120	4	780.00
1465		
4445		
194		
1512	2	756.00
2000		
1145		
5113		
5107		
840		
1590		
314		
1257		
125		
80		
20		
80		
3410		

Total Bldg ft^2	Total Bldg SqYd	Total Bldg Acres	Rational C	CA
42353	4705.91	0.97	0.80	0.78

Gravel Area ft^2	Gravel Area SqYd	Gravel Area Acres	Rational C	CA
169059	18784.31	3.88	0.10	0.39

Total Area	8.12 Acres

Composite C	% Impervious
0.37	44%

Alameda County Flood Control &
Water Conservation District
C.3 Stormwater Technical Guidance V1.0
Appedix E

Mean Average Rainfall Map Inches
12

Alameda County Flood Control &
Water Conservation District
C.3 Stormwater Technical Guidance V1.0
Table 5-2

San Jose

Inches	Composite C	0.25	0.50
14	inches	0.14	0.28

Unit Basin Storage Volume (unadjusted)

inches	0.20

Unit Basin Storage Volume (adjusted)

inches	0.17

Capture Volume
CuFt 4511.34

Required Capture Volume
10 % Increase
CuFt 4962

Precipitation Frequency Data Output

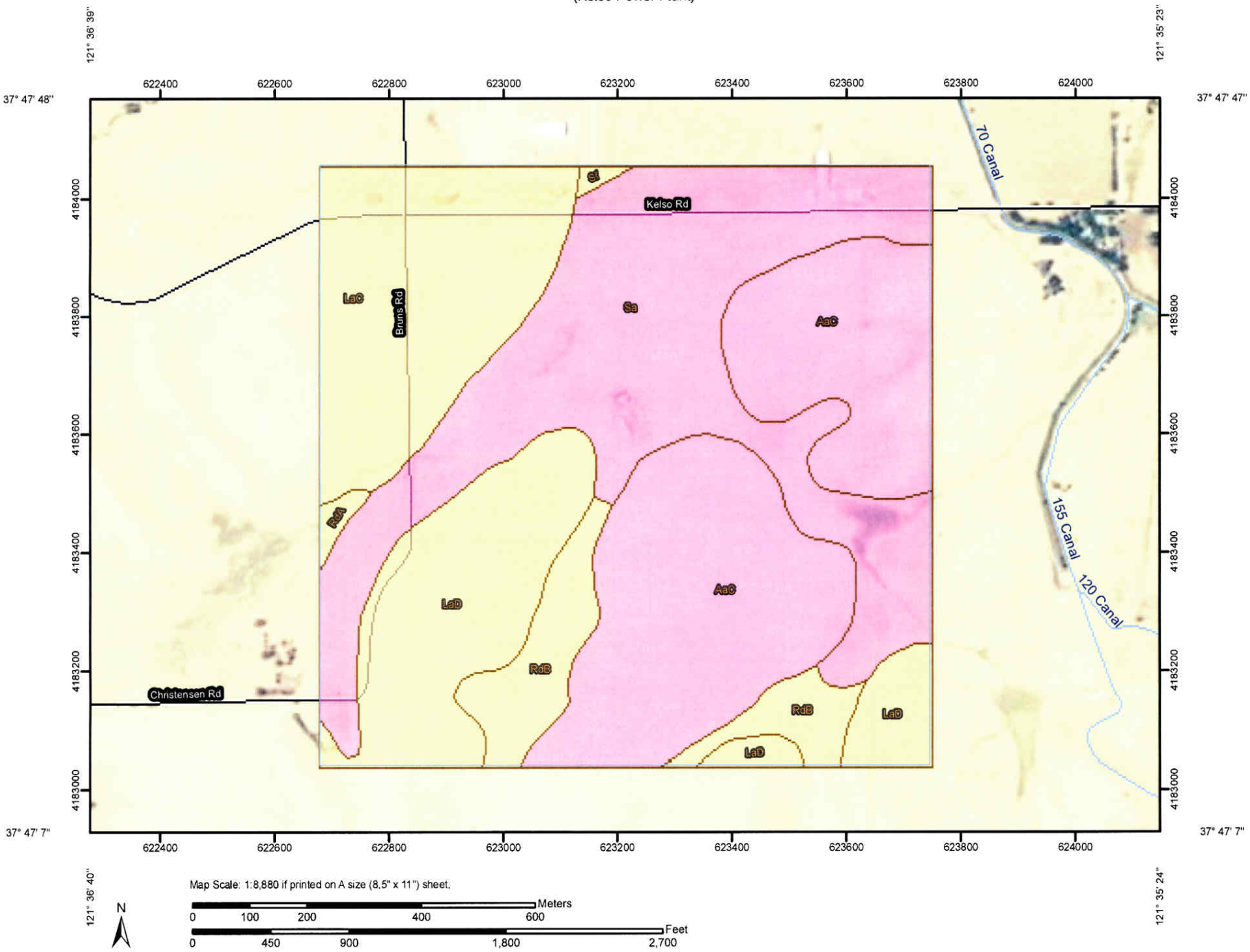
14

NOAA Atlas 2
California 37.7905?N 121.6012?W
Site-specific Estimates

Map	Precipitation (inches)	Precipitation Intensity (in/hr)
2-year 6-hour	1.02	0.17
2-year 24-hour	1.64	0.07
100-year 6-hour	2.07	0.35
100-year 24-hour	4.00	0.17

Hydrometeorological Design Studies Center - NOAA/National Weather Service
1325 East-West Highway - Silver Spring, MD 20910 - (301) 713-1669
Mon Feb 2 17:08:46 2009

Hydrologic Soil Group—Alameda Area, California
(Kelso Power Plant)



15

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:8,880 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 5, Jul 22, 2008

Date(s) aerial images were photographed: 6/30/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Alameda Area, California				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
AaC	Altamont clay, 3 to 15 percent slopes	D	78.1	29.2%
LaC	Linne clay loam, 3 to 15 percent slopes	C	43.8	16.4%
LaD	Linne clay loam, 15 to 30 percent slopes	C	41.9	15.6%
RdA	Rincon clay loam, 0 to 3 percent slopes	C	1.2	0.5%
RdB	Rincon clay loam, 3 to 7 percent slopes	C	17.4	6.5%
Sa	San Ysidro loam	D	84.8	31.6%
Sf	Solano fine sandy loam	C	0.7	0.3%
Totals for Area of Interest			**267.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

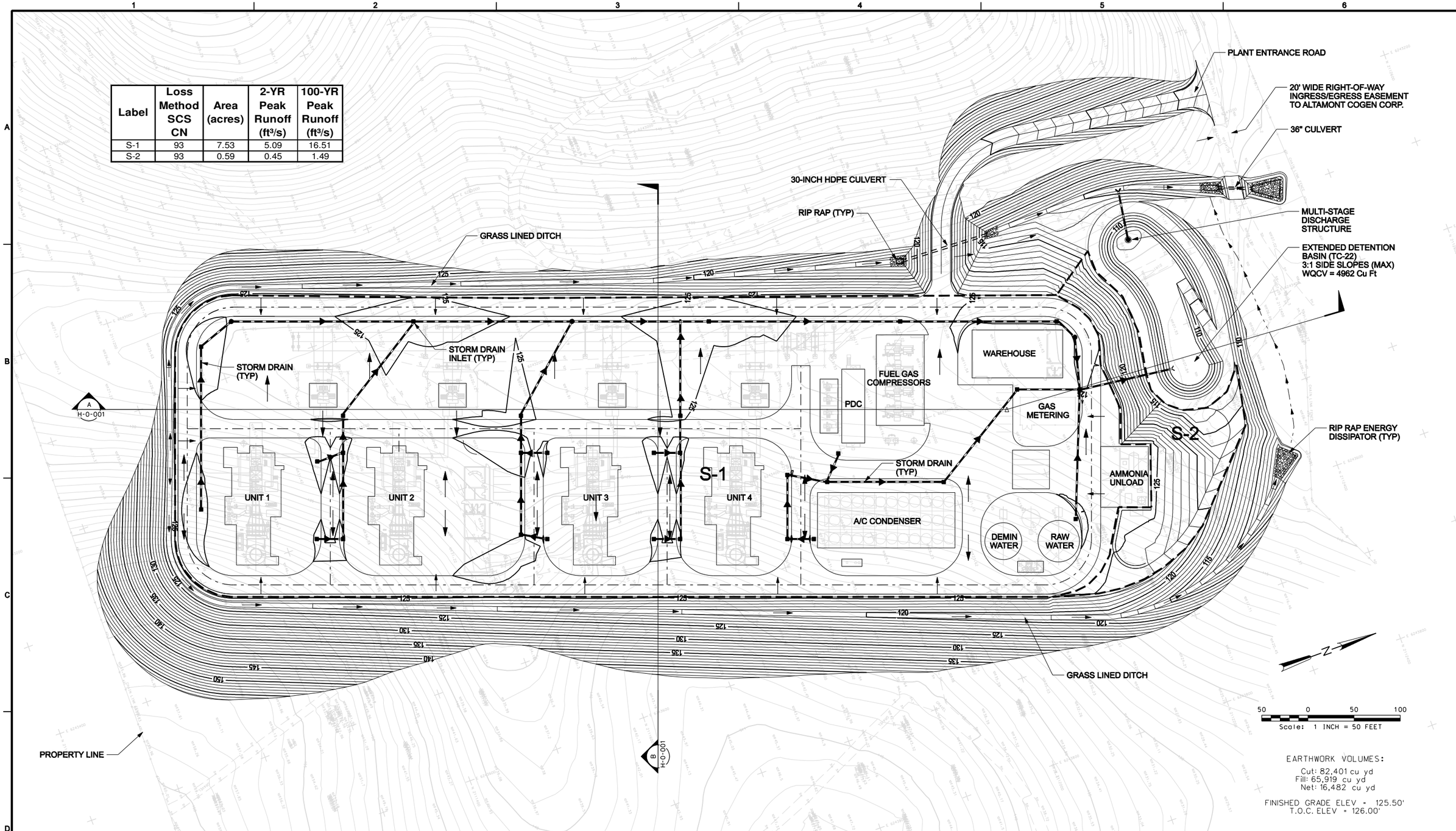
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Label	Loss Method SCS CN	Area (acres)	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
S-1	93	7.53	5.09	16.51
S-2	93	0.59	0.45	1.49



EARTHWORK VOLUMES:

Cut: 82,401 cu yd
Fill: 65,919 cu yd
Net: 16,482 cu yd

FINISHED GRADE ELEV = 125.50'
T.O.C. ELEV = 126.00'

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RESPONSIBLE ENGINEER

PE #

NO.	DATE	REVISION	BY	CHK
A	2/13/09	ISSUED FOR REVIEW	TC	JP
B	2/26/09	ISSUED FOR REVIEW	TC	JP
C	5/4/09	ISSUED FOR REVIEW	TC	JP
D	5/4/09	ISSUED FOR REVIEW	TC	JP

REVISION APPROVAL — REV C — DATE 5/4/09

DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONT.	
MECHANICAL		ARCH.	
PROCESS		GEN. ARRANG.	
PIPING			

STATUS

ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY	P1	-			
FOR REVIEW AND APPROVAL	D	5/4/09			
APPROVED FOR CONSTRUCTION	0				
REVISED & APPROVED FOR CONSTRUCTION					

SCALE AS SHOWN

Diamond Generating Corporation
A Subsidiary of Mitsubishi Corporation

Mariposa Energy Project

PROJECT NO. 383206

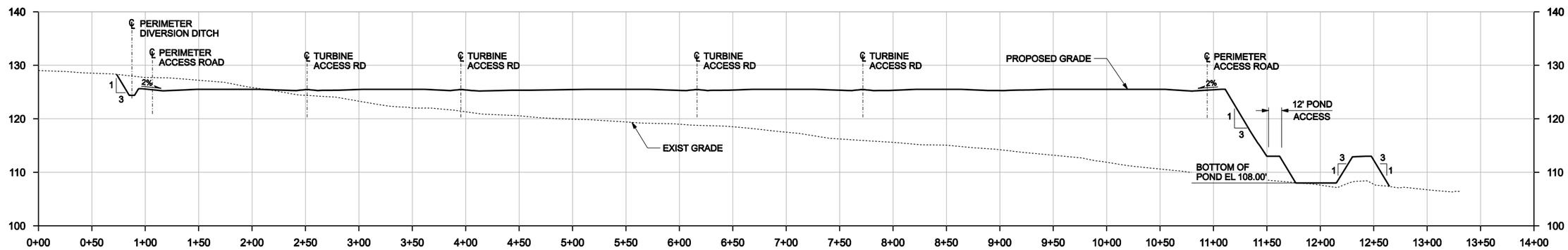
CH2MHILL
CH2MHILL Engineers

CIVIL
PRELIMINARY
GRADING AND DRAINAGE
PLAN

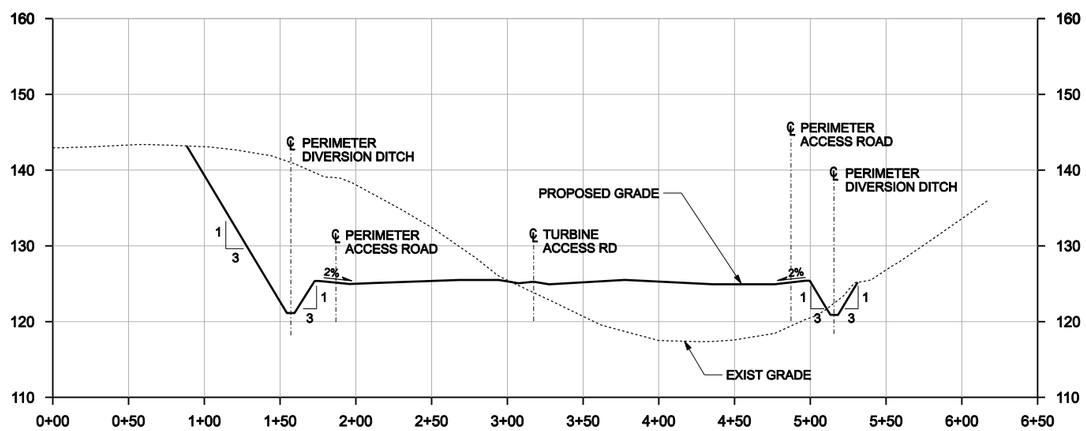
DWG. NO. C-000-W-0-002 REV. D

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: PLOT DATE: PLOT TIME:



SECTION A
SCALE: 1" = 50'
W-0-001



SECTION B
SCALE: 1" = 50'
W-0-001

NO.	DATE	REVISION	BY	CHK
A	2/13/09	ISSUED FOR REVIEW	TC	JP
B	2/26/09	ISSUED FOR REVIEW	TC	TC

REVISION APPROVAL		REV B	DATE 2/26/09
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONT.	
MECHANICAL		ARCH.	
PROCESS		GEN. ARRANG.	
PIPING			

STATUS					
ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY	P1	-			
FOR REVIEW AND APPROVAL	B	2/26/09			
APPROVED FOR CONSTRUCTION	0				
REVISED & APPROVED FOR CONSTRUCTION					

RESPONSIBLE ENGINEER
PE #

SCALE AS SHOWN

Diamond Generating Corporation
A Subsidiary of Mitsubishi Corporation

Kelso CT Project

PROJECT NO. 383206

CH2MHILL
CH2MHILL Engineers

CIVIL
PRELIMINARY
GRADING AND DRAINAGE
SECTIONS

DWG. NO. C-000-H-0-001

REV. B

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME:
PLOT DATE:
PLOT TIME:

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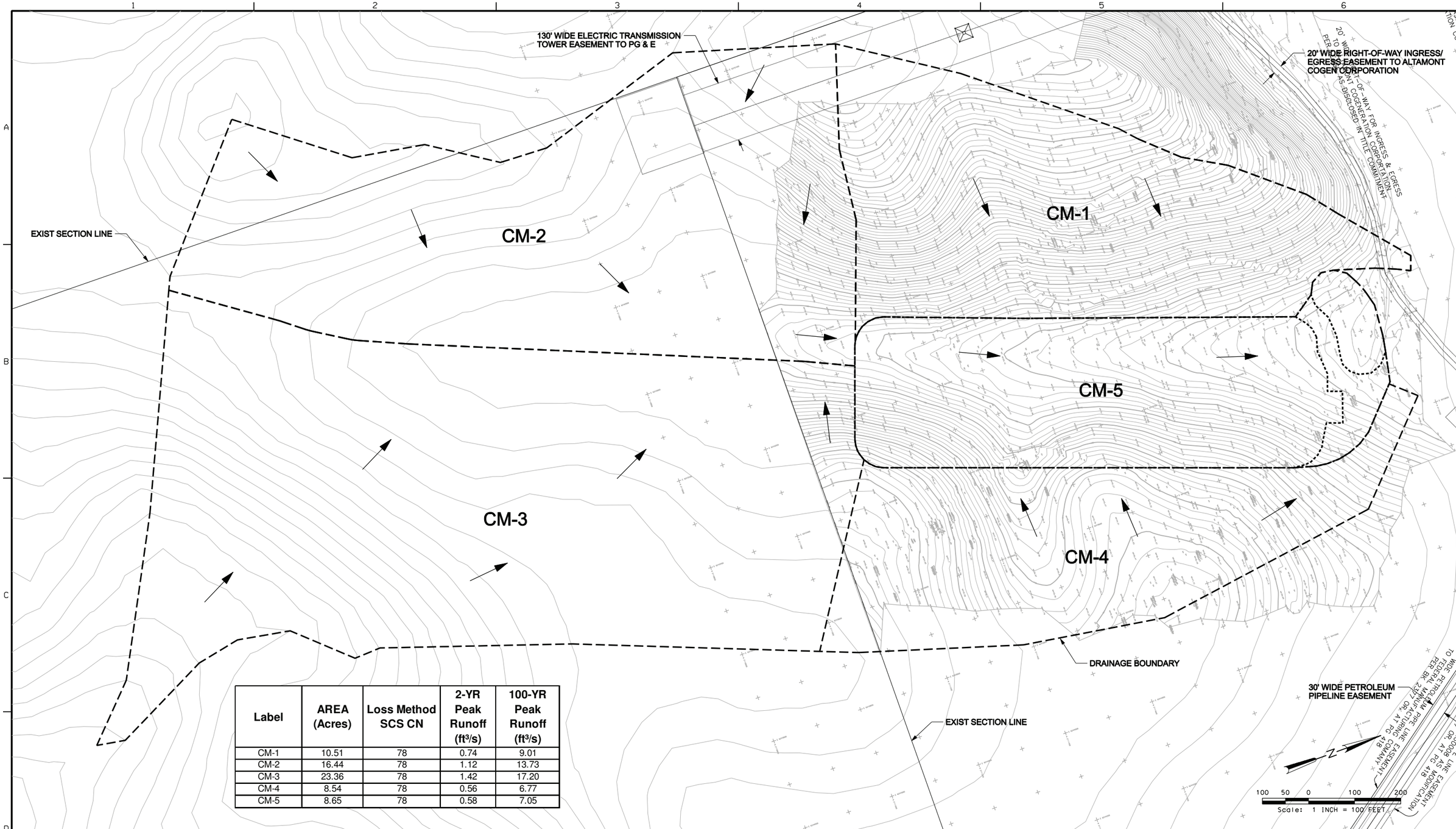

Label	AREA (Acres)	Loss Method SCS CN	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
CM-1	10.51	78	0.74	9.01
CM-2	16.44	78	1.12	13.73
CM-3	23.36	78	1.42	17.20
CM-4	8.54	78	0.56	6.77
CM-5	8.65	78	0.58	7.05

RESPONSIBLE ENGINEER

PE #

NO.	DATE	REVISION	BY	CHK
A	2/13/09	ISSUED FOR REVIEW	TC	JP
B	2/26/09	ISSUED FOR REVIEW	TC	JP

REVISION APPROVAL — REV B — DATE 2/26/09

DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONT.	
MECHANICAL		ARCH.	
PROCESS		GEN. ARRANG.	
PIPING			

STATUS					
ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY	P1	-			
FOR REVIEW AND APPROVAL	B	2/26/09			
APPROVED FOR CONSTRUCTION	0				
REVISED & APPROVED FOR CONSTRUCTION					

SCALE AS SHOWN

Diamond Generating Corporation
A Subsidiary of Mitsubishi Corporation

Kelso CT Project

PROJECT NO. 383206

CH2MHILL
CH2MHILL Engineers

CIVIL
PRE-CONSTRUCTION DRAINAGE CONDITIONS

DWG. NO. C-000-W-0-001 REV. B

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: PLOT DATE: PLOT TIME:

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Attachment C
Soil Loss Estimates

Table 5.11-3. Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

Table 5.11-2. Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

Feature (acreage)[2]	Activity	Duration (months)	Estimates Using Revised Universal Soil Loss Equation[1] Soil Loss (tons) without BMPs	Soil Loss (tons) with BMPs	Soil Loss (tons/yr) No Project
Site (9.7 acres estimated)	Grading	2	16.0	0.02	0.300
	Construction	14	5.2	0.15	---
Site Cut and Fill area (3.59 acres estimated)	Grading	3	13.0	0.17	0.15
	Construction	2	4.1	0.12	---
Site Access Road (1.2 acres estimated)	Grading	1	1.8	0.0	0.058
(1.2 acres exposed; will be paved or gravelled after grading)	Construction	14	0.0	0.0	---
Site Laydown Area (4.6 acres estimated)	Grading	1	1.5	0.0	0.124
	Construction	14	0.0	0.0	---
Site Laydown Area Access Roads (0.44 acres estimated)	Grading	1	0.3	0.0	0.012
	Construction	14	0.0	0.0	---
Transmission Line (5.15 acres for construction; 0.0020 acre	Grading	3	0.0030	0.010	0.00004
for pole footprints)	Construction	6	0.68	0.019	---
Transmission Line Laydown Area (0.6 acres estimated)	Grading	0	0.000	0.000	0.009
	Construction	6	0.000	0.000	---
Water Supply Pipeline (1.38 acres for construction; 0.44 acre	Grading	6	1.806	0.010	0.0112
for trench)	Construction	8	0.458	0.013	---
Water Supply Laydown Area (1.0 acre estimated)	Grading	0	0.000	0.000	0.030
	Construction	8	0.000	0.000	---
Natural Gas Pipeline (0.99 acre for construction; 0.04 acre for	Grading	2	0.05	0.0016	0.00258
trench)	Construction	6	0.17	0.0049	---
Project Soil Loss Estimates	**Construction Period**	**14**	**45.16**	**0.51**	**0.69**

Notes:

1. Soil losses (tons/acre/year) are estimated using RUSLE2 software available online [http://fargo.nserl.purdue.edu/rusle2_dataweb/].
   -The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped NRCS soil unit.
   -Soil loss (R-factors) were estimated using 2-year, 6-hour point precipitation frequency amount for the Mariposa Energy Facility project site found at [http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm].
   -Estimates of actual soil losses use the RUSLE2 soil loss times the duration and the affected area. The No Project Alternative estimate does not have a specific duration so loss is given as tons/year.
2. Acreages assume a 30 ft corridor for the transmission line and 100 ft corridors for the natural gas and water pipeline construction. Trenches for the natural gas and water pipelines are assumed to be 4 ft wide. The transmission line pole holes each have a 4 ft by 4 ft excavation footprint.

Other Project Assumptions as follows:
-It is assumed that 100% of the MEF project site will be exposed during grading, and approximately 10% of the site will be bare soil during construction.
-It is assumed that only the project site, a portion of the project site laydown areas, and project site access roads will be graded; all other areas will be 100% covered, either through natural vegetation or gravelling/paving.
-It is assumed that grading the project site will take 2 months and construction will take a total of 14 months.
-It is assumed that site cut and fill grading will occur over a 3 month period and will take an additional 2 months before permanent vegetation is established
-It is assumed that none of the laydown areas will be graded and that natural cover will be maintained (yielding negligible runoff).
-The overhead transmission line poles will have 4-foot x 4-foot footprints.
-It is assumed that the grading/excavation for the pole holes will be completed within 3 months and the entire installation will be completed within 6 months.
-It is assumed that the natural gas and water supply pipelines will be installed within a 4 ft wide trench and a 100 ft construction corridor.
-It is assumed that the natural gas pipeline will take 4 months to construct and will take another 2 months before permanent cover is established.
-It is assumed that the water supply pipeline will take 6 months to construct and an additional 2 months before permanent cover is established.
-It is assumed that the majority of the water supply pipeline construction will occur within Bruns Rd.
-It is assumed that an on-site septic system will be constructed and a sanitary sewer line will not be constructed.

RUSLE2 Assumptions as follows:
100-ft slope length. Estimated soil unit slope is the midpoint of the minimum and maximum of the unit slope class.
Construction soil losses assume the following inputs: Management - Bare ground; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.
Grading soil losses assume the following inputs: Management - Bare ground/rough surface; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.
Construction with BMP soil losses assume the following inputs: Management - Silt fence; Contouring - Perfect, no row grade; Diversion/terracing - None; Strips and Barriers - 2 fences, 1 at end of RUSLE slope.
No Project soil losses assume the following inputs: Management - Dense grass, not harvested; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.

Soil Type	Acreage		Soil Loss Estimates Using RUSLE2 software (tons/ac/year)			
		Slope	Grading	Construction w/o BMPs	Construction with BMPs	No Project
Project Site						
Sa/Sccc	0.57	4.5	7.8	3.5	0.098	0.026
LaD	1.67	23.0	25.0	12.0	0.34	0.064
AaC	1.67	9.0	7.8	3.7	0.10	0.027
RdB	5.78	5.0	6.4	2.9	0.081	0.023
	0.97	**Subtotal**	**96.20**	**4.50**	**0.13**	**0.30**
Site Cut and Fill Area						
AaC	1.77	9.0	7.8	3.7	0.10	0.027
LaD	1.41	23.0	25.0	12.0	0.34	0.064
RdB	0.25	5.0	6.4	2.9	0.081	0.023
Sa	0.16	4.5	7.8	3.5	0.098	0.026
	3.59	**Subtotal**	**51.90**	**24.75**	**0.69**	**0.15**
Site Access Road						
Sa/Sccc	0.42	4.5	7.8	3.5	0.098	0.026
LaD	0.74	23.0	25.0	12.0	0.34	0.064
	0.00	**Subtotal**	**21.78**	**0.0**	**0.0**	**0.058**
Site Laydown Area						
AaC	**2.30**	9.0	7.8	3.7	0.10	0.027
	4.60	**Subtotal**	**17.9**	**0.0**	**0.0**	**0.124**
Laydown Area Access Rds						
AaC	0.44	9.0	7.8	3.7	0.10	0.027
RdB	0.005	5.0	6.4	2.9	0.081	0.023
	0.00	**Subtotal**	**3.5**	**0.0**	**0.0**	**0.012**
Transmission Line						
Sf/Sfaa	0.0009	2.0	3.6	1.6	0.045	0.015
Sa/Sccc	0.0009	4.5	7.8	3.5	0.098	0.026
AaC	0.0002	9.0	7.8	3.7	0.10	0.027
	0.52	**Subtotal**	**0.012**	**1.369**	**0.038**	**0.00004**
T-Line Laydown						
Sf/Sfaa	0.60	2.0	3.6	1.6	0.045	0.015
	0.00	**Subtotal**	**0.00**	**0.00**	**0.00**	**0.009**
Water Supply Pipeline						
Sf/Sfaa	0.08	2.0	3.6	1.6	0.045	0.015
LaC	0.17	9.0	8.0	3.7	0.10	0.024
LaD	0.03	23.0	25.0	12.0	0.34	0.064
LbDcc/LbD	0.03	10.0	9.3	4.4	0.12	0.028
Sa/Sccc	0.13	4.5	7.8	3.5	0.098	0.026
	0.14	**Subtotal**	**3.61**	**0.69**	**0.02**	**0.011**
Water Supply Laydown						
Sc	1.00	4.5	9.1	4.0	0.11	0.03
	0.00	**Subtotal**	**0.00**	**0.00**	**0.00**	**0.030**
Natural Gas Pipeline						
Sa/Sccc	0.04	4.5	7.8	3.5	0.098	0.026
	0.10	**Subtotal**	**0.31**	**0.35**	**0.01**	**0.003**
Sewer Line						
On-site connection	**0.00**	**Subtotal**	**0.00**	**0.00**	**0.00**	**0.00**

Assumptions:
Assumes slope is the mid-point of the slope class
Assumes no grading at any of the laydown areas or access roads, with the exception of the project site laydown area and access road).

Project site is currently 10% bare soil and would have same proportion during construction.
100% of project site would be bare soil during grading.
100% of pole holes will be bare soil during grading/excavation.
100% of the cut and fill area will be bare soil during grading/excavation

Transmission pole impact area assumes a 4 ft by 4 ft footprint times the number of poles
The No Project soil loss assumes a 'dense grass, not harvested' management scenario.

Project: DGC-Kelso - Jenny Krenz updated 05/08/09 based on e-mail from Mike Haskell

OBJECTID	AREASYMBOL	Length	Shape_Area_SF	Acres	Acreage_tot	
MEP Site	Sa/Sccc			0.57	0.57	Acres from Mike Haskell, 3/19/2009
	LaD			1.67	1.67	Acres from Mike Haskell, 3/19/2009
	AaC			1.67	1.67	Acres from Mike Haskell, 3/19/2009
	RdB			5.78	5.78	Acres from Mike Haskell, 3/19/2009
				9.7	**0.97**	Assumes only 10% of site is bare soil during construction
Cut and Fill area at Site	AaC			1.77	**1.77**	Acres from Mike Haskell, 5/08/09
	LaD			1.41	**1.41**	Acres from Mike Haskell, 5/08/09
	RdB			0.25	**0.25**	Acres from Mike Haskell, 5/08/09
	Sa			0.16	**0.16**	Acres from Mike Haskell, 5/08/09
				3.59	**3.59**	Assumes 100% of the cut and fill area is bare soil during cut and fill construction
Access to Site	Sa/Sccc	454.72	18188.8	0.42	0.42	Assumes 40 foot wide roadway access; Length from Mike Haskell, 3/19/2009
	LaD	806.92	32276.7	0.74	0.74	Assumes 40 foot wide roadway access; Length from Mike Haskell, 3/19/2009
				1.2	**0.00**	Assumes access is completely covered (paved or gravelled) after grading
Site Laydown Area	AaC			4.60	4.60	
				2.30	**0.00**	Assumes 1/2 of the laydown area is graded; Laydown area is completely paved; Email from Doug Urry 3/25/09
Access to Laydown Area	AaC	637.11	19113.2	0.44		Assumes 30 foot wide roadways access; Length from Mike Haskell, 3/19/2009
	RdB	7.04	211.3	0.0049		Assumes 30 foot wide roadways access; Length from Mike Haskell, 3/19/2009
				0.44	**0.00**	Assumes access roads are completely paved after grading; E-mail from Robert Smith/DEN 3/25/09
			# of poles	**Pole Holes**	**Construction Corridor**	
Transmission Line	Sf/Sfaa	1652.76	3	0.0009	**2.324**	Assumes 12 sq ft hole for each pole spaced at 500 ft. Assumes 50 ft construction corridor along length, and 100x100 ft construction corridor at each pole. Length from Mike Haskell, 05/07/09; spacing from Doug Urry, 3/25/09.
	Sa/Sccc	1720.65	3	0.0009	**2.419**	Assumes 12 sq ft hole for each pole spaced at 500 ft. Assumes 50 ft construction corridor along length, and 100x100 ft construction corridor at each pole. Length from Mike Haskell, 05/07/09; spacing from Doug Urry, 3/25/09.
	AaC	289.86	1	0.0002	**0.408**	Assumes 12 sq ft hole for each pole spaced at 500 ft. Assumes 50 ft construction corridor along length, and 100x100 ft construction corridor at each pole. Length from Mike Haskell, 05/07/09; spacing from Doug Urry, 3/25/09.
		subtotal	**7**	**0.0020**	**5.15**	Assumes pole hole footprint unprotected until pole installed
					0.515	Assumes 10% of the corridor is unprotected during construction
T Line Laydown Area	Sf/Sfaa			0.6	0.6	
					0.00	Assumes no grading and laydown area is completely covered (paved or gravelled) during construction
		Trench	**Corridor**	**Trench Acres**	**Construction Corridor Acres**	
Water Supply Pipeline	Sf/Sfaa	1719.26	0	0.08	0.00	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	LaC	3685.39	0	0.17	0.00	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	LaD	579.44	350	0.03	0.24	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	LbDcc	633.55	0	0.03	0.00	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	Sa/Sccc	2898.58	1650	0.13	1.14	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
				0.44	1.38	Assumes trench is 100% exposed during construction
					0.14	Assumes corridor is 10% exposed during construction
Water Supply Laydown Area	Sc				1.0	
					0.00	Assumes laydown area is completely covered (paved or gravelled) during construction
				Trench Acres	**Construction Corridor Acres**	
Natural Gas Supply Pipeline	Sa/Sccc	576.73		0.04	0.99	Assumes 3 ft wide trench & 75 ft wide construction corridor; length from Mike Haskell, 05/07/09; details from Doug Urry, 3/25/09
				0.04	0.99	Assumes trench is 100% exposed during construction
					0.10	Assumes corridor is 10% exposed during construction
Sewer Line	-	0		**0**	**0**	Assumes on-site connection

Table 5.11-4. Estimate of Total Suspended Particulates (TSP) Emitted from Grading and Wind Erosion

Table 5.11-3. Estimate of Total Suspended Particulates (TSP) Emitted from Grading and Wind Erosion				
Emission Source	**Acreage**	**Duration (months)**	**Unmitigated TSP (tons)**	**Mitigated TSP (tons)**
Grading Dust:				
Project Site	9.69	2	0.333	0.117
Site Cut and Fill Area	3.59	3	0.185	0.065
Project Site Access Road	1.16	1	0.020	0.007
Project Site Laydown Area	2.30	1	0.040	0.014
Project Site Laydown Area Access Road	0.44	1	0.008	0.003
Transmission Line Pole Holes	0.0020	3	0.00010	0.00004
Transmission Line Laydown Area	0.60	0	0.000	0.000
Water Supply Line Trench	0.44	6	0.045	0.016
Water Supply Line Laydown Area	1.00	0	0.000	0.000
Natural Gas Pipeline Trench	0.04	2	0.00137	0.00048
Wind Blown Dust:				
Project Site	0.97	12	0.368	0.129
Site Cut and Fill Area	3.59	2	0.227	0.080
Project Site Access Road	0.00	14	0.000	0.000
Project Site Laydown Area	0.00	14	0.000	0.000
Project Site Laydown Area Access Road	0.00	14	0.000	0.000
Transmission Line Pole Holes	0.002018	6	0.00038	0.00013
Transmission Line Laydown Area	0.00	6	0.000	0.000
Water Supply Line Corridor	0.14	8	0.035	0.012
Water Supply Line Laydown Area	0.00	8	0.000	0.000
Natural Gas Pipeline Corridor	0.0993	6	0.0189	0.0066
Estimated Total		14	1.281	0.448

Notes:
All linear feature impacts noted above are for portions outside of the project areas footprints.

Project Assumptions:
Grading for project site will be completed in a 2 month period and construction will extend an additional 12 months.
Approximately 1/10th of the project site will have bare soil exposure during the length of the construction period.
None of the laydown areas (except a portion of the project site laydown area) will be graded. It is expected that all roadway and laydown areas would be covered (gravelled or paved) for all season use.
Excavation of transmission line pole holes will take 3 months followed by a 3 month construction period.
The transmission poles will have a 4 by 4 foot area for a total impact permanent area of 0.0075 acre.
The natural gas line and water supply line will be installed in a 4-ft trench with a 100-ft construction corridor.
The natural gas and water supply trenches will be 100% exposed during the excavation period, with permenant vegetation restored after installation.
The 100 ft construction corridors will remain in natural vegetation, with approximately 10% bare soil exposed
It is assumed grading activities will be limited to the project site and the project site access road.

Data Sources:
[a] PM10 Emission Factor Source: Midwest Research Institute, South Coast AQMD Project No. 95040, Level 2 Analysis Procedure, March 1996
[b] PM10 to TSP Conversion Factor Source: Bay Area Air Quality Management District CEQA Guidelines, Assessing the Air Quality Impacts of Projects, December 1999.
SCAQMD CEQA Handbook (1993) Table 11-4 for mitigation efficiency rates (as summarized in Table 8.9-4)

Project: Mariposa Energy Facility JLK 5/08/09

Dust from Wind Erosion - With and Without Mitigation

Grading		MRI factor of 0.011 tons/acre/month is based on 168 hours per month of construction activity.
PM10 Emission Factor (ton/acre/month)[a]	0.011	Fact Sheet, 4/26/2007.
Project Site		
Duration (months):	2	Assumes 2 months of active grading.
Site Acreage:	9.69	Assumes 100% of site is graded
PM10 Emitted (tons):	0.21	
TSP Emitted (tons)[b]:	**0.333**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.117**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Site Cut and Fill Area		
Duration (months):	3	Assumes 3 months of active grading
Site Acreage:	3.59	Assumes 100% of area will be graded
PM10 Emitted (tons):	0.12	
TSP Emitted (tons)[b]:	**0.185**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.065**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Access Road		
Duration (months):	1	Assumes one month to grade
Site Acreage:	1.16	Assumes 100% of access road is graded
PM10 Emitted (tons):	0.01	
TSP Emitted (tons)[b]:	**0.020**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.007**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area		
Duration (months):	1	Assumes project site laydown area will be partially graded (1/2 estimated).
Site Acreage:	2.30	
PM10 Emitted (tons):	0.03	
TSP Emitted (tons)[b]:	**0.040**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.014**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area Access Road		
Duration (months):	1	Assumes project site laydown access road will be graded.
Site Acreage:	0.44	
PM10 Emitted (tons):	0.00	
TSP Emitted (tons)[b]:	**0.008**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.003**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Pole Holes		
Duration (months):	3	Assumes 3 months to grade
Site Acreage:	0.0020	
PM10 Emitted (tons):	0.0001	
TSP Emitted (tons)[b]:	**0.0001**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Laydown Area		
Duration (months):	0	Assumes transmission line laydown area WILL NOT be graded.
Site Acreage:	0.60	
PM10 Emitted (tons):	0.00	
TSP Emitted (tons)[b]:	**0.000**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Trench		
Duration (months):	6	Assumes 4 months to grade pipeline
Site Acreage:	0.437	
PM10 Emitted (tons):	0.0288	
TSP Emitted (tons)[b]:	**0.0451**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0158**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Laydown Area		
Duration (months):	0	Assumes water supply line laydown area WILL NOT be graded.
Site Acreage:	1.00	
PM10 Emitted (tons):	0.0000	
TSP Emitted (tons)[b]:	**0.0000**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Natural Gas Pipeline Trench		
Duration (months):	2	Assumes 2 months to grade pipeline
Site Acreage:	0.040	
PM10 Emitted (tons):	0.0009	
TSP Emitted (tons)[b]:	**0.0014**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0005**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Sanitary Sewer Line		
Duration (months):	0	Assumes on-site connection
Site Acreage:	0.000	
PM10 Emitted (tons):	0.0000	
TSP Emitted (tons)[b]:	**0.0000**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Total Unmitigated TSP Emitted (tons):	**0.632**	
Total Mitigated TSP Emitted (tons):	**0.221**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4

[a]Emission Factor Source: Midwest Research Institute, South Coast AQMD Project No. 95040, March 1996, Level 2 Analysis Procedure

[b] Conversion Factor Source: Bay Area Air Quality Management District (BAAQMD) BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans. December 1999

Wind Blown Dust		
TSP Emission Factor (ton/acre/year)	0.38	Emission Factor Source: AP-42, Section 11.9 Western Surface Coal Mining Table 11.9-4, January 1995.
Project Site		
Acres exposed	0.97	Assumes that only 10% of the project area is exposed during construction
Duration (months)	12	Assumes 12 months of construction after grading
TSP Emitted for Site (tons):	**0.368**	
Mitigated TSP Emitted (tons):	**0.129**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Site Cut and Fill Area		
Duration (months):	2.00	Assumes it will take 2 months for revegetation
Site Acreage:	3.59	100% of the cut and fill area will be disturbed
PM10 Emitted (tons):	**0.227**	
TSP Emitted (tons)[b]:	**0.080**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Access Road		
Acres exposed	0.00	Assumes project site access road is completely covered with gravel or other material after grading
Duration (months)	14	Assumes 14 months of construction traffic
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area		
Acres exposed	0.00	Assumes project site laydown area is completely covered (natural veg, gravelled or paved) during construction
Duration (months)	14	Assumes 14 months of construction traffic
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area Access Road		
Acres exposed	0.00	Assumes project site laydown access road is completely covered (natural veg, gravelled or paved) during construction
Duration (months):	14	Assumes 14 months of construction traffic
TSP Emitted (tons)[b]:	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Pole Footprints		
Acres exposed	0.0020	Assumes pole holes are unprotected until pole installed
Duration (months)	6	Assumes 6 months of excavation & installation
TSP Emitted for Site (tons):	**0.00038**	
Mitigated TSP Emitted (tons):	**0.000134**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Laydown Area		
Acres exposed	0.000	Assumes transmission line laydown area is completely covered (natural veg, gravelled or paved) during construction
Duration (months):	6	Assumes 6 months of construction
TSP Emitted (tons)[b]:	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Corridor		
Acres exposed	0.138	Assumes corridor is 10% exposed during construction
Duration (months):	8	Assumes 8 months of construction
TSP Emitted (tons)[b]:	**0.035**	
Mitigated TSP Emitted (tons):	**0.012**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Laydown Area		
Acres exposed	0.000	Assumes water supply line laydown area is completely covered (natural veg, gravelled or paved) during construction
Duration (months)	8	Assumes 8 months of construction
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Natural Gas Pipeline Corridor		
Acres exposed	0.099	Assumes corridor is 10% exposed during construction
Duration (months)	6	Assumes 6 months of construction
TSP Emitted for Site (tons):	**0.019**	
Mitigated TSP Emitted (tons):	**0.007**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Sanitary Sewer Line		
Acres exposed	0.000	Assumes on-site construction
Duration (months)	0	
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Total Wind Blown Dust (tons) without mitiga	**0.650**	
Total WBD (tons) with mitigation	**0.227**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project total without mitigation	**1.281**	
Project total with mitigation	**0.448**	

Attachment D
Risk Determination Worksheet

Sediment Risk Factor Worksheet

Affected Map Units (MUs)

MUs	R	K	L	S	LS	**R*K*LS in tons/acre**
AaC	16	0.20	100	9	1.28	4.096
LaC	16	0.20	100	9	1.28	4.096
LaD	16	0.20	100	22.5	3.57	11.424
LbDcc/LbD	16	0.20	100	10	1.46	4.672
RdB	16	0.28	100	5	0.68	3.0464
Sa	16	0.37	100	1	0.15	0.888
Sccc	16	0.43	100	1	0.15	1.032
Sf/Sfaa	16	0.37	100	1	0.15	0.888

Attachment E
SMP Consideration Checklist

Attachment E

BMP Consideration Checklist

CONSTRUCTION SITE BMPs CONSIDERATION CHECKLIST					
The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.					
EROSION CONTROL BMPs					
BMP No.	**BMP**	**CONSIDERED FOR PROJECT**	**CHECK IF USED**	**CHECK IF NOT USED**	**IF NOT USED, STATE REASON**
EC-1	Scheduling				
EC-2	Preservation of Existing Vegetation				
EC-3	Hydraulic Mulch				
EC-4	Hydroseeding				
EC-5	Soil Binders				
EC-6	Straw Mulch				
EC-7	Geotextiles & Mats				
EC-8	Wood Mulching				
EC-9	Earth Dikes & Drainage Swales				
EC-10	Velocity Dissipation Devices				
EC-11	Slope Drains				
EC-12	Streambank Stabilization				
EC-13	Polyacrylamide				

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

BMP No.	BMP	CONSIDERED FOR PROJECT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SEDIMENT CONTROL BMPs					
SE-1	Silt Fence				
SE-2	Sediment Basin				
SE-3	Sediment Trap				
SE-4	Check Dam				
SE-5	Fiber Rolls				
SE-6	Gravel Bag Berm				
SE-7	Street Sweeping and Vacuuming				
SE-8	Sand Bag Barrier				
SE-9	Straw Bale Barrier				
SE-10	Storm Drain Inlet Protection				
SE-11	Chemical Treatment				
WIND EROSION CONTROL BMPs					
WE-1	Wind Erosion Control				
TRACKING CONTROL BMPs					
TR-1	Stabilized Construction Entrance/Exit				
TR-2	Stabilized Construction Roadway				
TR-3	Entrance/Outlet Tire Wash				

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

NON-STORM WATER MANAGEMENT BMPs

BMP No.	BMP	CONSIDERED FOR PROJECT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
NS-1	Water Conservation Practices				
NS-2	Dewatering Operations				
NS-3	Paving and Grinding Operations				
NS-4	Temporary Stream Crossing				
NS-5	Clear Water Diversion				
NS-6	Illicit Connection/ Discharge				
NS-7	Potable Water/Irrigation				
NS-8	Vehicle and Equipment Cleaning				
NS-9	Vehicle and Equipment Fueling				
NS-10	Vehicle and Equipment Maintenance				
NS-11	Pile Driving Operations				
NS-12	Concrete Curing				
NS-13	Concrete Finishing				
NS-14	Material and Equipment Use Over Water				
NS-15	Demolition Adjacent to Water				
NS-16	Temporary Batch Plants				

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs

BMP No.	BMP	CONSIDERED FOR PROJECT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
WM-1	Material Delivery and Storage				
WM-2	Material Use				
WM-3	Stockpile Management				
WM-4	Spill Prevention and Control				
WM-5	Solid Waste Management				
WM-6	Hazardous Waste Management				
WM-7	Contaminated Soil Management				
WM-8	Concrete Waste Management				
WM-9	Sanitary/Septic Waste Management				
WM-10	Liquid Waste Management				

Attachment F
BMP Fact Sheets

ATTACHMENT F

BMP Fact Sheets

The CASQA Handbook BMP Fact Sheets will be included in the final project SWPPP. These fact sheets can be provided for Staff review upon request.

Attachment G
Water Pollution Control Cost Breakdown

Attachment G

Water Pollution Control Cost Breakdown

Project Name: _____

Project Number: _____

ITEM	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	VALUE	AMOUNT
EC-3	Hydraulic Mulch	FT^2			
EC-4	Hydroseeding	FT^2			
EC-5	Soil Binders	FT^2			
EC-6	Straw Mulch	FT^2			
EC-7	Geotextiles & Mats	FT^2			
EC-8	Wood Mulching	FT^2			
EC-9	Earth Dikes & Drainage Swales	FT			
EC-10	Velocity Dissipation Devices	EA			
EC-11	Slope Drains	EA			
EC-12	Streambank Protection	LS			
EC-13	Polyacrylamide	LS			
SE-1	Silt Fence	FT			
SE-2	Sediment Basin	EA			
SE-3	Sediment Trap	EA			
SE-4	Check Dam	EA			
SE-5	Fiber Rolls	FT			
SE-6	Gravel Bag Berm	FT			
SE-7	Street Sweeping and Vacuuming	LS			
SE-8	Sandbag Barrier	FT			
SE-9	Straw Bale Barrier	FT			
SE-10	Storm Drain Inlet Protection	EA			
WE-1	Wind Erosion Control	LS			
TC-1	Stabilized Construction Entrance/Exit	EA			
TC-2	Stabilized Construction Roadway	EA			

ITEM	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	VALUE	AMOUNT
TC-3	Entrance/Outlet Tire Wash	EA			
NS-1	Water Conservation Practices	LS			
NS-2	Dewatering Operations	EA			
NS-3	Paving and Grinding Operations	LS			
NS-4	Temporary Stream Crossing	EA			
NS-5	Clear Water Diversion	EA			
NS-6	Illicit Connection/ Discharge	LS			
NS-7	Potable Water/Irrigation	LS			
NS-8	Vehicle and Equipment Cleaning	LS			
NS-9	Vehicle and Equipment Fueling	LS			
NS-10	Vehicle and Equipment Maintenance	LS			
NS-11	Pile Driving Operations	LS			
NS-12	Concrete Curing	LS			
NS-13	Material and Equipment Use Over Water	LS			
NS-14	Concrete Finishing	LS			
NS-15	Demolition Adjacent to Water	LS			
NS-16	Temporary Batch Plants	LS			
WM-1	Material Delivery and Storage	LS			
WM-2	Material Use	LS			
WM-3	Stockpile Management	LS			
WM-4	Spill Prevention and Control	LS			
WM-5	Solid Waste Management	LS			
WM-6	Hazardous Waste Management	LS			
WM-7	Contaminated Soil Management	LS			
WM-8	Concrete Waste Management	LS			
WM-9	Sanitary/Septic Waste Management	LS			
WM-10	Liquid Waste Management	LS			
			TOTAL		

Attachment H
Trained Contractor Personnel Log

Attachment H

Trained Contractor Personnel Log

Storm Water Management Training Log

Project Name: _____

Project Number/Location: _____

Storm Water Management Topic: (check as appropriate)

- ❑ Erosion Control
- ❑ Sediment Control
- ❑ Wind Erosion Control
- ❑ Tracking Control
- ❑ Non-storm water management
- ❑ Waste Management and Materials Pollution Control
- ❑ Storm Water Sampling

Specific Training Objective: _____

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours): _____

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

Name	Company	Phone

COMMENTS:

Attachment I
Subcontractor Notification Letter and Log

Attachment I

Subcontractor Notification Letter and Notification Log

SWPPP Notification

Company
Address
City, State, ZIP

Dear Sir/Madam,

Please be advised that the California State Water Resources Control Board has adopted the General Permit (General Permit) for Storm Water Discharges Associated with Construction Activity (CAS000002). The goal of these permits is prevent the discharge of pollutants associated with construction activity from entering the storm drain system, ground and surface waters.

[Owner] has developed a Storm Water Pollution Prevention Plan (SWPPP) in order to implement the requirements of the Permits.

As a subcontractor, you are required to comply with the SWPPP and the Permits for any work that you perform on site. Any person or group who violates any condition of the Permits may be subject to substantial penalties in accordance with state and federal law. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP and the Permits. A copy of the Permits and the SWPPP are available for your review at the construction office. Please contact me if you have further questions.

Sincerely,

Name
Title

SUBCONTRACTOR NOTIFICATION LOG

Project Name: _____

Project Number/Location: _____

SUBCONTRACTOR COMPANY NAME	CONTACT NAME	ADDRESS	PHONE NUMBER	PAGER/ FIELD PHONE	DATE NOTIFICATION LETTER SENT	TYPE OF WORK

USE ADDITIONAL PAGES AS NECESSARY

Attachment J
Other Plans and Permits

ATTACHMENT J

Other Plans and Permits

The NPDES Permit, and others as applicable, will be included in the final project SWPPP. The NPDES Permit can be provided for Staff review upon request.

Attachment K
Site Inspection Checklists

Attachment K

Storm Water Quality Construction Site Inspection Checklist

GENERAL INFORMATION				
Project Name				
Project N^{o}				
Contractor				
Inspector's Name				
Inspector's Title				
Signature				
Date of Inspection				
Inspection Type (Check Applicable)	❒ Prior to forecast rain ❒ 24-hr intervals during extended rain		❒ After a rain event ❒ Other _____	
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (inches)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE		
Total Project Area	_____	Acres
Field Estimate of Active DSAs	_____	Acres
Field Estimate of Non-Active DSAs	_____	Acres

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				
Erosion Control				
Does the applied temporary erosion control provide 100% coverage for the affected areas?				
Are any non-vegetated areas that may require temporary erosion control?				
Is the area where erosion controls are used required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Temporary Linear Sediment Barriers (Silt Fence, Fiber Rolls, Sandbag Barriers, etc.)				
Are temporary linear sediment barriers properly installed, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Location:				
Location:				
Location:				
Location:				
Location:				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				
Sediment Basins				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Are basins designed in accordance with the requirements of the General Permit?				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				
Location:				
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, run-off from adjacent areas and from winds?				
Are stockpiles located at least 15 m from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				
Location:				
Location:				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Is the entrance stabilized to prevent tracking				
Is the stabilized entrance inspected daily to ensure that it is working properly				
Are points of ingress/egress to public/private roads inspected and swept and vacuumed as needed?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Location:				
Location:				
Location:				
Location:				
Wind Erosion Control				
Is dust control implemented?				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Location:				
Location:				
Location:				
Location:				
Dewatering Operations				
Are all one-time dewatering operations covered by the General Permit inspected before and as they occur and BMPs implemented as necessary during discharge?				
Is ground water dewatering handled in conformance with the dewatering permit issued by the RWQCB?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of appropriately?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 15 m from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
Temporary Water Body Crossing or Encroachment				
Are temporary water body crossings and encroachments constructed appropriately?				
Does the project conform to the requirements of the 404 permit and/or 1601agreement?				
Location:				
Location:				
Location:				
Location:				
Illicit Connection/ Discharge				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Owner/Operator been notified?				
Location:				
Location:				
Location:				
Location:				
Discharge Points				
Are discharge points and discharge flows free from visible pollutants?				
Are discharge points free of any significant sediment transport?				
Location:				
Location:				
Location:				
Location:				
SWPPP Update				
Does the SWPPP and Project Schedule adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the water pollution control drawings installed in the proper location(s) and according to the details in the SWPPP?				
Location:				
Location:				
Location:				
Location:				
General				
Are there any other potential concerns at the site?				
Location:				
Location:				
Location:				
Location:				
Storm Water Monitoring				
Does storm water discharge directly to a water body listed in the General Permit as impaired for sediment/sedimentation or turbidity?				
If yes, were samples for sediment/sedimentation or turbidity collected pursuant to the sampling and analysis plan in the SWPPP?				
Did the sampling results indicate that the discharges are causing or contributing to further impairment?				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
If yes, were the erosion/sediment control BMPs improved or maintained to reduce the discharge of sediment to the water body?				
Were there any BMPs not properly implemented or breaches, malfunctions, leakages or spills observed which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
If sampling indicated pollution of the storm water, were the leaks, breaches, spills, etc. cleaned up and the contaminated soil properly disposed of?				
Were the BMPs maintained or replaced?				
Were soil amendments (e.g., gypsum, lime) used on the project?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				
If sampling indicated pollution of the storm water by the use of the soil amendments, is there a contingency plan for retention onsite of the polluted storm water?				
Did storm water contact stored materials or waste and run off the construction site? (Materials not in watertight containers, etc.)				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				

Attachment L
Program for Maintenance, Inspection, and Repair Program of BMPs

Attachment L

Program for Maintenance, Inspection, and Repair of Construction Site BMPs

The contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
TEMPORARY EROSION CONTROL BMPs		
		■ ■ ■
		■ ■ ■
TEMPORARY SEDIMENT CONTROL BMPs		
		■ ■ ■ ■ ■ ■
		■ ■
		■ ■ ■ ■ ■ ■
WIND EROSION CONTROL BMPs		
		■
TRACKING CONTROL BMPs		
		■ ■ ■

The contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
NON-STORM WATER MANAGEMENT BMPs		
		■ ■ ■ ■ ■ ■ ■
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs		
		■ ■ ■ ■ ■ ■ ■
		■

Attachment M
Sample Activity Log

Attachment M

Sampling Activity Log

RAIN EVENT GENERAL INFORMATION				
Project Name				
Project Number				
Contractor				
Sampler's Name				
Signature				
Date of Sampling				
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (inches)	

For rainfall information: http://cdec.water.ca.gov/weather.html or http://www.wrh.noaa.gov/wrhq/nwspage.html

SAMPLE LOG		
Sample Identification	**Sample Location**	**Sample Collection Date and Time**

Specific sample locations descriptions may include: 100 ft upstream from discharge at eastern boundary, runoff from northern waste storage area, downgradient of inlet located near the intersection of A Street and B avenue, etc.

FIELD ANALYSIS		
❑Yes	❑ No	
Sample Identification	**Test**	**Result**

Attachment N
Notice of Non-Compliance Form

Attachment N

Notice of Non-Compliance

To: Date:

Subject: Notice of Non-Compliance

Project Name: _____

Project Number/Location: _____

In accordance with the NPDES Statewide Permit for Storm Water Discharges Associated with Construction Activity, the following instance of discharge is noted:

Date, time, and location of discharge

Nature of the operation that caused the discharge

Initial assessment of any impact cause by the discharge

Existing BMP(s) in place prior to discharge event

Date of deployment and type of BMPs deployed after the discharge.

Steps taken or planned to reduce, eliminate and/or prevent recurrence of the discharge

Implementation and maintenance schedule for any affected BMPs

If further information or a modification to the above schedule is required, notify the contact person below.

Name of Contact Person	Title
Company	Telephone Number
Signature	Date

Attachment O
Discharge Reporting Log

Attachment O

Discharge Reporting Log

Project Name: _____

Project Number: _____

Date	Material(s) Discharged	Estimated Quantity	Observed By

Attachment DR68-1
Draft DESCP

Draft Drainage, Erosion, and Sedimentation Control Plan for the Mariposa Energy Project

Draft

Prepared for

Mariposa Energy, LLC

November 2009

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

Draft Drainage, Erosion, and Sedimentation Control Plan for the Mariposa Energy Project

Draft

Submitted to

Mariposa Energy, LLC

November 2009

CH2MHILL

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Draft

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D CASQA Handbook BMP Factsheets

Draft

Acronyms and Abbreviations

BMP	best management practice
BBID	Byron Bethany Irrigation District
BO	Biological Opinion
BRMIMP	Biological Resources Mitigation Implementation Monitoring Plan
cfs	cubic feet per second
DESCP	Drainage, Erosion, and Sedimentation Control Plan
DTSC	Department of Toxic Substances Control
GE	General Electric
kV	kilovolt(s)
Mariposa Energy	Mariposa Energy, LLC
MEP	Mariposa Energy Project
MSDS	material safety data sheet
MW	megawatt(s)
OES	Office of Emergency Services
PG&E	Pacific Gas and Electric Company
RUSLE2	Revised Universal Soil Loss Equation
RWQCB	Regional Water Quality Control Board
SWPPP	Stormwater Pollution Prevention Plan
TBD	to be determined
TSP	total suspended particulates
USFWS	U.S. Fish and Wildlife Service
yd^3	cubic yard(s)

Draft

Mariposa Energy Project
Drainage, Erosion, and Sedimentation Control Plan

Mariposa Energy, LLC (Mariposa Energy) proposes to construct, own, and operate an electrical generating plant in Alameda County, California. The Mariposa Energy Project (MEP or project) will be a natural gas-fired, simple-cycle electrical generating facility rated at a nominal generating capacity of 200 megawatts (MW).The facility will be located southeast of the intersection of Bruns Road and Kelso Road on a 10-acre portion of a 158-acre parcel immediately south of the Pacific Gas and Electric Company (PG&E) Bethany Compressor Station and 230-kilovolt (kV) Kelso Substation. The proposed power plant site is located in the southern portion of the 158-acre parcel, between two small hills. The site is located approximately 7 miles northwest of Tracy, 7 miles east of Livermore, 6 miles south of Byron, and approximately 2.5 miles west of the community of Mountain House in San Joaquin County. Figure 1 shows the location of the project within Alameda County. Figure 2 shows the site location (all figures are provided in Appendix A).

The MEP construction laydown and parking area will be located east of the project site, and will be approximately 5 acres. Two access roads (one to the north and one to the south) will be used to move between the project site and the laydown area. Additionally, the current access road between the project site and Bruns Road will be upgraded. Natural gas and electric transmission interconnections will be less than 0.5 mile from the proposed project site. The new gas line will run approximately 580 feet northeast on the property to the point of interconnection with PG&E's high pressure gas line. The 0.7-mile electrical transmission line connection would run north, across Kelso Road to the Kelso Substation. A small laydown area (0.6 acre) just north of Kelso Road will be used during construction of the electrical transmission line. MEP service water will be provided via a new pipeline connection to the Byron Bethany Irrigation District (BBID) canal placed within and along the east side of Bruns Road. Another laydown area (1.0 acre) near the corner of Bruns Road and Bethany Lane will be utilized during the construction of the new water supply pipeline.

The project will have the following design features:

- Four General Electric (GE) LM6000 PC Sprint combustion turbine generators and associated support equipment
- Air emissions control systems including selective catalytic reduction systems for nitrogen oxides control and oxidation catalyst for carbon monoxide control
- A new approximately 0.7-mile-long, 230-kV transmission line to deliver the plant output to the electrical grid via the existing 230-kV Kelso Substation located north of the project site
- Approximately 580 feet of new 4-inch-diameter natural gas pipeline that will run directly northeast from the project site to interconnect with PG&E's existing high-pressure natural gas pipeline

Draft

- A new 6-inch-diameter, 1.8-mile water supply line from BBID Canal 45
- The existing, unrelated 6.5-MW Byron Power Cogen Plant occupies 2 acres of the 158-acre parcel northeast of MEP. The remainder of the parcel is non-irrigated grazing land. There was a prior wind turbine development on the project site and the southern portion of the parcel. Minor debris from that wind development remains on site.

Mariposa Energy has prepared this Drainage, Erosion, and Sedimentation Control Plan (DESCP) for the MEP to demonstrate that construction activities associated with the project will not result in an increase in offsite flooding potential or sedimentation and that the project will meet all local, state, and federal regulatory requirements associated with the protection of water quality and soil resources. The DESCP includes the following elements:

- A vicinity map showing the location of all project elements with depictions of all significant geographic features including swales, storm drains, and sensitive areas
- A detailed site delineation that includes the boundary lines of all areas subject to disturbance and the location of existing and project structures, pipelines, roads, and drainage facilities will be provided in a future DESCP update
- Watercourses and critical areas including water courses, critical areas, and existing/project drainage systems
- Site map showing existing site drainage; maps depicting interim and project drainage systems to protect the site and downstream facilities, and drainage area boundaries will be provided in a future DESCP update
- Preliminary narrative of the project site drainage including appropriate measures to be taken to protect the site and downstream facilities; preliminary hydrology calculations are provided in Appendix C.
- Preliminary Grading and Drainage Plan discharging to an onsite extended detention basin
- Clearing and grading plans including delineation of all areas to be cleared of vegetation and areas to be preserved will be provided in a future DESCP update; the plans will provide contours and cross sections, elevations, slopes, locations, and the extent of all project grading.
- The location of Best Managements Practices (BMPs) to be implemented during construction will be identified on a topographic site map and provided in a future DESCP update.

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A. Vicinity Map

The project site is in an unincorporated area of northeastern Alameda County. The Assessor's parcel number is 099B-7050-001-10. The site is located in Township 2S, Range 3E, Section 1 (Mount Diablo Base and Meridian). Access is via an access road that runs east from Bruns Road to the MEP site, within the project parcel. The 6.5-MW Byron Power Cogen Plant currently occupies 2 acres of the 158-acre parcel. The remainder of the parcel is

non-irrigated grazing land. There was prior wind turbine development on the project site and the southern portion of the parcel. Minor debris from that development remains on site.

Project features are identified on Figure 2, including the power plant site, natural gas pipeline routes, electrical transmission lines, water supply lines, and the construction laydown and parking area.

B. Site Delineation

Figure 2 shows the project features and associated areas subject to soil disturbance. Figure 3 shows the limits of grading at the plant site. Figure 4 shows general pre-construction drainage at the plant site, and Figure 5 shows post-construction drainage. Boundary lines of all construction areas, including the construction laydown and parking area and linear facilities, will be further defined in the final design phase of the project and the DESCP will be updated accordingly.

Activities such as grading can potentially increase rates of erosion during construction. In addition, construction materials could contaminate runoff or groundwater if not properly stored and used. The National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity (General Permit; Water Quality Order 99-08-DWQ) requires construction projects 1 acre or greater to develop a Stormwater Pollution Prevention Plan (SWPPP) to identify potential pollutant sources that may affect the quality of discharges associated with construction activity, to identify non-stormwater discharges, and to design the use and placement of BMPs to effectively prohibit the entry of pollutants from the construction site into waterways during construction. A SWPPP will be prepared in accordance with National Pollutant Discharge Elimination System requirements. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to the DESCP and SWPPP will minimize the potential for offsite migration of sediment and other pollutants to the maximum extent practicable.

The factors that have the largest effect on soil loss include steep slopes, lack of vegetation, and erodible soils composed of large proportions of fine sands. The soils found in the MEP area are rolling, and range from 0 to 30 percent slopes, according to the soil survey (USDA-NRCS, 2008a, USDA-NRCS, 2008b). The area is vegetated with pasture grasses. Soil textures throughout the project area are medium to fine grained with textures ranging from fine sandy loam to clay (USDA-NRCS, 2008a, USDA-NRCS, 2008b). The erosion potential of these soils will vary based on the wetness of the soil, soil compaction, sizes of soil particles, and other site-specific properties. Because of the sloping nature of the property, soils in the project area are expected to have a high water erosion potential and moderate wind erosion potential for the following reasons:

- Much of the area is sloping; the project site and its associated laydown area are in soil units with 3 to 15 percent slope. Although these units are vegetated, disruption during construction could result in increased erosion.
- The loamy and fine sandy surface materials have the potential to be readily transported by wind.
- Although the site is rolling, very little other development exists nearby to slow ground-level winds. These winds could lead to excessive wind erosion if soils are exposed.

An estimate of soil loss during construction by water erosion was developed using the Revised Universal Soil Loss Equation (RUSLE2), and is summarized in Table 1. Detailed calculations for the soil loss estimates, including assumptions and conditions, are found in Appendix B.

TABLE 1
Estimate of Soil Loss by Water Erosion Using RUSLE2

			Estimates Using RUSLE2[a]		
Feature (acreage)[b]	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/year) No Project**
Site (9.7 acres estimated)	Grading	2	16.0	0.02	0.300
	Construction	14	5.2	0.15	—
Site cut and fill area (3.59 acres estimated)	Grading	3	13.0	0.17	0.15
	Construction	2	4.1	0.12	
Site access road (1.2 acres estimated) (1.2 acres exposed; will be paved or graveled after grading)	Grading	1	1.8	0.0	0.058
	Construction	14	0.0	0.0	—
Site laydown area (4.6 acres estimated)	Grading	1	1.5	0.0	0.124
	Construction	14	0.0	0.0	—
Site laydown area access roads (0.44 acre estimated)	Grading	1	0.3	0.0	0.012
	Construction	14	0.0	0.0	—
Transmission line (5.15 acres for construction; 0.0020 acre for pole footprints)	Grading	3	0.003	0.010	0.00004
	Construction	6	0.68	0.019	—
Transmission line laydown area (0.6 acre estimated)	Grading	0	0.000	0.000	0.009
	Construction	6	0.000	0.000	—
Water supply pipeline (1.38 acres for construction; 0.44 acre for trench)	Grading	6	1.806	0.010	0.0112
	Construction	8	0.458	0.013	—
Water supply laydown area (1.0 acre estimated)	Grading	0	0.000	0.000	0.030
	Construction	8	0.000	0.000	—
Natural gas pipeline (0.99 acre for construction; 0.04 acre for trench)	Grading	2	0.05	0.0016	0.00258
	Construction	6	0.17	0.0049	—
Project soil loss estimates	**All activities**	**14**	**45.16**	**0.51**	**0.69**

[a] Soil losses (tons/acre/year) are estimated using RUSLE2 software available online (http://fargo.nserl.purdue.edu/rusle2_dataweb/) as the RUSLE2 soil loss times the duration and the affected area. The No Project Alternative estimate does not have a specific duration, so loss is given as tons/year.

- The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit.
- Soil loss (R-factors) was estimated using 2-year, 6-hour point precipitation frequency amount for the MEP site found at http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm.

[b] Acreages assume a 30-foot corridor for the transmission line and 100-foot corridors for the natural gas and water pipeline construction. Trenches for the natural gas and water pipelines are assumed to be 4 feet wide. The transmission line pole holes each have a 4-foot by 4-foot excavation footprint.

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With the implementation of appropriate BMPs outlined in the SWPPP, the total project soil loss is estimated to be 0.51 ton. This amount is considered to be minimal.

The potential for wind erosion of surface soil was estimated by calculating the total suspended particulates (TSP) that could be emitted as a result of grading and the wind erosion of exposed soil; reference Appendix B for detailed calculations for the soil loss estimates, including assumptions and conditions.

Table 2 summarizes the mitigated TSP predicted to be emitted from the site from grading and the wind erosion of exposed soil. The maximum predicted erosion of material from the site is estimated at 0.45 ton over the course of the project construction cycle when implementing basic mitigation measures such as water application (see mitigation measures below), which will be identified in the SWPPP. Impacts related to soil erosion from wind will be less than significant.

TABLE 2
Total Suspended Particulate Emitted from Grading and Wind Erosion with and without Mitigation

Emission Source	Duration (months)	Unmitigated TSP (tons)[a]	Mitigated TSP (tons)[b]
Grading Dust			
Project site	2	0.333	0.117
Site cut and fill area	3	0.185	0.065
Project site access road	1	0.020	0.007
Project site laydown area	1	0.040	0.014
Project site laydown area access road	1	0.008	0.003
Transmission line pole holes	3	0.00010	0.00004
Transmission line laydown area	0	0.000	0.000
Water supply line trench	6	0.045	0.016
Water supply line laydown area	0	0.000	0.000
Natural gas pipeline trench	2	0.00137	0.00048
Wind-blown dust			
Project site	12	0.368	0.129
Site cut and fill area	2	0.227	0.080
Project site access road	14	0.000	0.000
Project site laydown area	14	0.000	0.000
Project site laydown area access road	14	0.000	0.000
Transmission line pole holes	6	0.00038	0.00013
Transmission line laydown area	6	0.000	0.000
Water supply line corridor	8	0.035	0.012
Water supply line laydown area	8	0.000	0.000
Natural gas pipeline corridor	6	0.0189	0.0066
Estimated total		**1.281**	**0.448**

Note: All linear feature impacts noted above are for portions outside of the project area footprints.

[a] PM_{10} Emission Factor Source: Midwest Research Institute, 1996
[b] PM_{10} to TSP Conversion Factor: BAAQMD, 1999.
SCAQMD, 1993 (Table 11-4 for mitigation efficiency rates)

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C. Watercourses and Critical Areas

The MEP site is arid to semiarid, with hot summers and mild winters. Most of the yearly precipitation falls between October and May. Table 3 lists the average monthly maximum temperatures, the average monthly minimum temperatures, and the average monthly rainfall recorded at the Tracy Pumping Plant weather station from 1955 through 2007. Average annual rainfall is 12.19 inches. Additional preliminary hydrology calculations are located in Appendix C.

TABLE 3
Monthly Climate Summary at Tracy Pumping Plant Weather Station (February 1, 1955 to December 31, 2007)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average maximum temperature (°F)	54.6	61.2	66.4	72.2	79.7	87.2	92.6	91.9	87.5	78.4	64.7	55.2	74.3
Average minimum temperature (°F)	38.2	41.8	44.6	47.7	53.3	57.6	60.4	60.4	58.1	52.2	44.0	38.5	49.8
Average total precipitation (inches)	2.62	2.15	1.59	0.84	0.41	0.11	0.03	0.06	0.24	0.62	1.60	1.93	12.19

Source: Western Regional Climate Center, 2008.

°F = degrees Fahrenheit

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The California Aqueduct is adjacent to the MEP site, and the Delta-Mendota Canal is less than 0.5 miles northeast of the site. Proximity of watercourses, swales, storm drains, and ditches is shown in Figure 6; pre-construction project site topography and drainage at the plant site are shown in Figure 4. The nearby watercourses including swales, storm drains, and drainage ditches to all project features will be identified in greater detail in the project construction drawings.

The project site does not discharge directly to a water body listed as impaired for sedimentation/siltation or turbidity under the Clean Water Act Section 303(d).

D. Soil Characteristics

As shown on Figure 7, most of the project site lies in mapping unit RdB - Rincon clay loam (3 to 7 percent slopes). The remainder of the project site lies in mapping units AaC - Altamont clay (3 to 15 percent slopes), LaD - Linne clay loam (15 to 30 percent slopes), and Sa - San Ysidro loam (0 to 2 percent slopes). The project site laydown area lies completely in mapping unit AaC, as do the access roads connecting the project site to the project site laydown area. The linear features (and associated laydown areas) cross soil map units AaC, LaD, Sa, LaC - Linne clay loam (3 to 15 percent slopes), LbDcc - Linne clay loam (5 to 15 percent slopes), Sccc - San Ysidro (0 to 2 percent slopes), and Sfaa - Solano fine sandy loam (0 to 2 percent slopes). Free groundwater was not encountered within 100 feet bgs during the project geotechnical investigation; the groundwater depth is not known. Soil map unit characteristics for the area potentially affected by project construction are summarized in Table 4.

TABLE 4
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description	
AaC	**Altamont clay, 3 to 15 percent slopes:**	
	Portions of the project site, project laydown area and access road, natural gas pipeline, and electrical transmission line cross this soil unit.	
	Parent Material:	Residuum weathered from sandstone and shale
	Typical profile:	0 to 28 inches: clay 25 to 50 inches: clay, silty clay 50 to 54 inches: weathered bedrock
	Shrink-swell capacity:	High
	Depth and drainage:	40 to 60 inches to paralithic bedrock; well drained
	Permeability:	Slow
	Runoff:	Medium to very high
	Farmland Class:	Farmland of Statewide Importance
	Storie Index:	Grade 4, Poor
	Capability class:	3e irrigated, 4e nonirrigated
	Taxonomic class:	Fine, smectitic, thermic Aridic Haploxererts
LaC	**Linne clay loam, 3 to 15 percent slopes:**	
	A portion of the water supply pipeline crosses this soil unit.	
	Parent Material:	Residuum weathered from sandstone and shale
	Typical profile:	0 to 36 inches: clay loam 36 to 40 inches: weathered bedrock
	Shrink-swell capacity:	Moderate
	Depth and drainage:	20 to 40 inches to paralithic bedrock; well drained
	Permeability:	Moderately slow
	Runoff:	Medium to very rapid
	Farmland Class:	Farmland of Statewide Importance
	Storie Index:	Grade 3, Fair
	Capability class:	3e irrigated; 4e nonirrigated
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
LaD	**Linne clay loam, 15 to 30 percent slopes:**	
	Portions of the water supply pipeline and site access road cross this soil unit.	
	Parent Material:	Residuum weathered from sandstone and shale
	Typical profile:	0 to 36 inches: clay loam 36 to 40 inches: weathered bedrock
	Shrink-swell capacity:	Moderate
	Depth and drainage:	20 to 40 inches to paralithic bedrock; well drained
	Permeability:	Moderately slow
	Runoff:	Medium to very rapid
	Farmland Class:	None
	Storie Index:	Grade 3, Fair
	Capability class:	4e
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls

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TABLE 4
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description	
LbDcc	**Linne clay loam, 5 to 15 percent slopes:**	
	A portion of the water supply pipeline crosses this soil unit.	
	Parent Material:	Residuum weathered from calcareous shale and/or sandstone
	Typical profile:	0 to 29 inches: clay loam 29 to 33 inches: weathered bedrock
	Shrink-swell capacity:	Moderate
	Depth and drainage:	20 to 40 inches to paralithic bedrock; well drained
	Permeability:	Moderately slow
	Runoff:	Medium to very rapid
	Farmland Class:	Farmland of Statewide Importance
	Storie Index:	Grade 3, Fair
	Capability class:	3e irrigated; 4e nonirrigated
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
RdB	**Rincon clay loam, 3 to 7 percent slopes:**	
	Most of the project site falls within this soil unit.	
	Parent Material:	Alluvium derived from sandstone and shale
	Typical profile:	0 to 16 inches: clay loam 16 to 52 inches: sandy clay 52 to 60 inches: stratified sandy loam to clay loam
	Shrink-swell capacity:	High
	Depth and drainage:	Very deep; well drained
	Permeability:	Slow
	Runoff:	Slow to rapid
	Farmland Class:	Prime Farmland if irrigated
	Storie Index:	Grade 1, Excellent
	Capability class:	2e irrigated; 4e nonirrigated
	Taxonomic class:	Fine, smectitic, thermic, Mollic Haploxeralfs
Sa	**San Ysidro loam, 0 to 2 percent slopes:**	
	Portions of the project site, site access road, natural gas pipeline, electrical transmission line, and water supply pipeline cross this soil unit.	
	Parent Material:	Alluvium from sedimentary rocks
	Typical profile:	0 to 16 inches: loam 16 to 34 inches: clay 34 to 60 inches: silty clay loam
	Shrink-swell capacity:	High
	Depth and drainage:	Very deep; moderately well drained
	Permeability:	Very slow
	Runoff:	Slow to medium
	Farmland Class:	None
	Storie Index:	Grade 1, Excellent
	Capability class:	4s
	Taxonomic class:	Fine, smectitic, thermic, Typic Palexeralfs

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TABLE 4
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
Sa/Sccc	**San Ysidro loam, 0 to 2 percent slopes:**
	Portions of the water supply line and water supply line laydown area fall within this soil unit.
	Parent Material: Alluvium derived from sedimentary rock
	Typical profile: 0 to 15 inches: loam 15 to 54 inches: clay 54 to 80 inches: silty clay loam
	Shrink-swell capacity: High
	Depth and drainage: Very deep; moderately well drained
	Permeability: Very slow
	Runoff: Slow to medium
	Farmland Class: None
	Storie Index: Grade 1, Excellent
	Capability class: 4s
	Taxonomic class: Fine, smectitic, thermic, Typic Palexeralfs
Sf/Sfaa	**Solano fine sandy loam, 0 to 2 percent slopes:**
	Portions of the water supply pipeline, electrical transmission line, and transmission line laydown area fall within this soil unit.
	Parent Material: Alluvium derived from sandstone and shale
	Typical profile: 0 to 6 inches: fine sandy loam 6 to 60 inches: clay loam
	Shrink-swell capacity: Moderate
	Depth and drainage: Very deep; somewhat poorly drained
	Permeability: Very slow
	Runoff: Very slow or slow
	Farmland Class: None
	Storie Index: Grade 2, Good
	Capability class: 3w irrigated; 4w nonirrigated
	Taxonomic class: Fine-loamy, mixed, superactive, thermic Typic Natrixeralfs

Note: Soil descriptions provided above are limited to those soil units that could be affected by MEP. Other soil mapping units, which are well outside of the project area but shown on Figure 7, include the following: AaD – Altamont clay (15 to 30 percent slopes), ArD – Altamont rocky clay, moderately deep (7 to 30 percent slopes), Bb – Brentwood clay loam (0 to 2 percent slopes), LbEcc - Linne clay loam (15 to 30 percent slopes), RdA – Rincon clay loam (0 to 3 percent slopes), Sh - Solano loam (0 to 2 percent slopes), and W - Water.

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As indicated, the soil mapping units in the project area vary from finer soils formed in residuum to coarser soils formed in alluvium. The finer soils are generally on residual hills, with the coarser soils formed in the more level areas in between the hills. The soils range from well drained in the upland rolling portions of the project area, to moderately well and somewhat poorly drained in the more level areas of the project area.

The project area soils have been previously disturbed. The project site contains remnants of previous wind turbine development, as well as buried natural gas pipelines that run through the project area (and under the proposed transmission line and water supply pipeline). Because the site and project area have previously been disturbed it is possible that soil conditions may vary slightly from those shown in the USDA-NRCS soil survey due to local grading.

E. Other Critical Areas

Land developments in the MEP area are common and include agriculture to the north and east, and scattered industry and residences throughout the area. Non-native annual grassland characterizes the project area.

Table 5 lists special-status wildlife species potentially affected by project construction. This information is based on the results of the reconnaissance-level field surveys and an analysis of habitat suitability (coupled with known species' ranges).

TABLE 5
Special-status Species Potentially Affected during Project Construction

Common Name	Scientific Name	Special Status	Within 1 Mile of MEP (Y/N)
Crustacea			
Mid-valley fairy shrimp	*Branchinecta mesovallensis*	—/—	Y
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT/—	Y
Amphibians			
California tiger salamander, central population	*Ambystoma californiense*	FT/CSC	Y
California red-legged frog	*Rana draytonii*	FT/CSC	Y
Reptiles			
Western pond turtle	*Actinemys marmorata*	—/CSC	Y
Birds			
Tricolored blackbird	*Agelaius tricolor*	—/CSC	N
Loggerhead shrike	*Lanius ludovicianus*	—/CSC	Y*
Western burrowing owl	*Athene cunicularia*	—/CSC	Y*
Swainson's hawk	*Buteo swainsoni*	—/CT	Y*
Grasshopper sparrow	*Ammodramus savannarum*	—/CSC	N
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	—/CSC	N
Mammals			
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/CT	Y
American badger	*Taxidea taxus*	—/CSC	Y

*Species observed during the 2009 MEP reconnaissance survey; others recorded in project vicinity by CNDDB or other sources.

CT = state listed as threatened
CFP = state fully protected
CSC = state species of concern
FE = federally listed as endangered
FT = federally listed as threatened

MEP falls inside the South and East San Francisco Bay California red-legged frog recovery unit and therein, the East San Francisco Bay Core Area. During consultation with Mariposa Energy, the U.S. Fish and Wildlife Service (USFWS) will require demonstration that any adverse effects of the project on the species do not threaten existing populations, and suitable habitat is created or restored, and/or protected and managed in perpetuity.

Mitigation (or protective) measures for biological resources, including special-status species that could be affected by MEP, will be taken from existing guidelines developed with the

USFWS and California Department of Fish and Game. Mitigation measures developed for unavoidable project impacts that eliminate or minimize impacts to less than significant will be detailed and expanded upon in the Biological Resources Mitigation Implementation Monitoring Plan (BRMIMP). The BRMIMP also presents protection and mitigation measures issued by the natural resource agencies' in each of their permit terms and conditions.

A Biological Assessment will be prepared prior to project construction during Section 7 consultation with the USFWS, resulting in a Biological Opinion (BO) for the project. The BO will include project-specific compensatory mitigation requirements. As-needed focused surveys to support formal consultation for impacts on federally and state-listed species will occur for the project.

A formal wetland delineation for the project occurred in April 2009. The MEP plant site does not support any potential waters of the United States (including wetlands). Nor will 230-kV transmission line and gas pipeline work impact wetlands.

The water supply pipeline intersects four intermittent and ephemeral drainages along Bruns Road that may be classified as jurisdictional wetlands by the US Army Corps of Engineers and Regional Water Quality Control Board (RWQCB). Emergent wetland vegetation, including cattail (*Typha* sp.) and sedge (*Carex* sp.) exists along the intermittent drainages. Italian ryegrass (*Lolium multiflorum*) and meadow barley (*Hordeum brachyantherum*) dominate the ephemeral drainages.

The 26 special-status plant species in Table 6 have a low to moderate potential for occurrence on the project area because of their association with annual grassland habitat or seasonal wetlands.

Protocol-level rare plant surveys occurred during spring and summer of 2009, for all proposed project impact areas. No special-status plant species were observed within the project impact areas.

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TABLE 6
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status	Season	Primary Habitat	Potential Occurrence in Project Area
Plants					
Large-flowered fiddleneck	*Amsinckia grandiflora*	FE, CE, 1B, ECCHCP: No EACCS: No	Apr–May	Cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Bent-flowered fiddleneck	*Amsinckia lunaris*	1B, ECCHCP: No EACCS: No	Mar–Jun	Coastal bluff scrub, cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Alkali milk-vetch	*Astragalus tener* var. *tener*	1B, ECCHCP: No EACCS: No	Mar–Jun	Playas, valley and foothill grassland, vernal pools/alkaline	Low; alkaline wetland areas lacking in project area. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Heartscale	*Atriplex cordulata*	1B, ECCHCP: No EACCS: No	Apr–Oct	Chenopod scrub, meadows and seeps, valley and foothill grassland	Moderate; there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Brittlescale	*Atriplex depressa*	1B, ECCHCP: Yes EACCS: No	Apr–Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools	Moderate; there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
San Joaquin spearscale	*Atriplex joaquiniana*	1B, ECCHCP: Yes EACCS: Yes	Apr–Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland/alkaline	Moderate; there are no known records of occurrence in the project area, but alkaline conditions exist along segments of project linears. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 6
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status	Season	Primary Habitat	Potential Occurrence in Project Area
Big-scale balsamroot	*Balsamorhiza macrolepis* var. *macrolepis*	1B, ECCHCP: No EACCS: No	Mar–Jun	Chaparral, cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Big tarplant	*Blepharizonia plumosa*	1B, ECCHCP: Yes EACCS: Yes	Jul–Oct	Valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.
Round-leaved filaree	*California macrophylla*	1B, ECCHCP: Yes EACCS: No	Mar–May	Cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Bristly sedge	*Carex comosa*	2, ECCHCP: No EACCS: No	May–Sep	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland	Low; potentially suitable habitat in project area is disturbed and no known records of occurrences in project area. Protocol-level surveys for this species scheduled for summer 2009.
Lemmon's jewelflower	*Caulanthus coulteri* var. *lemmonii*	1B, ECCHCP: No EACCS: No	Mar–May	Valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during Spring 2009 rare plant surveys. No additional surveys needed for this species.
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	1B, ECCHCP: No EACCS: Yes	May–Oct (Nov)	Valley and foothill grassland (alkaline)	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.
Hispid bird's-beak	*Cordylanthus mollis* ssp. *hispidus*	1B, ECCHCP: No EACCS: No	Jun–Sep	Meadows and seeps, playas, valley and foothill grassland/alkaline	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.

TABLE 6
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status	Season	Primary Habitat	Potential Occurrence in Project Area
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	FE, CE, 1B, ECCHCP: No EACCS: Yes	May–Oct	Chenopod scrub, valley and foothill grassland/alkaline	Low; project area dominated by non-native annual grasses and forbs, and there are no known records of occurrence in the project area. Protocol-level surveys for this species scheduled for summer 2009.
Livermore tarplant	*Deinandra bacigalupi*	1B, ECCHCP: No EACCS: Yes	Jun–Oct	Meadows and seeps (alkaline)	Low; potentially suitable habitat in project area is disturbed, and there are no known records of occurrences in project area. Protocol-level surveys for this species scheduled for summer 2009.
Recurved larkspur	*Delphinium recurvatum*	1B, ECCHCP: No EACCS: Yes	Mar–Jun	Chenopod scrub, cismontane woodland, valley and foothill grassland/alkaline	Moderate; CNDDB occurrence in an alkaline meadow located less than 1,000 feet from the water supply pipeline. However, this species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Diamond-petaled California poppy	*Eschscholzia rhombipetala*	1B, ECCHCP: No EACCS: No	Mar–Apr	Valley and foothill grassland (alkaline)	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Diablo helianthella	*Helianthella castanea*	1B, ECCHCP: No EACCS: No	Mar–Jun	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Contra Costa goldfields	*Lasthenia conjugens*	FE, 1B, ECCHCP: No EACCS: No	Mar–Jun	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Showy golden madia	*Madia radiata*	1B, ECCHCP: No EACCS: No	Mar–May	Cismontane woodland, valley and foothill grassland	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.

TABLE 6
List of Special-status Plant Species with Low to Moderate Potential for Occurring in the MEP Area

Common Name	Scientific Name	Status	Season	Primary Habitat	Potential Occurrence in Project Area
Little mousetail	*Myosurus minimus* ssp. *apus*	2, ECCHCP: No EACCS: No	Mar–Jun	Valley and foothill grassland, vernal pools (alkaline)	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Hairless popcorn-flower	*Plagiobothrys glaber*	1B, ECCHCP: No EACCS: No	Mar–May	Meadows and seeps (alkaline)	Low; there are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Marsh skullcap	*Scutellaria galericulata*	2, ECCHCP: No EACCS: No	Jun–Sep	Meadows and seeps (mesic), marshes and swamps	None; this species generally associated with Delta water bodies (i.e., sloughs). There are no known records of occurrence in the project area.
Saline clover	*Trifolium depauperatum* var. *hydrophilum*	1B, ECCHCP: No EACCS: No	Apr–Jun	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools	Low; there are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.
Caper-fruited tropidocarpum	*Tropidocarpum capparideum*	1B, ECCHCP: No EACCS: No	Mar–Apr	Valley and foothill grassland (alkaline hills)	Low; project area dominated by non-native annual grasses and forbs. There are no known records of occurrence in the project area. This species not observed during spring 2009 rare plant surveys. No additional surveys needed for this species.

F. Drainage Map

Figure 6 shows the location of nearby drainages and watercourses in relation to MEP. Figure 4 shows general pre-construction drainage at the plant site, and Figure 5 shows post-construction drainage. Site drainage will be further defined in the final design phase of the project and its features incorporated into the DESCP.

G. Drainage Narrative

The MEP site is located in the San Joaquin Basin. The principal streams in the basin are the San Joaquin River and its larger tributaries: the Cosumnes, Calaveras, Mokelumne, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno rivers. The MEP site is not located near any of these surface water features.

Surface water is imported to the basin through several main canals via the State Water Project (SWP) and the federal Central Valley Project (CVP). These canals include the Delta-Mendota Canal (CVP) and the California Aqueduct (SWP). The California Aqueduct is adjacent to the MEP site, and the Delta-Mendota Canal is less than 0.5 miles northeast of the site (Figure 6).

Currently there is no active stormwater management system on the project area; drainage is generally via percolation or sheetflow to the north into ephemeral drainages that converge into a single constructed linear channel. The channel's waters eventually discharge into Italian Slough, located 3.5 miles downstream of the project site.

The grading and drainage of the MEP plant was designed in accordance with the Alameda County Flood Control and Water Conservation District *C.3 Stormwater Technical Guidance*. Appendix C provides the preliminary stormwater management design for the project, which includes stormwater calculations and the pre- and post-development drainage plans.

The MEP plant will mitigate storm runoff with a series of inlets and storm drain pipes that will convey runoff to a proposed onsite extended detention basin located on the north end of the site. Figures 4 and 5 show pre- and post-construction drainage conditions for the site. The extended detention basin is designed to release site stormwater runoff from the design storm over a 48-hour period to allow particles and associated pollutants to settle. The multi-stage discharge structure will discharge to one of the swales routing upgradient stormwater around the site, as shown in Figure 5.

Areas of potential oily water contamination will be sited within containment to prevent oily water from mixing with stormwater flowing to the extended detention basin. Impervious areas will be limited to paved loop and equipment access roads and the equipment to operate the plant. Forty-four percent of the MEP site will have impervious surfaces for equipment siting and roads.

Table 7 presents the pre-development and post-development runoff peak for the site.

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TABLE 7
Pre- and Post-development Runoff for the MEP Plant Site

Scenario	Area (acres)	Runoff Peak (cfs) 2-year event	Runoff Peak (cfs) 100-year event
Pre-Development (Zone CM-5)	8.65	0.58	7.05
Post-Development Uncontrolled[a] (Zone S-1&2)	8.12[b]	5.4	17.8
Post Development Discharge Rate[c]	8.65	0.58	6.58

cfs = cubic feet per second

[a]Post-development runoff rate to the extended detention basin
[b]Post-development acreage is shown less than pre-development because the detention pond surface acreage is not considered in the hydrologic routing model.
[c]Post-development Discharge from extended detention basin to natural drainage.

The peak runoff for the two-year and one hundred-year storm events for the site in the pre- and post-development conditions was determined and compared. As shown in Table 7, overall runoff will increase between pre-development and post-development due to the proposed impervious surfaces (structures and asphalt paving of the facility roads) and the shortened drainage basin time of concentration (time for runoff to occur). The predevelopment basin is described as grass land and has capability to absorb the runoff more efficiently than the post-development case with structures and paved or gravels surfacing. Also, runoff occurs over a longer period of time in the pre-developed case. In the developed site, runoff will have a shorter time of concentration; the runoff will occur over a shorter time period due to the site drainage system. This decrease in concentration time causes the increase in peak flow rates for the developed site (higher flow rates for a shorter period of time). The extended detention basin outfall discharge rates will not be greater than pre-development site stormwater discharge rates. Additionally, the extended detention basin will improve the water quality by allowing sediments to settle out prior to discharge. Although road paving will increase site runoff, this measure will improve both the air and water quality by minimizing dust during the dry season and sedimentation of runoff during rain events.

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H. Clearing and Grading Plans

Figure 2 shows the project features and associated areas subject to soil disturbance. Figure 3 shows the limits of grading at the plant site. Rough grading plans are not available at this stage of the project. Prior to the start of construction, the DESCP will be updated to include these plans and final design information.

Post-construction stormwater runoff at the MEP plant site will be conveyed to the onsite extended detention basin.

I. Clearing and Grading Narrative

The information provided in this section is preliminary and will be updated and expanded upon once the clearing and grading plans are completed and prior to the start of construction. Site grading design will comply with applicable land development

regulations. The general site grading will establish a working surface for construction and plant operating areas, and will provide positive drainage from buildings and structures, as well as adequate ground coverage for subsurface utilities. Graded areas will be smooth, compacted, free from irregular surface changes, and sloped to drain to onsite drainage features and the stormwater extended detention basin when constructed.

During construction, approximately 10 acres of land associated with the plant will be disturbed. Additional soil disturbance areas will include the project linear features and laydown areas. Temporary construction facilities will include a 5-acre worker parking and laydown area immediately east of the project site, a 1-acre water supply pipeline parking and laydown area located at the BBID headquarters facility on Bruns Road, and a 0.6-acre laydown area along the transmission line route adjacent to the PG&E Kelso Substation and Bethany Compressor Station.

Soil-disturbing activities will include clear and grub operations, grading operations, and excavation and fill operations. For all areas where earthwork will be executed, materials suitable for compaction will be stockpiled in designated onsite locations. Materials not suitable for compaction will be stored in separate stockpiles for reuse onsite or disposed of at a licensed facility. If needed, only licensed, commercial fill will be used onsite. Any contaminated materials encountered during excavation will be disposed of in accordance with applicable laws, ordinances, regulations, and standards.

Construction equipment anticipated to be used onsite include scrapers, graders, vibrating rollers, front loaders, dump trunks, trenching machines, concrete mixers, water trucks, and fuel trucks (list is not all inclusive).

Table 8 outlines the amount of cut and fill planned for specific components of the project (the DESCP will be updated once this information becomes available).

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TABLE 8
Clearing and Grading

Description	Stockpile (yd^3)	Total Cut (yd^3)	Total Fill (yd^3)
To be determined (TBD).			
Total			

yd^3 = cubic yards

The following subsections provide a discussion of clearing and grading associated with each of the major construction elements of the project.

Project Schedule

Table 9 lists the project construction schedule. Construction of the generating facility, from site preparation and grading to commercial operation, is expected to take place from April of 2011 to July of 2012, 12 months total. Table 9 will be updated with project milestones when this information becomes available.

TABLE 9
Project Schedule

Activity	Date
Begin construction	April 2011
Completion of construction activities	July 2012

Construction Laydown and Parking Area

Construction laydown and parking areas will require grading before use. It is likely that these areas will be graveled immediately thereafter to minimize soil erosion and to allow for wet season use. Once construction is complete, the gravel will either be removed from the site or incorporated into site paving.

Linear Areas

Using the open-cut trenching method, installation of linear project elements will be installed within a 4-foot-wide trench and a likely 10-foot construction corridor. After the new pipe is laid, the open trench will be backfilled with suitable material.

The overhead transmission lines will likely have poles with a 4-foot by 4-foot footprint.

As stated earlier in the DESCP, a SWPPP will be prepared prior to construction of the MEP to prevent the offsite migration of sediment and other pollutants, and to reduce the effects of runoff from the construction site to offsite areas. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to BMPs outlined in the SWPPP will minimize potential impacts to stormwater quality. In addition, the DESCP will be updated during the final design phase of the project to identify the location of specific erosion and sediment BMPs to be implemented during construction.

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J. Best Management Practices

A SWPPP will be developed prior to start of construction to:

- Identify all pollutant sources, including sources of sediment that may affect the quality of stormwater discharges associated with construction activity from the construction site, and
- Identify non-stormwater discharges, and
- Identify, construct, implement in accordance with a time schedule, and regularly inspect and maintain BMPs to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the construction site during construction, and
- Develop a maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs).

The placement and details of the BMPs that will be utilized during project construction will be identified during project design and incorporated into the SWPPP and DESCP. Potential impacts from construction activities will be controlled through implementation of the BMPs (including erosion and sediment control measures) outlined in the Final SWPPP and Final DESCP. The SWPPP is a living document and will be amended during the life of the project, as needed. Site grading activities and drainage features will be designed to comply with all applicable laws, rules, and regulations.

K. Best Management Practices Narrative

The project construction schedule is provided in Table 10, and will be updated after final project design.

TABLE 10
Key Construction Events

Event Description	Expected Dates
Date of certification by CEC	TBD
Rainy season	October 15 to April 15
Mobilization	April 2011
Delineate and mark the boundaries of the construction zone	Prior to construction
Implement perimeter erosion and sediment controls; protect interior and downgradient inlets, waterways, and sensitive areas	Prior to construction
Stabilize construction entrance/exit and roadway	TBD
Establish laydown and parking area	TBD
Clear and grub	Second quarter 2011
Rough grading	1 to 4 months
Implement concrete waste BMP	TBD
Install generators and associated equipment	TBD
Construct switchyard and transmission line corridors	TBD
Install water supply line	TBD
Install natural gas supply line	TBD
Construction of extended detention pond	TBD
Completion of construction	July 2012

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The following sections present standard construction BMPs, most of which are described in the *California Storm Water Best Management Practice Handbook* (2003) and the *Caltrans Storm Water Quality Handbook* (2003). These resource handbooks provide comprehensive details on BMP implementation and will be obtained and reviewed by managers for all construction contractors that may have an impact on implementation of the DESCP. Appendix D contains the CASQA Handbook BMP factsheets with detailed descriptions of the BMPs

discussed in the following sections. The fact sheets also include the maintenance practices for each BMP. Figure 8 is a hypothetical construction BMP plan and will be further developed during the final project design phase. The Final DESCP will include locations and details of all BMPs to be used during the construction, including for linear features, such as roads and pipelines.

An implementation and maintenance schedule for the drainage, erosion, and sediment control methods and practices that may be implemented as appropriate at the MEP site are included in Table 11. The selection of BMPs can potentially change during project design and Table 11 will be amended accordingly in the DESCP.

TABLE 11
BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Silt fence	Two weeks prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Replace torn sections; repair up-rooted sections; clean out collected sediment when greater than 1/3 height of fence
Fiber rolls or Coir logs	Two weeks prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Replace crushed sections; replace rotted sections; clean out collected sediment when greater than 1/3 height of roll
Sediment basin/ Sediment trap	Two weeks prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Repair damage and remove obstructions as needed; stabilize eroded areas; clean out collected sediment when 1/2 of designated storage volume of basin or 1/3 of trap capacity; dewater within 72 hours
Check dams	Two weeks prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Replace degraded or missing rock, bags, etc.; clean out when collected soil greater than 1/3 of barrier height
Erosion control blankets (geotextiles)	In sequence with construction activities; prior to forecasted rain event	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Repair eroded areas; replace and repair geotextiles and mats as needed
Sandbags	Two weeks prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Repair, reshape, replace bags as necessary; replace bags exposed to sunlight every 2 to 3 months; clean out collected sediment when greater than 1/3 barrier height

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TABLE 11
BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Gravel bags	Two weeks prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Repair, reshape, replace bags as necessary; replace bags exposed to sunlight every 2 to 3 months; clean out collected sediment when greater than 1/3 barrier height
Strom drain inlet protection	Two weeks prior to construction	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Clean and repair filters or fabric fence as needed; clean out collected sediment when greater than 1/3 barrier height
Hydraulic mulch	In sequence with construction activities; prior to forecasted rain event	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Repair eroded areas; re-apply on bare areas as needed
Mulch (straw, wood, organic)	In sequence with construction activities; prior to forecasted rain event	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Repair eroded areas; re-apply on bare areas as needed
Hydroseeding/Seeding	As soon possible after disturbance has permanently or temporarily ceased, but in no case more than 14 days after the construction activity in an area has ceased (Except when construction activity will resume on that portion of the site within 21 days)	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly; monitored every May for the first three years following project completion	Reseed areas that do not meet revegetation criteria
Aggregate surfacing	Completion of grading activities	Weekly	Keep all temporary roadway ditches clear; periodically apply additional aggregate as needed
Stabilized construction entrance/exit	Prior to grading of the project site	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Remove aggregate, separate and dispose of sediment when construction entrance/exit is clogged with sediment; keep all temporary roadway ditches clear; check for damage and repair as needed; replace gravel material when surface voids are visible

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TABLE 11
BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Stockpile management	In sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly	Repair or replace perimeter controls and covers as needed
Street sweeping and vacuuming	Start of construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); when actively in use, inspect points of ingress and egress daily, otherwise weekly	Remove tracked or spilled sediment outside the construction limits at a minimum daily
Post-construction revegetation	As soon possible after disturbance has permanently or temporarily ceased, but in no case more than 14 days after the construction activity in an area has ceased (Except when construction activity will resume on that portion of the site within 21 days)	Inspect before and after storm events (and once each 24-hour period during extended storm events), and weekly; monitored every May for the first three years following project completion or until the site has been successfully revegetated to 70 percent coverage	Areas that do not meet revegetation criteria will be reseeded

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The selection of BMPs can potentially change during project design and Table 11 will be amended accordingly in the DESCP. The following describes the BMPs that will be implemented at the project site and the construction laydown and parking area during the pre-construction, construction, and post-construction phases of the project.

Scheduling

Construction shall be scheduled to minimize construction activities impacts during the rainy season consistent with local and resource agency regulations.

Preservation of Natural Features

In general, site designs shall preserve existing vegetation to the maximum extent possible. Prior to the commencement of soil-disturbing activities, areas of existing vegetation that are to remain and environmentally sensitive areas shall be fenced for protection. During construction, existing vegetation shall be preserved as long as possible to minimize erosion.

Stormwater Runon and Concentrated Flows

Existing watercourses shall be protected. To the extent feasible, all concentrated water flows shall be channeled away from disturbed soil areas and stockpiles. Concentrated water flows shall be conveyed in a non-eroding fashion. Erosion in areas of concentrated flow paths shall be controlled by applying erosion control blankets, erosion control seeding, and lining of swales.

Stockpile Management

Stockpiles shall be managed according to the type of material being stockpiled and the season, as follows:

- Soil stockpiles shall be covered or protected with soil stabilization measures and perimeter sediment barriers during the rainy season and protected with perimeter sediment barriers during the non-rainy season.
- Concrete/asphalt rubble, rock, and aggregate base and sub-base stockpiles shall be covered or protected with perimeter sediment barriers year-round.
- Cold mix asphalt stockpiles shall be covered year-round.

Disturbed Soil Area Management

Disturbed soil areas shall be protected with an effective combination of erosion and sediment control measures.

- **Erosion controls –** Hydraulic mulch; hydroseeding; straw/wood/organic mulch; geotextiles; stabilized construction roadways.
- **Sediment controls –** Silt fences; sand and gravel bag barriers; fiber rolls; check dams; sediment basin/traps; street sweeping and vacuuming; inlet protection

During construction of the project and the related linear facilities, dust erosion control measures will be implemented to minimize the wind-blown loss of soil from the site. Water will be applied to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction as needed, but will not be excessively watered so as to generate runoff.

Sufficient erosion and sediment control materials will be maintained onsite to allow implementation in conformance with the DESCP. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.

BMPs will be implemented to follow the progress of grading and construction. As the locations of soil disturbances change, erosion and sedimentation controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter. BMPs will be in place throughout the entire construction period.

Non-active areas (including all finished slopes) will be stabilized as soon as feasible after construction is complete and no later than 14 days after construction in that portion of the site has temporarily or permanently ceased.

Disturbed soil areas that have not been re-vegetated will be stabilized with plastic covers, erosion control blankets, or mulch before rain events. Disturbed areas that are substantially complete will be stabilized with permanent erosion control (soil stabilization—graveling, paving, or vegetation). Re-vegetated areas will be monitored until a minimum of 70 percent ground coverage has been established.

During the rainy season, temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas, at the toe of slopes, and at outfall areas at all times. During

the non-rainy season, temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas.

Linear sediment controls will be used along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths in accordance with Table 12. Placement of linear sediment controls at grade breaks of exposed slopes will interrupt the length of the slope and reduce erosion by reducing runoff velocity.

TABLE 12
Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Slope Percentage Sheet Not to Exceed
0–25%	20 feet
25–50%	15 feet
Over 50%	10 feet

Storm drain inlets and outlets will be stabilized with riprap as needed. The areas around equipment, where not paved, will be graveled to minimize soil erosion and to allow for all-season use.

Offsite Sediment Tracking

The construction entrance and exit will be constructed and maintained to reduce tracking of sediments onto public streets. Excess material tracked onto public streets will be removed at a minimum daily using a street sweeper. All trucks hauling soil and other loose material will be covered or have at least 2 feet of freeboard.

Petroleum Products

Construction equipment will require use of fuel and oil on a regular basis. The staging, fueling, and maintenance of vehicles and equipment will only occur within the laydown and parking area. Vehicle cleaning will not be performed onsite.

A dedicated temporary fueling area will be protected with berms or dikes to prevent runon, runoff, and to contain spills. Drip pans or absorbent pads will be used for all vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids.

Spills will be cleaned up immediately in accordance with applicable local, state, or federal regulations. A spill kit will be maintained onsite and readily accessible in the laydown and parking area. Vehicles and equipment will be regularly maintained and inspected daily for leaks.

Petroleum products will be stored in clearly labeled and tightly sealed containers or tanks. It will be the contractor's responsibility to ensure that secondary containment around fuel/oil tanks (stationary or mobile) will meet the minimum requirements of EPA 40 CFR Part 112, or more stringent state requirements, if applicable. Any soil impacted by fuel or oil spills will be removed and disposed of by a licensed hauler at an approved disposal site.

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Sanitary Wastes

Maintenance will be provided weekly by a sanitation company and wastes will be disposed of at an appropriate facility. Portable toilets will be anchored during periods of heavy wind and all leaks or spills shall be reported immediately to the construction supervisor.

Hazardous Materials/Wastes

Hazardous materials will be stored in chemical storage facilities appropriately designed for their individual characteristics. Hazardous wastes potentially associated with construction of the project will be limited to small quantities of liquids and solids such as lubricating oils, acids for equipment cleanup, and concrete curing compounds. These wastes are typical of industrial construction activities and will be placed in segregated and clearly labeled containers onsite and recycled or disposed of in accordance with applicable regulations. A licensed hauler will remove hazardous waste as needed for appropriate disposal.

Cover and secondary containment will be provided for the storage of hazardous materials (i.e., oil drums, solvents, grease). Temporary containment facilities for hazardous materials will provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus 10 percent of the aggregate volume of all containers or 100 percent of the capacity of the largest container within its boundary, whichever is greater. It will be impervious to the materials stored therein for a minimum contact time of 72 hours. All drains and vent piping for volatile chemicals will be trapped and isolated from other drains. Containment areas for bulk storage tanks will not be drained. Any chemical spills in these areas will be removed with portable equipment and reused or disposed of according to applicable regulations.

Spill cleanup materials, material safety data sheets (MSDS), a material inventory, and emergency contact numbers will be maintained at the laydown and parking area. Site personnel will be instructed on spill cleanup procedures and the contractor's site manager will be responsible for implementing these practices.

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Contaminated Soil

Contaminated soil is not anticipated to be encountered during the project; however, workers will be educated on identification and handling of contaminated soil. Contaminated soil will be excavated, transported, and disposed of in accordance with applicable regulations. If temporary stockpiling of contaminated soil is necessary, the soil will be stockpiled on a 10 mil visqueen liner and covered with a 10 mil visqueen liner. A berm will be placed around the stockpile to prevent runoff from leaving the area.

Concrete Trucks

Excess concrete and concrete washout slurries will be discharged to a temporary concrete washout facility. The washout facility will be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. The washout facility will be cleaned, or a new facility constructed once the washout is 75 percent full. Dried concrete shall then be removed and disposed of at an approved offsite location. No surplus concrete or drum wash water will be disposed of onto the ground surface.

Waste Materials

All construction waste material, trash, and construction debris will be collected and stored in a covered metal dumpster. The dumpster will meet all local and state solid waste management regulations. A licensed hauler will remove waste materials at least weekly for appropriate disposal. No construction waste will be buried on site. All site personnel will be instructed regarding the correct procedure for waste disposal.

Good Housekeeping

Good housekeeping practices are designed to maintain a clean and orderly work environment. The good housekeeping practices listed below will be followed to reduce the risk of pollutants entering stormwater discharges. All construction personnel will be responsible for monitoring and maintaining housekeeping tasks and reporting potential problems to the contractor's site manager:

- Store only enough products required for doing the job.
- Store all materials in a neat and orderly manner in the appropriate containers. Store materials that may adversely impact stormwater, such as paint, oils, greases, sealers, etc., in covered areas such as temporary/permanent buildings or trailers. Provide secondary containment for the storage of hazardous materials.
- Keep products in the original container with the original manufacturer's label.
- Do not mix products unless recommended by the manufacturer.
- Use all of a product before disposing of the container.
- Use and dispose of products according to the manufacturer's recommendations.
- Perform regular inspections of the stormwater system and the material storage areas.
- When and where appropriate, use posters, bulletin boards, or meetings to remind and inform construction personnel of required good housekeeping, maintenance, and cleanup procedures.

Preventive maintenance includes regular inspection and maintenance of structural stormwater controls (catch basins, oil-water separators, etc.) as well as other facility equipment and systems.

Spill prevention and cleanup practices will be as follows:

- MEP's site manager or appointee is responsible for informing construction personnel of the manufacturer's recommended spill cleanup methods, and the location of that information and cleanup supplies.
- Materials and equipment for the cleanup of a relatively small spill will be kept in the laydown and parking area. These facilities may include brooms, rags, gloves, shovels, goggles, sand, sawdust, absorbent, plastic, or metal trash containers, and protective clothing.
- All containers will be labeled, tightly sealed, and stacked or stored neatly and securely.

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Spill response procedures will be as follows:

- Step 1: Upon discovery of a spill, stop the source of the spill.
- Step 2: Cease all spill material transfer until the release is stopped and waste removed from the spill site.
- Step 3: Initiate containment to prevent spill from reaching State waters.
- Step 4: Notify supervisor and MEP's site manager of the spill.
- Step 5: MEP's site manager will immediately notify the MEP emergency coordinator, and coordinate further cleanup activities
- Step 6: Any significant spill of hazardous material will be reported to the appropriate state and/or local agencies by MEP personnel or qualified contractors. Table 13 lists the project's environmental emergency contacts.

TABLE 13
Environmental Emergency Telephone List

Company/Organization	Telephone Numbers
Primary Facility Emergency Coordinator:	TBD
24-Hour Telephone Number:	TBD
Alternate Facility Emergency Coordinator:	TBD
Other Resources	
3E Company (MSDS by FAX):	(800) 451-8346
Chemtrec (emergency chemical information):	(800) 424-9300
Poison Control Center:	(800) 662-9886
Federal Agency	
U.S. Coast Guard/National Response Center:	(800) 424-8802
State Agencies	
California Office of Emergency Services (OES):	(800) 852-7550
California Department of Toxic Substances Control (DTSC)*:	(800) 852-7550
California Department of Fish and Game*:	(800) 852-7550
California State Lands Commission:	(562) 590-5201
RWQCB*:	(800) 852-7550
Local Contacts	
Alameda County Environmental Health Department:	(510) 777-2149
Fire:	911
Police:	911
Hospital:	911
Ambulance/paramedics:	911

* DTSC, RWQCB, and California Department of Fish and Game have requested that emergency notifications to these offices be made through the OES 800 number.

- Step 7: Record a description of the spill, cause, and cleanup measures taken.
- Step 8: Review and amend the SWPPP to address the violation of the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved.

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Inspection, Maintenance, and Recordkeeping Procedures

Site inspection and facility maintenance are important features of an effective stormwater management system. The Contractor's qualified personnel will inspect disturbed areas of the site that have not been stabilized, storage areas exposed to precipitation, all control measures, and site access areas to determine if the control measures and stormwater management system are effective in preventing significant impacts to receiving waters.

At a minimum, inspections will be performed prior to a forecast storm, after a rain event that causes runoff from the construction site, at 24-hour intervals during extended rain events, and weekly. During inspections, BMPs shall be evaluated for adequacy, proper implementation, and whether additional BMPs are required. The inspector will complete an inspection checklist, which will include the following information:

- Inspection date
- Weather conditions
- A description of any inadequate BMPs
- List of observations of all BMPs
- Corrective actions required, including any changes to the DESCP
- Inspector name, title, and signature

Maintenance of BMPs shall be performed as needed.

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Erosion and Sediment Controls

The following procedures will be used to maintain erosion and sedimentation controls:

- All controls will be maintained in good working order; if a repair is necessary, that repair will be initiated within 24 hours of the report.
- Sediment will be removed from the silt barriers when it has reached one-third of the height of the barrier.
- Silt barriers will be inspected for depth of accumulated sediment, tears, attachment to posts, and stability on a weekly basis.
- Aggregate-covered areas will be inspected for bare spots and washouts.
- The MEP site manager will select individuals to be responsible for inspections, maintenance, repairs, and reporting. The designated inspectors will receive the necessary training from MEP's site manager to properly inspect and maintain the controls in good working order.
- An inspection form will be completed after each inspection.
- The completed inspection forms will be retained onsite.

Non-stormwater Controls

The MEP site manager will select individuals to be responsible for inspections, maintenance, repairs, and reporting. The designated inspectors will receive the necessary training from MEP's Site Manager to properly inspect and maintain the controls in good working order.

The designated inspector will visually observe all drainage areas for the presence of unauthorized non-stormwater discharges and their sources.

All measures will be maintained in good working order; if a repair is necessary, that repair will be initiated within 24 hours of the report.

An inspection form will be completed after each inspection.

The completed inspection forms will be retained on site.

If a spill occurs that cannot be cleaned up before the next rain event, or under other circumstances warranting sample collection, the designated inspector will collect stormwater samples during the first two hours (including weekends or holidays) of discharge. The samples would be analyzed for compounds with the analytical testing suite determined from the specific materials spilled or not contained properly, and for any constituents in the spill that could occur in high enough concentrations to cause an impact to water quality.

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Recordkeeping

Records will be retained for a minimum of 3 years for the following items:

- Site inspections
- Compliance certifications
- Discharge reports
- Approved DESCP document and amendments

A copy of this DESCP and any supporting materials will be compiled in an orderly manner and maintained at the construction site from the date of CEC approval to the date of final stabilization.

The generation of reports, as part of the construction process and inspection or amendment procedures, provides accurate records, which can be used to evaluate the effectiveness of this DESCP and to document compliance. Amendments are included with the DESCP to facilitate review or evaluation.

Post-construction Stormwater Management

Finished grade slopes drain into one of two swales routing upgradient stormwater around the site. To reestablish grass vegetation, finished grade slopes and swales will be hydroseeded with a native grass mixture, and mulched to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow. Controlled watering would be applied if seasonal rainfall is not sufficient. The entire area would be regularly monitored for signs of erosion; areas would be revegetated as necessary to maintain adequate soil protection. Re-vegetating disturbed soil soon after construction is the

most effective way to control erosion and can also be one of the least expensive stabilization measures.

Other disturbed areas that are substantially complete will be stabilized with permanent erosion control (aggregate, paving, or vegetation). Re-vegetated areas will be monitored until a minimum of 70 percent ground coverage has been established. Areas where no vegetation grew will be reseeded. Once vegetation has established onsite and a Notice of Termination can be submitted to the RWQCB, drain inlet protection and temporary sediment and erosion control measures will be removed.

L. References

USDA-NRCS. 2008a. Soil Survey Geographic (SSURGO) database for Alameda Area, California (Online). Available at: http://soildatamart.nrcs.usda.gov (verified March 19, 2009).

USDA-NRCS. 2008b. Soil Survey Geographic (SSURGO) database for Contra Costa County, California (Online). Available at: http://soildatamart.nrcs.usda.gov (verified March 19, 2009).

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Appendix A
Figures

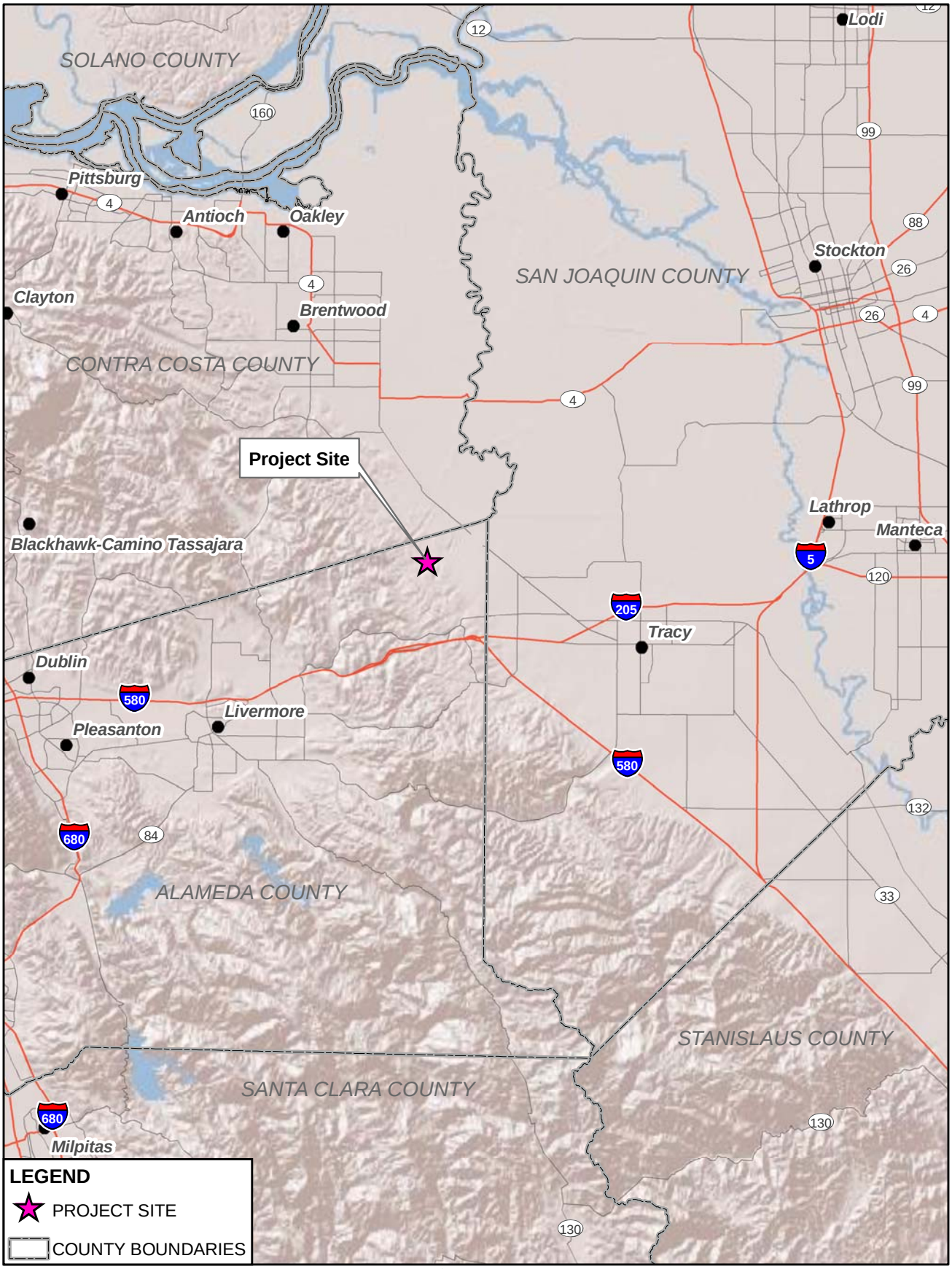

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FIGURE 1
PROJECT VICINITY
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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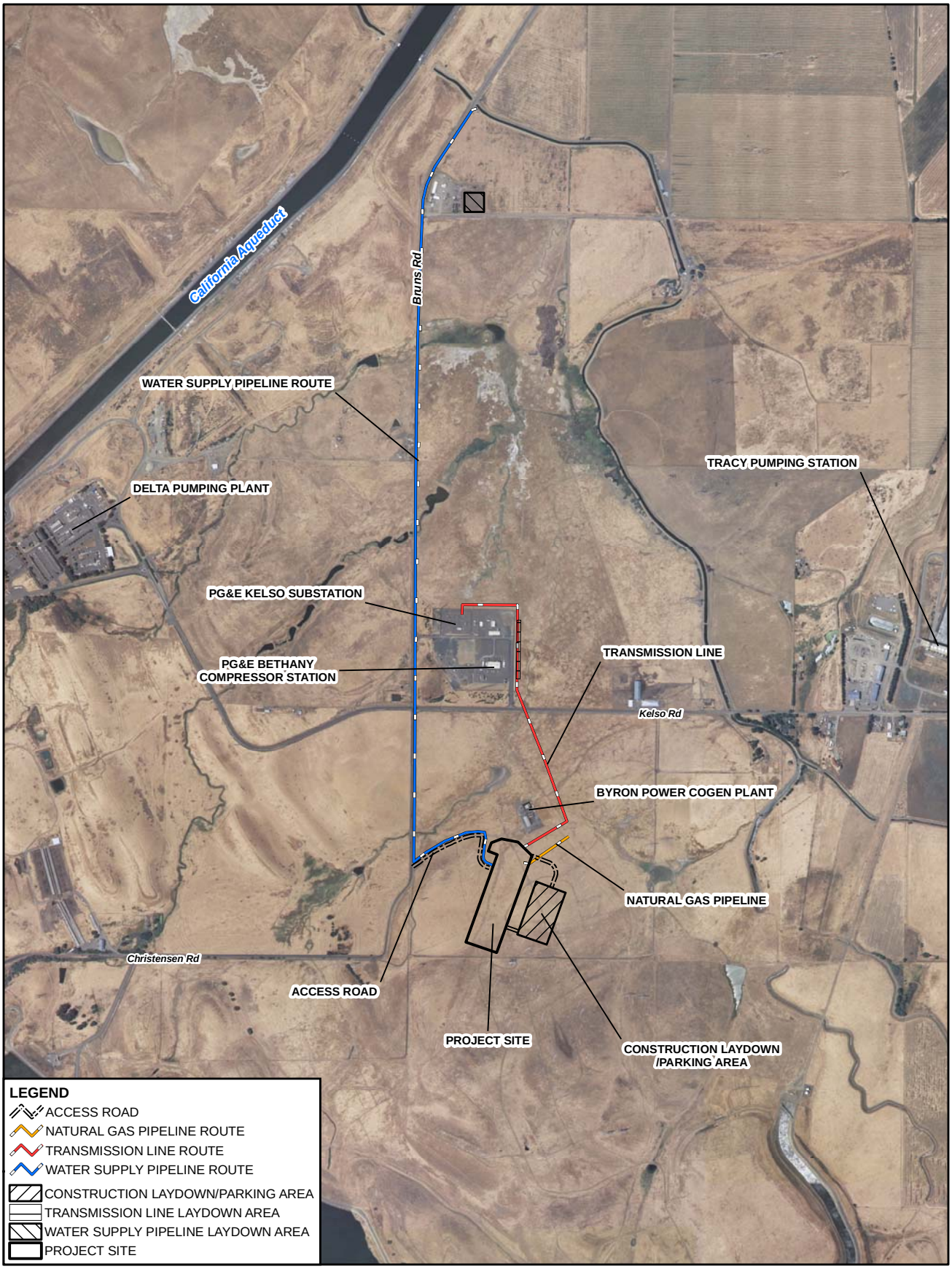

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

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FIGURE 2
SITE LOCATION

MARIPOSA ENERGY PROJECT

ALAMEDA COUNTY, CALIFORNIA

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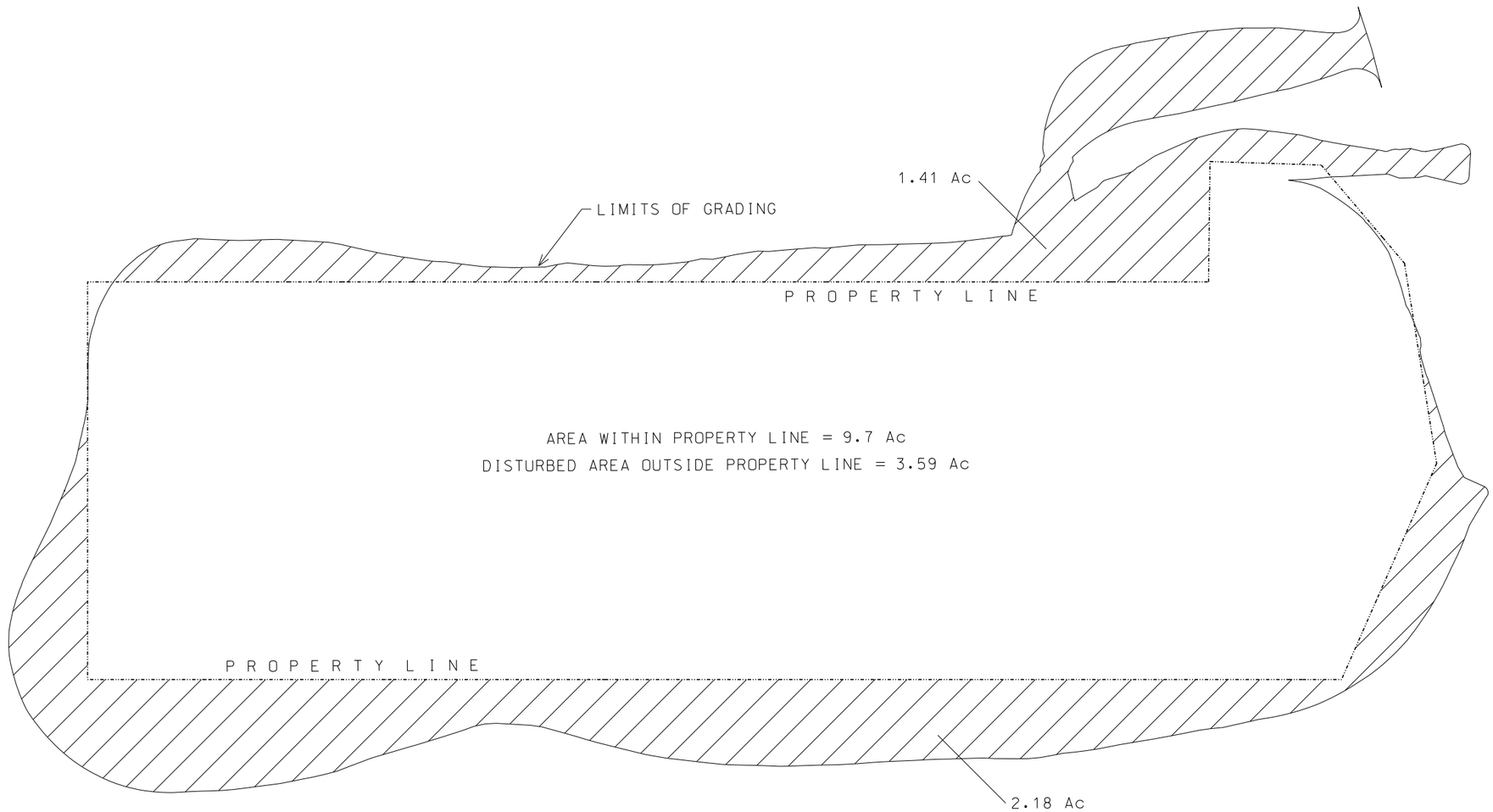
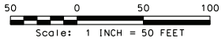
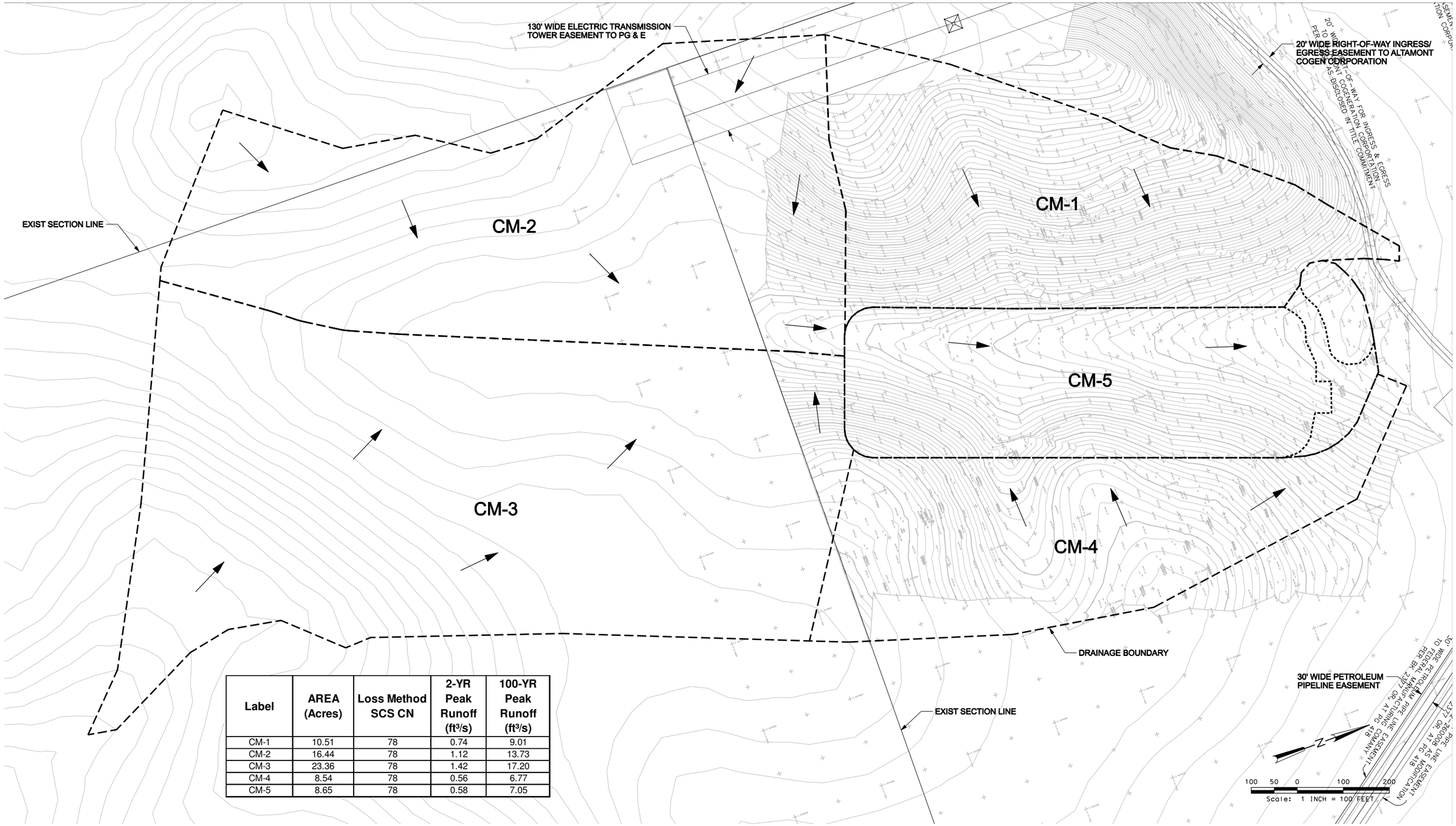




DISTURBANCE ACREAGE

SK-000-W-0-001

FIGURE 3
PLANT LIMITS OF GRADING
Mariposa Energy Project
Alameda County, California



Label	AREA (Acres)	Loss Method SCS CN	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
CM-1	10.51	78	0.74	9.01
CM-2	16.44	78	1.12	13.73
CM-3	23.36	78	1.42	17.20
CM-4	8.54	78	0.56	6.77
CM-5	8.65	78	0.58	7.05

FIGURE 4
PRE-CONSTRUCTION DRAINAGE CONDITION
Mariposa Energy Project
Alameda County, California

Label	Loss Method SCS CN	Area (acres)	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
S-1	93	7.53	5.09	16.51
S-2	93	0.59	0.45	1.49

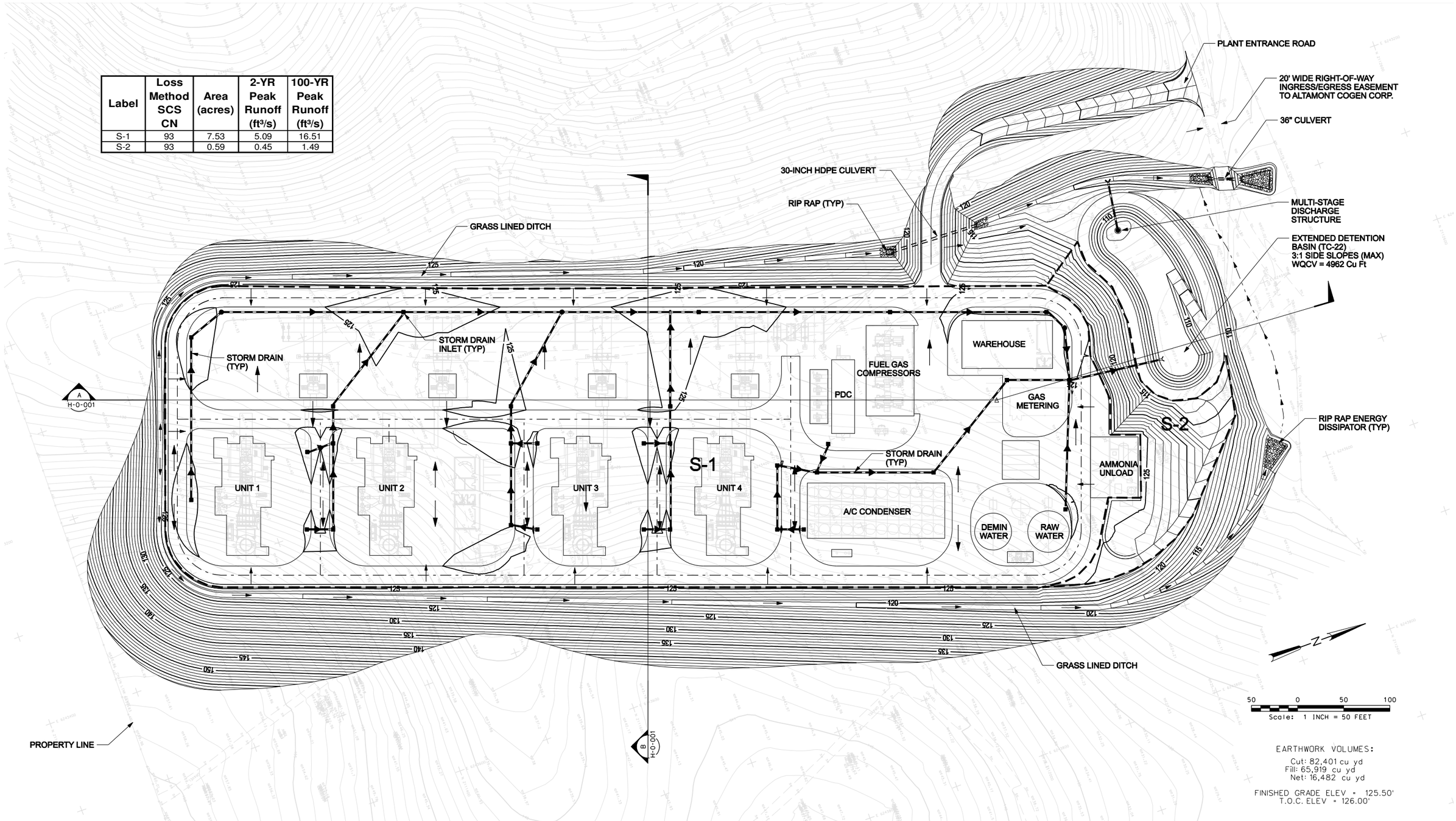


FIGURE 5
POST-CONSTRUCTION DRAINAGE CONDITION
Mariposa Energy Project
Alameda County, California

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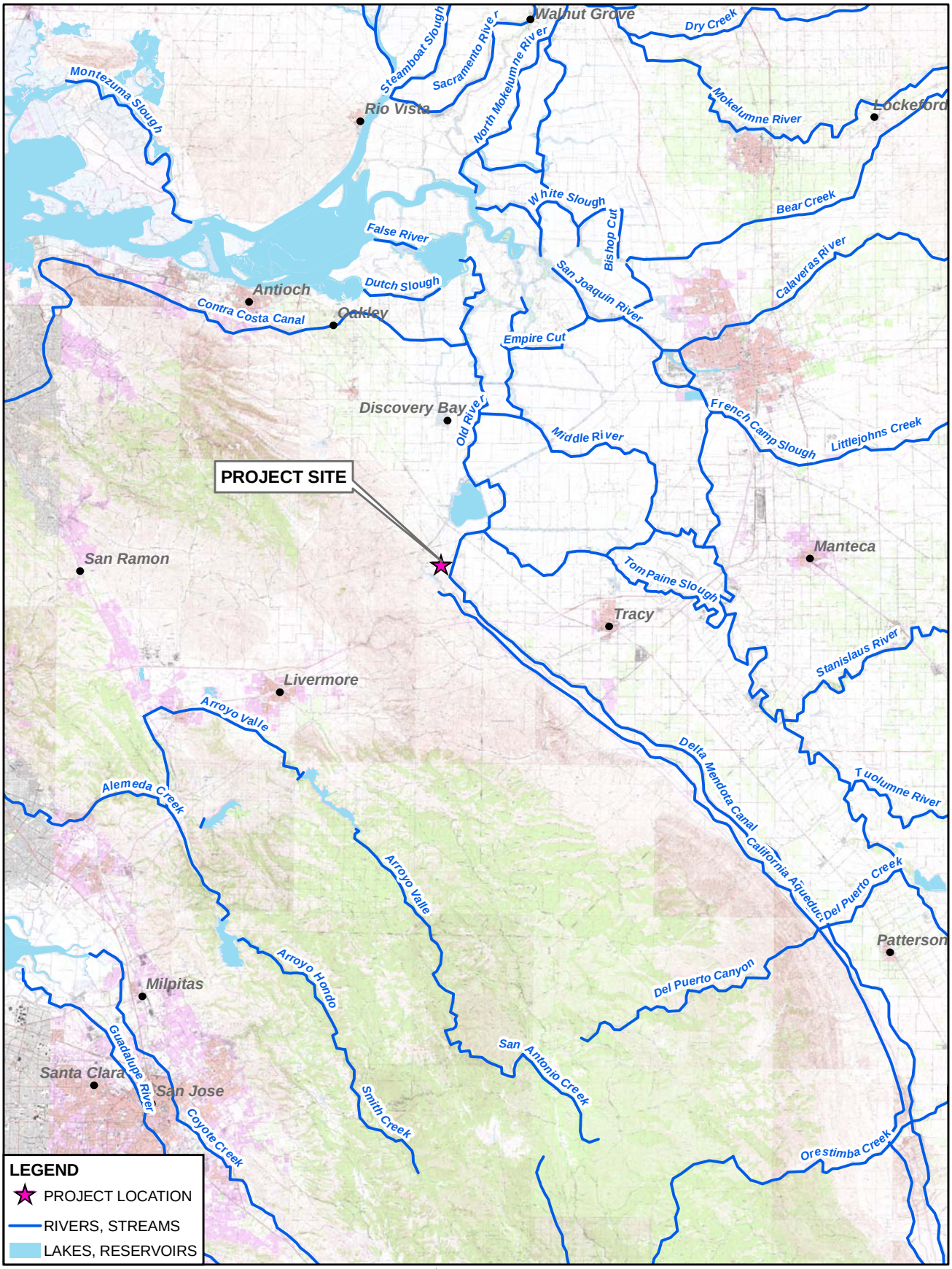

Notes:
1. Source: USGS, the National Atlas of the United States, Environmental Systems Research Institue (ESRI). Water Bodies - 2004, River and Streams - 2006.

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

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FIGURE 6
SURFACE WATER RESOURCES
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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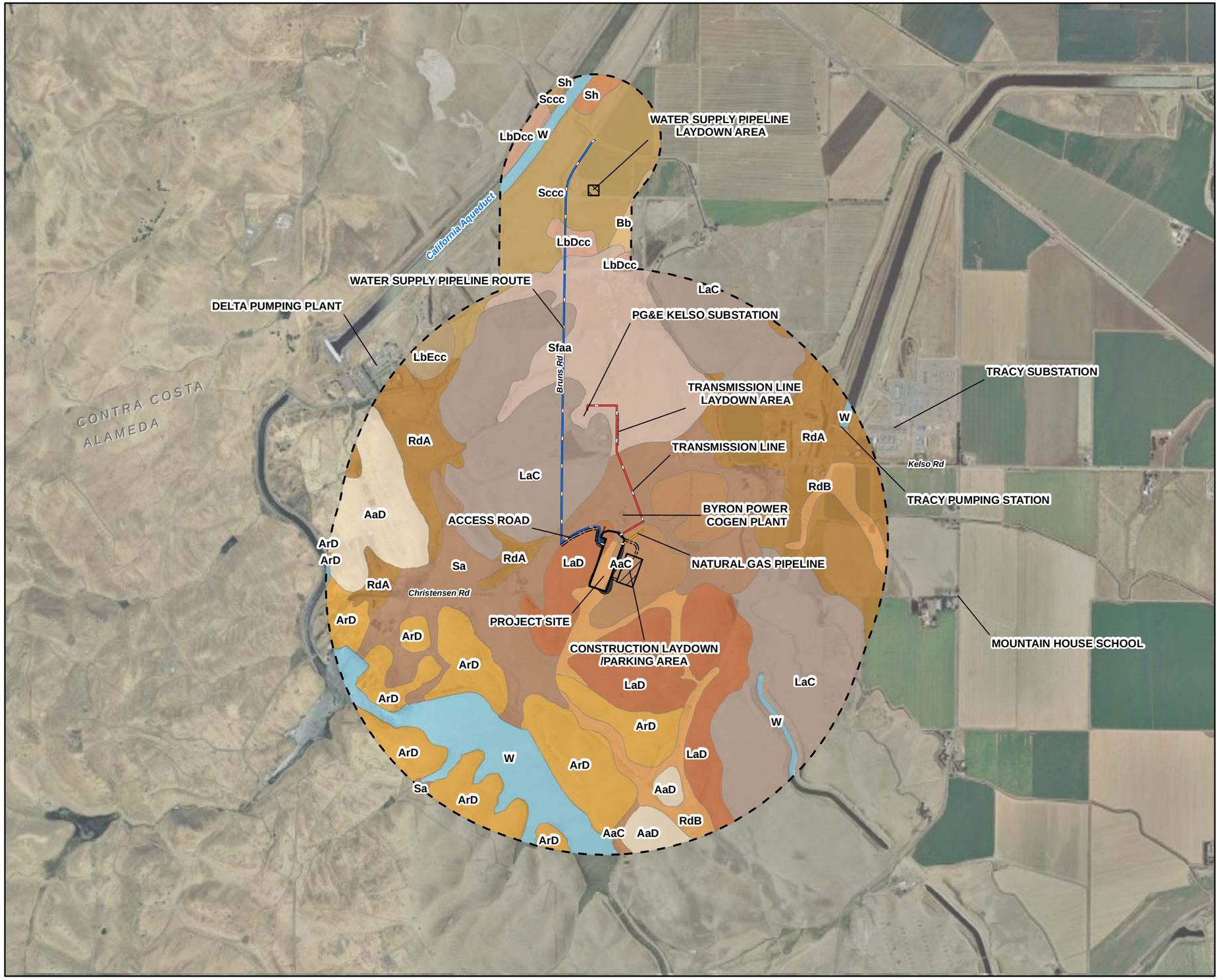

LEGEND

- ACCESS ROAD
- NATURAL GAS PIPELINE ROUTE
- TRANSMISSION LINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- DISTURBED AREA
- BUFFER

SOIL TYPE

- AaC, ALTAMONT CLAY, 3 TO 15 PERCENT SLOPES
- AaD, ALTAMONT CLAY, 15 TO 30 PERCENT SLOPES
- ArD, ALTAMONT ROCKY CLAY, 7 TO 30 PERCENT SLOPES
- Bb, BRENTWOOD CLAY LOAM
- LaC, LINNE CLAY LOAM, 3 TO 15 PERCENT SLOPES
- LaD, LINNE CLAY LOAM, 15 TO 30 PERCENT SLOPES
- LbDcc, LINNE CLAY LOAM, 5 TO 15 PERCENT SLOPES
- LbEcc, LINNE CLAY LOAM, 15 TO 30 PERCENT SLOPES
- RdA, RINCON CLAY LOAM, 0 TO 3 PERCENT SLOPES
- RdB, RINCON CLAY LOAM, 3 TO 7 PERCENT SLOPES
- Sa, SAN YSIDRO LOAM
- Sccc, SAN YSIDRO LOAM
- Sf, SOLANO FINE SANDY LOAM
- Sfaa, SOLANO FINE SANDY LOAM
- Sh, SOLANO LOAM
- W, WATER

Notes:
1. 1 Mile Buffer around Project Site, 1/4 Mile Buffer around all Linears.
2. Source: U.S. Department of Agriculture, Natural resources Conservation Service, Soil Survey Geographic (SSURGO) Database for Contra Costa and Alamenda County, California, 2005.

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

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FIGURE 7
SOIL TYPES
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

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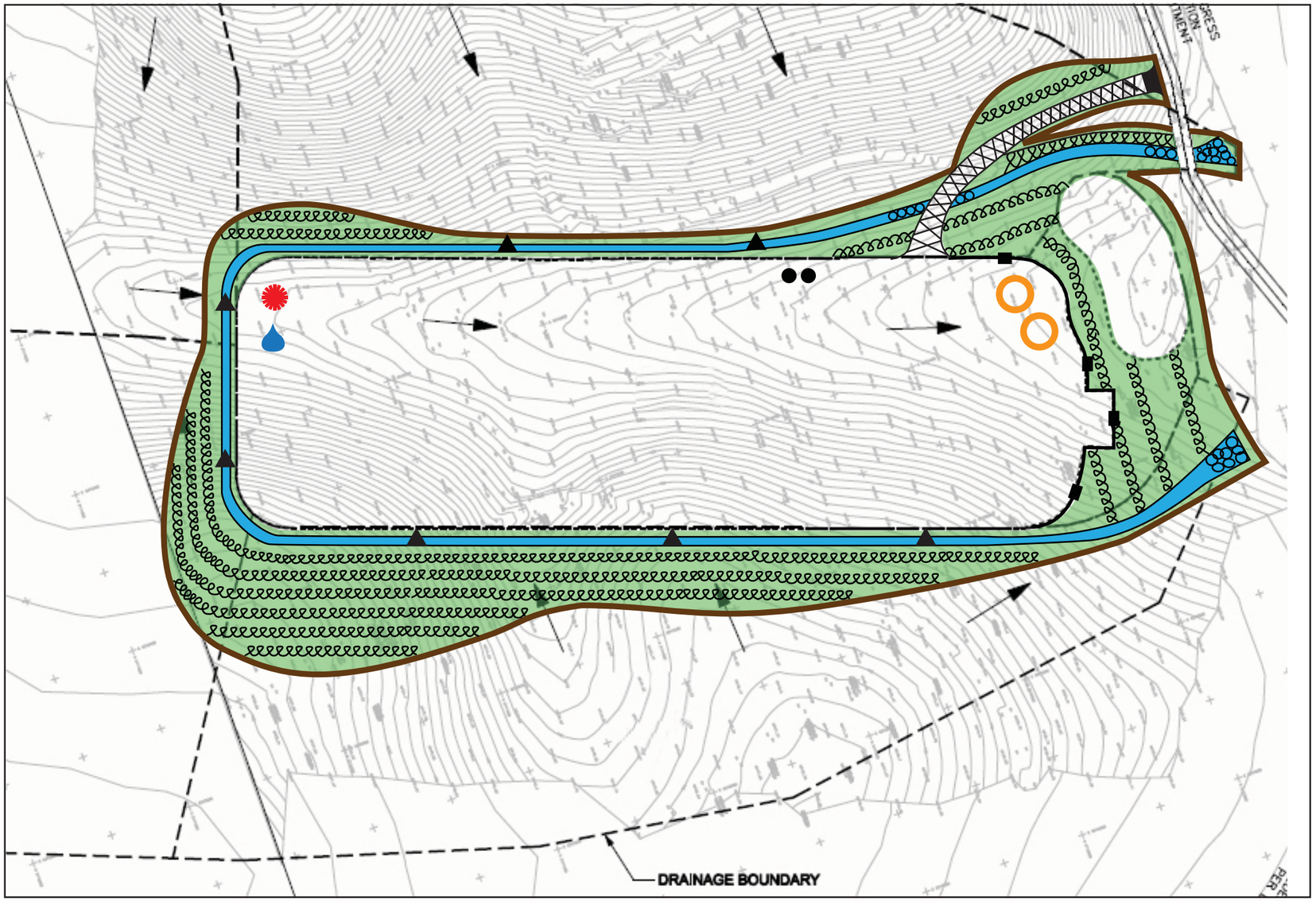


LEGEND

- TR-1 STABILIZED CONSTRUCTION ENTRANCE/EXIT
- TR-2 STABILIZED CONSTRUCTION ROADWAY
- EC-9 GRASS-LINED DRAINAGE SWALE
- EC-4 HYDROSEEDING/RE-VEGETATION AND/OR EC-3 HYDRAULIC MULCH
- EC-10 VELOCITY DISSIPATION DEVICES/RIPRAP
- DIRECTIONAL FLOW
- WM-9 SANITARY/SEPTIC WASTE MANAGEMENT
- SE-4 CHECK DAMS
- SE-1 SILT FENCE
- LIMITS OF GRADING
- WM-3 STOCKPILE MANAGEMENT
- COMPLETED AREAS STABILIZED WITH AGGREGATE OR PAVING, DISTURBED AREAS STABILIZED WITH MULCH OR EROSION CONTROL BLANKETS PRIOR TO RAIN EVENTS AS NEEDED
- USE OF FIBER ROLLS AND SILT FENCE AT THE TOE OF SLOPES AND PERIMETER OF DRAINAGE AREAS
- WE-1 WIND EROSION CONTROL, DISTURBED AREAS WATERED AS NEEDED
- SE-5 FIBER ROLL

CRITICAL SLOPE/SHEET FLOW LENGTH COMBINATIONS

Slope Percentage	Slope Percentage Sheet Not to Exceed
0 – 25%	20 feet
25-50%	15 feet
Over 50%	10 feet

FIGURE 8
CONCEPTUAL BMP PLAN
Mariposa Energy Project
Alameda County, California

Appendix B
Preliminary Stormwater Management Design

Table 5.11-3. Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

Table 5.11-2. Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

Feature (acreage)[2]	Activity	Duration (months)	Estimates Using Revised Universal Soil Loss Equation[1] Soil Loss (tons) without BMPs	Soil Loss (tons) with BMPs	Soil Loss (tons/yr) No Project
Site (9.7 acres estimated)	Grading	2	16.0	0.02	0.300
	Construction	14	5.2	0.15	---
Site Cut and Fill area (3.59 acres estimated)	Grading	3	13.0	0.17	0.15
	Construction	2	4.1	0.12	---
Site Access Road (1.2 acres estimated)	Grading	1	1.8	0.0	0.058
(1.2 acres exposed; will be paved or gravelled after grading)	Construction	14	0.0	0.0	---
Site Laydown Area (4.6 acres estimated)	Grading	1	1.5	0.0	0.124
	Construction	14	0.0	0.0	---
Site Laydown Area Access Roads (0.44 acres estimated)	Grading	1	0.3	0.0	0.012
	Construction	14	0.0	0.0	---
Transmission Line (5.15 acres for construction; 0.0020 acre	Grading	3	0.0030	0.010	0.00004
for pole footprints)	Construction	6	0.68	0.019	---
Transmission Line Laydown Area (0.6 acres estimated)	Grading	0	0.000	0.000	0.009
	Construction	6	0.000	0.000	---
Water Supply Pipeline (1.38 acres for construction; 0.44 acre	Grading	6	1.806	0.010	0.0112
for trench)	Construction	8	0.458	0.013	---
Water Supply Laydown Area (1.0 acre estimated)	Grading	0	0.000	0.000	0.030
	Construction	8	0.000	0.000	---
Natural Gas Pipeline (0.99 acre for construction; 0.04 acre for	Grading	2	0.05	0.0016	0.00258
trench)	Construction	6	0.17	0.0049	---
Project Soil Loss Estimates	**Construction Period**	**14**	**45.16**	**0.51**	**0.69**

Notes:

1. Soil losses (tons/acre/year) are estimated using RUSLE2 software available online [http://fargo.nserl.purdue.edu/rusle2_dataweb/].
   -The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped NRCS soil unit.
   -Soil loss (R-factors) were estimated using 2-year, 6-hour point precipitation frequency amount for the Mariposa Energy Facility project site found at [http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm].
   -Estimates of actual soil losses use the RUSLE2 soil loss times the duration and the affected area. The No Project Alternative estimate does not have a specific duration so loss is given as tons/year.
2. Acreages assume a 30 ft corridor for the transmission line and 100 ft corridors for the natural gas and water pipeline construction. Trenches for the natural gas and water pipelines are assumed to be 4 ft wide. The transmission line pole holes each have a 4 ft by 4 ft excavation footprint.

Other Project Assumptions as follows:
-It is assumed that 100% of the MEF project site will be exposed during grading, and approximately 10% of the site will be bare soil during construction.
-It is assumed that only the project site, a portion of the project site laydown areas, and project site access roads will be graded; all other areas will be 100% covered, either through natural vegetation or gravelling/paving.
-It is assumed that grading the project site will take 2 months and construction will take a total of 14 months.
-It is assumed that site cut and fill grading will occur over a 3 month period and will take an additional 2 months before permanent vegetation is established
-It is assumed that none of the laydown areas will be graded and that natural cover will be maintained (yielding negligible runoff).
-The overhead transmission line poles will have 4-foot x 4-foot footprints.
-It is assumed that the grading/excavation for the pole holes will be completed within 3 months and the entire installation will be completed within 6 months.
-It is assumed that the natural gas and water supply pipelines will be installed within a 4 ft wide trench and a 100 ft construction corridor.
-It is assumed that the natural gas pipeline will take 4 months to construct and will take another 2 months before permanent cover is established.
-It is assumed that the water supply pipeline will take 6 months to construct and an additional 2 months before permanent cover is established.
-It is assumed that the majority of the water supply pipeline construction will occur within Bruns Rd.
-It is assumed that an on-site septic system will be constructed and a sanitary sewer line will not be constructed.

RUSLE2 Assumptions as follows:
100-ft slope length. Estimated soil unit slope is the midpoint of the minimum and maximum of the unit slope class.
Construction soil losses assume the following inputs: Management - Bare ground; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.
Grading soil losses assume the following inputs: Management - Bare ground/rough surface; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.
Construction with BMP soil losses assume the following inputs: Management - Silt fence; Contouring - Perfect, no row grade; Diversion/terracing - None; Strips and Barriers - 2 fences, 1 at end of RUSLE slope.
No Project soil losses assume the following inputs: Management - Dense grass, not harvested; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.

Soil Type	Acreage		Soil Loss Estimates Using RUSLE2 software (tons/ac/year)			
		Slope	Grading	Construction w/o BMPs	Construction with BMPs	No Project
Project Site						
Sa/Sccc	0.57	4.5	7.8	3.5	0.098	0.026
LaD	1.67	23.0	25.0	12.0	0.34	0.064
AaC	1.67	9.0	7.8	3.7	0.10	0.027
RdB	5.78	5.0	6.4	2.9	0.081	0.023
	0.97	**Subtotal**	**96.20**	**4.50**	**0.13**	**0.30**
Site Cut and Fill Area						
AaC	1.77	9.0	7.8	3.7	0.10	0.027
LaD	1.41	23.0	25.0	12.0	0.34	0.064
RdB	0.25	5.0	6.4	2.9	0.081	0.023
Sa	0.16	4.5	7.8	3.5	0.098	0.026
	3.59	**Subtotal**	**51.90**	**24.75**	**0.69**	**0.15**
Site Access Road						
Sa/Sccc	0.42	4.5	7.8	3.5	0.098	0.026
LaD	0.74	23.0	25.0	12.0	0.34	0.064
	0.00	**Subtotal**	**21.78**	**0.0**	**0.0**	**0.058**
Site Laydown Area						
AaC	**2.30**	9.0	7.8	3.7	0.10	0.027
	4.60	**Subtotal**	**17.9**	**0.0**	**0.0**	**0.124**
Laydown Area Access Rds						
AaC	0.44	9.0	7.8	3.7	0.10	0.027
RdB	0.005	5.0	6.4	2.9	0.081	0.023
	0.00	**Subtotal**	**3.5**	**0.0**	**0.0**	**0.012**
Transmission Line						
Sf/Sfaa	0.0009	2.0	3.6	1.6	0.045	0.015
Sa/Sccc	0.0009	4.5	7.8	3.5	0.098	0.026
AaC	0.0002	9.0	7.8	3.7	0.10	0.027
	0.52	**Subtotal**	**0.012**	**1.369**	**0.038**	**0.00004**
T-Line Laydown						
Sf/Sfaa	0.60	2.0	3.6	1.6	0.045	0.015
	0.00	**Subtotal**	**0.00**	**0.00**	**0.00**	**0.009**
Water Supply Pipeline						
Sf/Sfaa	0.08	2.0	3.6	1.6	0.045	0.015
LaC	0.17	9.0	8.0	3.7	0.10	0.024
LaD	0.03	23.0	25.0	12.0	0.34	0.064
LbDcc/LbD	0.03	10.0	9.3	4.4	0.12	0.028
Sa/Sccc	0.13	4.5	7.8	3.5	0.098	0.026
	0.14	**Subtotal**	**3.61**	**0.69**	**0.02**	**0.011**
Water Supply Laydown						
Sc	1.00	4.5	9.1	4.0	0.11	0.03
	0.00	**Subtotal**	**0.00**	**0.00**	**0.00**	**0.030**
Natural Gas Pipeline						
Sa/Sccc	0.04	4.5	7.8	3.5	0.098	0.026
	0.10	**Subtotal**	**0.31**	**0.35**	**0.01**	**0.003**
Sewer Line						
On-site connection	**0.00**	**Subtotal**	**0.00**	**0.00**	**0.00**	**0.00**

Assumptions:
Assumes slope is the mid-point of the slope class
Assumes no grading at any of the laydown areas or access roads, with the exception of the project site laydown area and access road).

Project site is currently 10% bare soil and would have same proportion during construction.
100% of project site would be bare soil during grading.
100% of pole holes will be bare soil during grading/excavation.
100% of the cut and fill area will be bare soil during grading/excavation

Transmission pole impact area assumes a 4 ft by 4 ft footprint times the number of poles
The No Project soil loss assumes a 'dense grass, not harvested' management scenario.

Project: DGC-Kelso - Jenny Krenz updated 05/08/09 based on e-mail from Mike Haskell

OBJECTID	AREASYMBOL	Length	Shape_Area_SF	Acres	Acreage_tot	
MEP Site	Sa/Sccc			0.57	0.57	Acres from Mike Haskell, 3/19/2009
	LaD			1.67	1.67	Acres from Mike Haskell, 3/19/2009
	AaC			1.67	1.67	Acres from Mike Haskell, 3/19/2009
	RdB			5.78	5.78	Acres from Mike Haskell, 3/19/2009
				9.7	**0.97**	Assumes only 10% of site is bare soil during construction
Cut and Fill area at Site	AaC			1.77	**1.77**	Acres from Mike Haskell, 5/08/09
	LaD			1.41	**1.41**	Acres from Mike Haskell, 5/08/09
	RdB			0.25	**0.25**	Acres from Mike Haskell, 5/08/09
	Sa			0.16	**0.16**	Acres from Mike Haskell, 5/08/09
				3.59	**3.59**	Assumes 100% of the cut and fill area is bare soil during cut and fill construction
Access to Site	Sa/Sccc	454.72	18188.8	0.42	0.42	Assumes 40 foot wide roadway access; Length from Mike Haskell, 3/19/2009
	LaD	806.92	32276.7	0.74	0.74	Assumes 40 foot wide roadway access; Length from Mike Haskell, 3/19/2009
				1.2	**0.00**	Assumes access is completely covered (paved or gravelled) after grading
Site Laydown Area	AaC			4.60	4.60	
				2.30	**0.00**	Assumes 1/2 of the laydown area is graded; Laydown area is completely paved; Email from Doug Urry 3/25/09
Access to Laydown Area	AaC	637.11	19113.2	0.44		Assumes 30 foot wide roadways access; Length from Mike Haskell, 3/19/2009
	RdB	7.04	211.3	0.0049		Assumes 30 foot wide roadways access; Length from Mike Haskell, 3/19/2009
				0.44	**0.00**	Assumes access roads are completely paved after grading; E-mail from Robert Smith/DEN 3/25/09
			# of poles	**Pole Holes**	**Construction Corridor**	
Transmission Line	Sf/Sfaa	1652.76	3	0.0009	**2.324**	Assumes 12 sq ft hole for each pole spaced at 500 ft. Assumes 50 ft construction corridor along length, and 100x100 ft construction corridor at each pole. Length from Mike Haskell, 05/07/09; spacing from Doug Urry, 3/25/09.
	Sa/Sccc	1720.65	3	0.0009	**2.419**	Assumes 12 sq ft hole for each pole spaced at 500 ft. Assumes 50 ft construction corridor along length, and 100x100 ft construction corridor at each pole. Length from Mike Haskell, 05/07/09; spacing from Doug Urry, 3/25/09.
	AaC	289.86	1	0.0002	**0.408**	Assumes 12 sq ft hole for each pole spaced at 500 ft. Assumes 50 ft construction corridor along length, and 100x100 ft construction corridor at each pole. Length from Mike Haskell, 05/07/09; spacing from Doug Urry, 3/25/09.
		subtotal	**7**	**0.0020**	**5.15**	Assumes pole hole footprint unprotected until pole installed
					0.515	Assumes 10% of the corridor is unprotected during construction
T Line Laydown Area	Sf/Sfaa			0.6	0.6	
					0.00	Assumes no grading and laydown area is completely covered (paved or gravelled) during construction
		Trench	**Corridor**	**Trench Acres**	**Construction Corridor Acres**	
Water Supply Pipeline	Sf/Sfaa	1719.26	0	0.08	0.00	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	LaC	3685.39	0	0.17	0.00	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	LaD	579.44	350	0.03	0.24	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	LbDcc	633.55	0	0.03	0.00	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
	Sa/Sccc	2898.58	1650	0.13	1.14	Assumes 2 ft wide trench, primarily in Bruns Rd; 30 ft wide construction corridor for areas not under Bruns Rd; No additional corridor for under Bruns Rd; Length from Mike Haskell, 3/19/2009; additional info from Doug Urry, 3/25/09; corridor length estimated by JLK on 3/27/09 - waiting to hear from Mike
				0.44	1.38	Assumes trench is 100% exposed during construction
					0.14	Assumes corridor is 10% exposed during construction
Water Supply Laydown Area	Sc				1.0	
					0.00	Assumes laydown area is completely covered (paved or gravelled) during construction
				Trench Acres	**Construction Corridor Acres**	
Natural Gas Supply Pipeline	Sa/Sccc	576.73		0.04	0.99	Assumes 3 ft wide trench & 75 ft wide construction corridor; length from Mike Haskell, 05/07/09; details from Doug Urry, 3/25/09
				0.04	0.99	Assumes trench is 100% exposed during construction
					0.10	Assumes corridor is 10% exposed during construction
Sewer Line	-	0		**0**	**0**	Assumes on-site connection

Table 5.11-4. Estimate of Total Suspended Particulates (TSP) Emitted from Grading and Wind Erosion

Table 5.11-3. Estimate of Total Suspended Particulates (TSP) Emitted from Grading and Wind Erosion				
Emission Source	**Acreage**	**Duration (months)**	**Unmitigated TSP (tons)**	**Mitigated TSP (tons)**
Grading Dust:				
Project Site	9.69	2	0.333	0.117
Site Cut and Fill Area	3.59	3	0.185	0.065
Project Site Access Road	1.16	1	0.020	0.007
Project Site Laydown Area	2.30	1	0.040	0.014
Project Site Laydown Area Access Road	0.44	1	0.008	0.003
Transmission Line Pole Holes	0.0020	3	0.00010	0.00004
Transmission Line Laydown Area	0.60	0	0.000	0.000
Water Supply Line Trench	0.44	6	0.045	0.016
Water Supply Line Laydown Area	1.00	0	0.000	0.000
Natural Gas Pipeline Trench	0.04	2	0.00137	0.00048
Wind Blown Dust:				
Project Site	0.97	12	0.368	0.129
Site Cut and Fill Area	3.59	2	0.227	0.080
Project Site Access Road	0.00	14	0.000	0.000
Project Site Laydown Area	0.00	14	0.000	0.000
Project Site Laydown Area Access Road	0.00	14	0.000	0.000
Transmission Line Pole Holes	0.002018	6	0.00038	0.00013
Transmission Line Laydown Area	0.00	6	0.000	0.000
Water Supply Line Corridor	0.14	8	0.035	0.012
Water Supply Line Laydown Area	0.00	8	0.000	0.000
Natural Gas Pipeline Corridor	0.0993	6	0.0189	0.0066
Estimated Total		14	1.281	0.448

Notes:
All linear feature impacts noted above are for portions outside of the project areas footprints.

Project Assumptions:
Grading for project site will be completed in a 2 month period and construction will extend an additional 12 months.
Approximately 1/10th of the project site will have bare soil exposure during the length of the construction period.
None of the laydown areas (except a portion of the project site laydown area) will be graded. It is expected that all roadway and laydown areas would be covered (gravelled or paved) for all season use.
Excavation of transmission line pole holes will take 3 months followed by a 3 month construction period.
The transmission poles will have a 4 by 4 foot area for a total impact permanent area of 0.0075 acre.
The natural gas line and water supply line will be installed in a 4-ft trench with a 100-ft construction corridor.
The natural gas and water supply trenches will be 100% exposed during the excavation period, with permenant vegetation restored after installation.
The 100 ft construction corridors will remain in natural vegetation, with approximately 10% bare soil exposed
It is assumed grading activities will be limited to the project site and the project site access road.

Data Sources:
[a] PM10 Emission Factor Source: Midwest Research Institute, South Coast AQMD Project No. 95040, Level 2 Analysis Procedure, March 1996
[b] PM10 to TSP Conversion Factor Source: Bay Area Air Quality Management District CEQA Guidelines, Assessing the Air Quality Impacts of Projects, December 1999.
SCAQMD CEQA Handbook (1993) Table 11-4 for mitigation efficiency rates (as summarized in Table 8.9-4)

Project: Mariposa Energy Facility JLK 5/08/09

Dust from Wind Erosion - With and Without Mitigation

Grading		MRI factor of 0.011 tons/acre/month is based on 168 hours per month of construction activity.
PM10 Emission Factor (ton/acre/month)[a]	0.011	Fact Sheet, 4/26/2007.
Project Site		
Duration (months):	2	Assumes 2 months of active grading.
Site Acreage:	9.69	Assumes 100% of site is graded
PM10 Emitted (tons):	0.21	
TSP Emitted (tons)[b]:	**0.333**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.117**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Site Cut and Fill Area		
Duration (months):	3	Assumes 3 months of active grading
Site Acreage:	3.59	Assumes 100% of area will be graded
PM10 Emitted (tons):	0.12	
TSP Emitted (tons)[b]:	**0.185**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.065**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Access Road		
Duration (months):	1	Assumes one month to grade
Site Acreage:	1.16	Assumes 100% of access road is graded
PM10 Emitted (tons):	0.01	
TSP Emitted (tons)[b]:	**0.020**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.007**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area		
Duration (months):	1	Assumes project site laydown area will be partially graded (1/2 estimated).
Site Acreage:	2.30	
PM10 Emitted (tons):	0.03	
TSP Emitted (tons)[b]:	**0.040**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.014**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area Access Road		
Duration (months):	1	Assumes project site laydown access road will be graded.
Site Acreage:	0.44	
PM10 Emitted (tons):	0.00	
TSP Emitted (tons)[b]:	**0.008**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.003**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Pole Holes		
Duration (months):	3	Assumes 3 months to grade
Site Acreage:	0.0020	
PM10 Emitted (tons):	0.0001	
TSP Emitted (tons)[b]:	**0.0001**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Laydown Area		
Duration (months):	0	Assumes transmission line laydown area WILL NOT be graded.
Site Acreage:	0.60	
PM10 Emitted (tons):	0.00	
TSP Emitted (tons)[b]:	**0.000**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Trench		
Duration (months):	6	Assumes 4 months to grade pipeline
Site Acreage:	0.437	
PM10 Emitted (tons):	0.0288	
TSP Emitted (tons)[b]:	**0.0451**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0158**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Laydown Area		
Duration (months):	0	Assumes water supply line laydown area WILL NOT be graded.
Site Acreage:	1.00	
PM10 Emitted (tons):	0.0000	
TSP Emitted (tons)[b]:	**0.0000**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Natural Gas Pipeline Trench		
Duration (months):	2	Assumes 2 months to grade pipeline
Site Acreage:	0.040	
PM10 Emitted (tons):	0.0009	
TSP Emitted (tons)[b]:	**0.0014**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0005**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Sanitary Sewer Line		
Duration (months):	0	Assumes on-site connection
Site Acreage:	0.000	
PM10 Emitted (tons):	0.0000	
TSP Emitted (tons)[b]:	**0.0000**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.0000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Total Unmitigated TSP Emitted (tons):	**0.632**	
Total Mitigated TSP Emitted (tons):	**0.221**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4

[a]Emission Factor Source: Midwest Research Institute, South Coast AQMD Project No. 95040, March 1996, Level 2 Analysis Procedure

[b] Conversion Factor Source: Bay Area Air Quality Management District (BAAQMD) BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans. December 1999

Wind Blown Dust		
TSP Emission Factor (ton/acre/year)	0.38	Emission Factor Source: AP-42, Section 11.9 Western Surface Coal Mining Table 11.9-4, January 1995.
Project Site		
Acres exposed	0.97	Assumes that only 10% of the project area is exposed during construction
Duration (months)	12	Assumes 12 months of construction after grading
TSP Emitted for Site (tons):	**0.368**	
Mitigated TSP Emitted (tons):	**0.129**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Site Cut and Fill Area		
Duration (months):	2.00	Assumes it will take 2 months for revegetation
Site Acreage:	3.59	100% of the cut and fill area will be disturbed
PM10 Emitted (tons):	**0.227**	
TSP Emitted (tons)[b]:	**0.080**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Access Road		
Acres exposed	0.00	Assumes project site access road is completely covered with gravel or other material after grading
Duration (months)	14	Assumes 14 months of construction traffic
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area		
Acres exposed	0.00	Assumes project site laydown area is completely covered (natural veg, gravelled or paved) during construction
Duration (months)	14	Assumes 14 months of construction traffic
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project Site Laydown Area Access Road		
Acres exposed	0.00	Assumes project site laydown access road is completely covered (natural veg, gravelled or paved) during construction
Duration (months):	14	Assumes 14 months of construction traffic
TSP Emitted (tons)[b]:	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Pole Footprints		
Acres exposed	0.0020	Assumes pole holes are unprotected until pole installed
Duration (months)	6	Assumes 6 months of excavation & installation
TSP Emitted for Site (tons):	**0.00038**	
Mitigated TSP Emitted (tons):	**0.000134**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Transmission Line Laydown Area		
Acres exposed	0.000	Assumes transmission line laydown area is completely covered (natural veg, gravelled or paved) during construction
Duration (months):	6	Assumes 6 months of construction
TSP Emitted (tons)[b]:	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Corridor		
Acres exposed	0.138	Assumes corridor is 10% exposed during construction
Duration (months):	8	Assumes 8 months of construction
TSP Emitted (tons)[b]:	**0.035**	
Mitigated TSP Emitted (tons):	**0.012**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Water Supply Line Laydown Area		
Acres exposed	0.000	Assumes water supply line laydown area is completely covered (natural veg, gravelled or paved) during construction
Duration (months)	8	Assumes 8 months of construction
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Natural Gas Pipeline Corridor		
Acres exposed	0.099	Assumes corridor is 10% exposed during construction
Duration (months)	6	Assumes 6 months of construction
TSP Emitted for Site (tons):	**0.019**	
Mitigated TSP Emitted (tons):	**0.007**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Sanitary Sewer Line		
Acres exposed	0.000	Assumes on-site construction
Duration (months)	0	
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Total Wind Blown Dust (tons) without mitiga	**0.650**	
Total WBD (tons) with mitigation	**0.227**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Project total without mitigation	**1.281**	
Project total with mitigation	**0.448**	

Appendix C
Preliminary Stormwater Management Design

CALCULATION SET NO. 383206-CE-01

CH2MHILL

CALCULATION SUMMARY & CONTROL SHEET

PRELIM.	FINAL	VOID	REVISION
X			C

Sheet	1	of	19
Discipline	Civil		
Project No	383206		

CLIENT: Diamond Generating Corporation (DGC)

PROJECT TITLE: Kelso CT Project

SUBJECT: Drainage calculations for Peak Runoff and Detention Pond sizing.

COMPLETED BY: *John Purdy, P.E.* JMP DATE: 5/19/09

CHECKED BY: *Matthew Cannizzaro, P.E.* MMC DATE: 5/19/09

APPROVED BY: DATE:

REVISION SUMMARY: *General Revision*

TOTAL NUMBER OF SHEETS IN THIS ISSUE: 19

SHEETS REVISED, ADDED, or DELETED: pgs 3 & 4

PROBLEM STATEMENT: *Calculate subbasin peak runoff flows and confirm the size of the site stormwater detention pond.*

RESULTS & CONCLUSIONS: *See Calculation Summary Sheet Page 2*

DESIGN BASIS & ASSUMPTIONS: *See Calculation Summary Sheet Page 2*

UNVERIFIED ASSUMPTIONS/OPEN ITEMS: N/A

REFERENCES: NOAA Atlas 2, Volume XI; Alameda County Flood Control & Water Conservation District, C.3 Stormwater Technical Guidance, V1.0, 8/2006

ATTACHMENTS (Including number of pages): *Drainage System Schematic (2p), Bentley CivilStorm Output Report (6p), Detention Pond Stage-Storage & Flow In / Out Graphs (2p), Water Quality Capture Volume (WQCV) Calculation (1p) California Precipitation Frequency Data Output (1p), Hydrologic Soil Group (4p), Alameda County Mean Annual Precipitation Map (1p)*

COMPUTER PROGRAM DISCLOSURE INFORMATION:

Program Used	Rev No./Issue Date	CH2M Verified
Bentley Civil Storm	*V8 XM /*	X Yes ___ No

Site hydrology will be based on the following criteria:

Method: SCS Unit Hydrograph Method
Rainfall Distribution: SCS Type I
Hydrologic Soil Group: Group D (See Attachment from NRCS)
Curve Number: 78 – Existing Condition – Meadow – cont. grass, HSG D
Curve Number: 93 – Proposed Plant - Urban industrial, HSG D
Water Quality Capture Volume (WQCV): Per Alameda County, C.3 Storm Water Technical Guidance, 8/2006
Proposed Project Drainage Area: 8.12 Acres
Tributary Off-Site Drainage Area: 67.50 Acres (Diverted around the Proposed Project Site)
Minimum Time of Concentration (Tc): 5-minutes
Minimum Pipe Size for Storm Drain Main Line: 18-inches

Design Storms:

2-year 24 hour - 1.64 inches (Prec. Freq. Data Output, NOAA Atlas 2, See Attachment)
100-year 24 hour – 4.00 inches Prec. Freq. Data Output, NOAA Atlas 2, See Attachment)

Existing Condition Peak Runoff (CM-5):

2-year 24 hour – 0.21 Acre-ft, Q=0.58 cfs
100-year 24 hour – 1.36 Acre-ft, Q=7.05 cfs

Computed runoff volume tributary to the On-Site Detention Pond (S-1 &S-2):

2-year 24 hour – 0.28 Acre-ft, Qout=0.58 cfs, peak elevation 108.63 ft
100-year 24 hour – 0.79 Acre-ft, Qout=6.58 cfs, peak elevation 110.96 ft with 2.04 ft of freeboard
Water Quality Capture Volume (WQCV): 4962 CuFt, outlet designed for 48-hour drawdown

System Description:

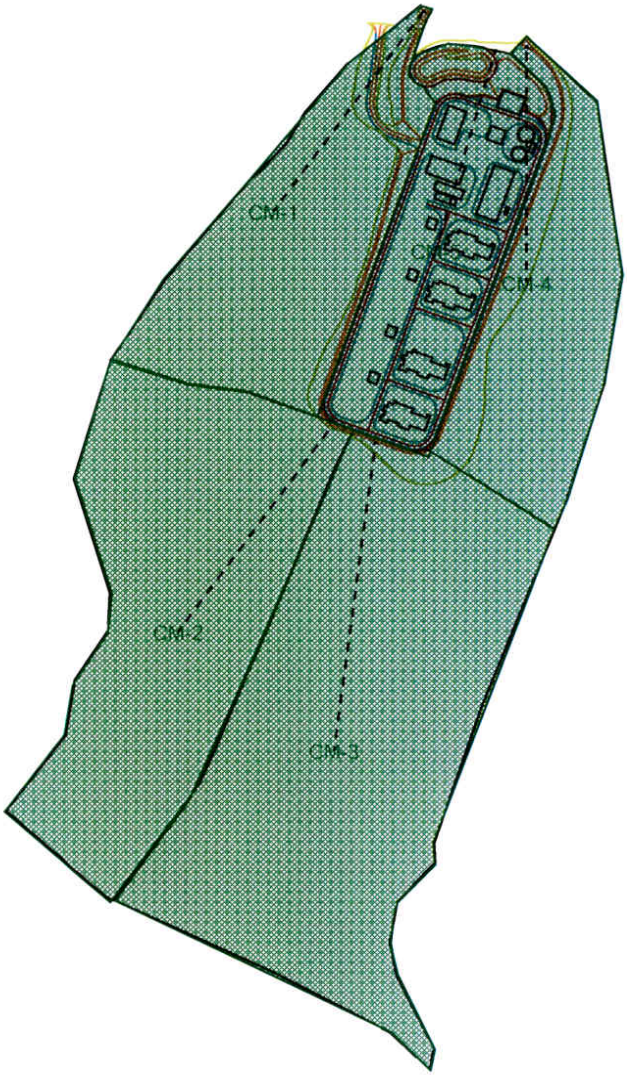
The Kelso Power Plant is a proposed facility in Alameda County, California.

The proposed facility will mitigate storm runoff with a series of inlets and storm drain pipes which will convey the runoff to a proposed on-site Extended Detention Basin (TC-22) located on the north end of the site. Areas of potential oil contamination will be sited inside containments which will prevent potential contaminates from being conveyed to the storm system. Storm water that is contained will be treated and disposed of per the regulatory requirements. The implementation of these containments will enable for the balance of site runoff to be conveyed directly to the Extended Detention Basin without prior treatment through an oil water separator.

Impervious areas will be limited to paved loop and equipment access roads and the equipment required to operate the plant. The remainder of the site will gravel surfaced. The proposed plant is 44% impervious.

EXISTING CONDITION

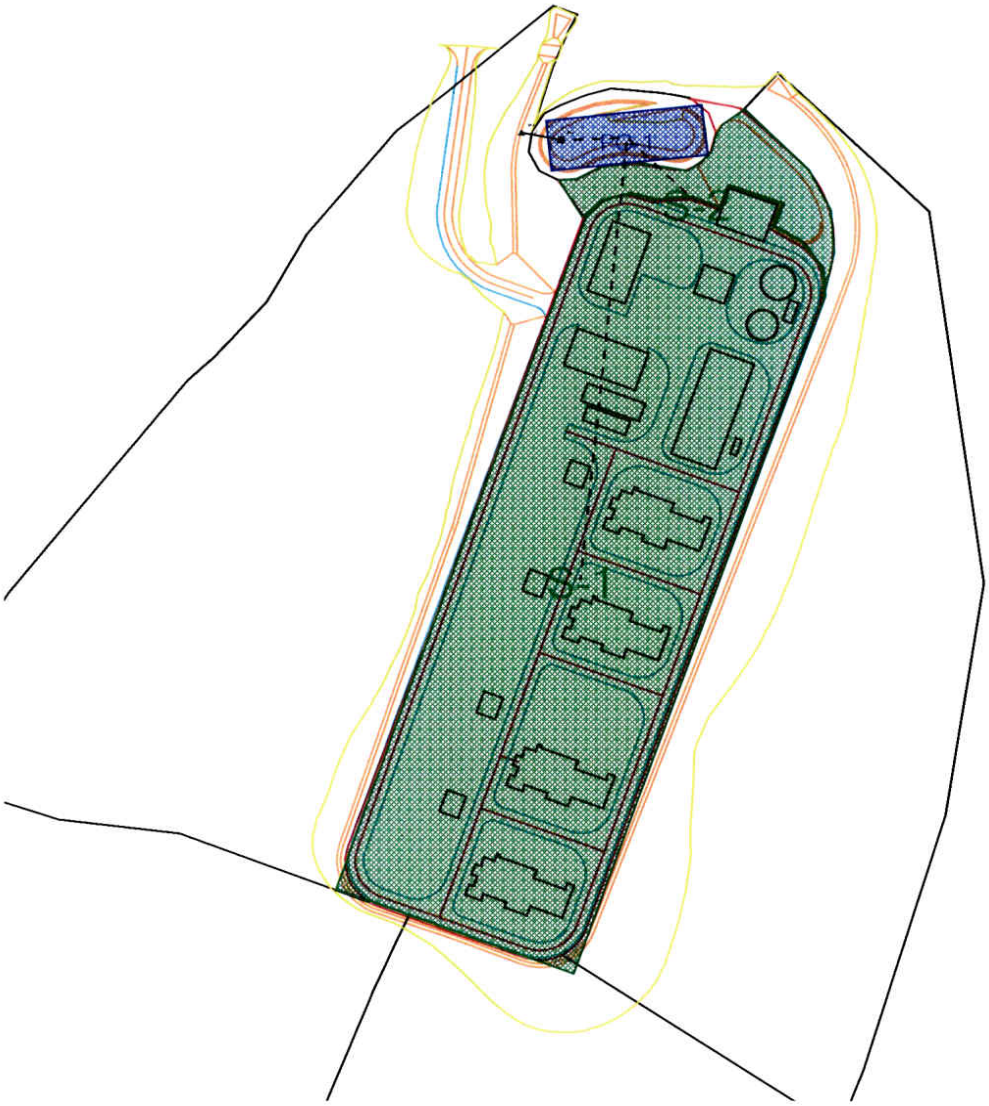
Scenario: Base



REV C

PROPOSED CONDITION

Scenario: Base



REV C

2-YR EXISTING

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		

Calculation Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	2880.00 min

Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft^3/s)	Time To Peak (min)
CM-5	Unit Hydrograph	SCS CN	1.640	8.650	0.21	0.58	618.00
CM-1	Unit Hydrograph	SCS CN	1.640	10.510	0.26	0.74	615.00
CM-2	Unit Hydrograph	SCS CN	1.640	16.440	0.41	1.12	615.00
CM-4	Unit Hydrograph	SCS CN	1.640	8.540	0.21	0.56	618.00
CM-3	Unit Hydrograph	SCS CN	1.640	23.360	0.58	1.42	621.00

General Calculation Summary N/A

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft^3/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)

100 YR EXISTING

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		
Calculation Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	2880.00 min
Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft³/s)	Time To Peak (min)
CM-5	Unit Hydrograph	SCS CN	3.995	8.650	1.36	7.05	612.00
CM-1	Unit Hydrograph	SCS CN	3.995	10.510	1.65	9.01	609.00
CM-2	Unit Hydrograph	SCS CN	3.995	16.440	2.58	13.73	609.00
CM-4	Unit Hydrograph	SCS CN	3.995	8.540	1.34	6.77	612.00
CM-3	Unit Hydrograph	SCS CN	3.995	23.360	3.66	17.20	615.00

General Calculation Summary

N/A

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft³/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)

24R PROPOSED

7

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		

Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	4800.00 min

Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft^3/s)	Time To Peak (min)
S-1	Unit Hydrograph	SCS CN	1.640	7.530	0.62	5.09	600.00
S-2	Unit Hydrograph	SCS CN	1.640	0.590	0.05	0.45	594.00

General Calculation Summary

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft^3/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)
CO-1	Conduit	2	727.48	0.58	4.52	105.94
PO-1	Pond	1	---	---	---	108.63

Node Calculation Summary

Label	Element Type	Branch	Time to Maximum Inflow (min)	Flow (Total In Maximum) (ft^3/s)	Time To Maximum Inlet Flow (min)	Flow (Surface Maximum) (ft^3/s)	Time To Maximum Captured Flow (min)	Flow (Captured Maximum) (ft^3/s)	Time to Maximum Overflow (min)	Flow (Overflow Maximum) (ft^3/s)
OF-7	Outfall	2	(N/A)	(N/A)	---	---	---	---	(N/A)	(N/A)
PO-1	Pond	1	598.48	5.42	---	---	---	---	0.00	0.00

Gutter Calculation Summary

Label	Open Cross Section	Flow (Maximum) (ft^3/s)	Time to Maximum Flow (min)	Velocity (Maximum) (ft/s)

100 YR PROPOSED

Calculation Detailed Summary

<General>			
Label	Base Calculation Options		
Options			
Calculation Time Step	1.50 min	Hydrologic Time Step	1.50 min
Output Increment	3.00 min	Total Simulation Time	4800.00 min
Options (Advanced)			
Y Iteration Tolerance	0.03 ft	Relaxation Weighting Coefficient	0.600
LPI Coefficient	1.000	Computation Distance	50.00 ft
NR Weighting Coefficient	0.700		

Catchment Calculation Summary

Label	Runoff Method	Loss Method	Total Rainfall Depth (in)	Area (acres)	Volume (Total Runoff) (ac-ft)	Flow (Peak) (ft^3/s)	Time To Peak (min)
S-1	Unit Hydrograph	SCS CN	4.000	7.530	2.02	16.51	600.00
S-2	Unit Hydrograph	SCS CN	4.000	0.590	0.16	1.49	594.00

General Calculation Summary

Label	Element Type	Branch	Time to Maximum Flow (min)	Flow (Maximum) (ft^3/s)	Velocity (Maximum) (ft/s)	Hydraulic Grade (Maximum) (ft)
CO-1	Conduit	2	613.48	6.58	9.44	106.38
PO-1	Pond	1	---	---	---	110.96

Node Calculation Summary

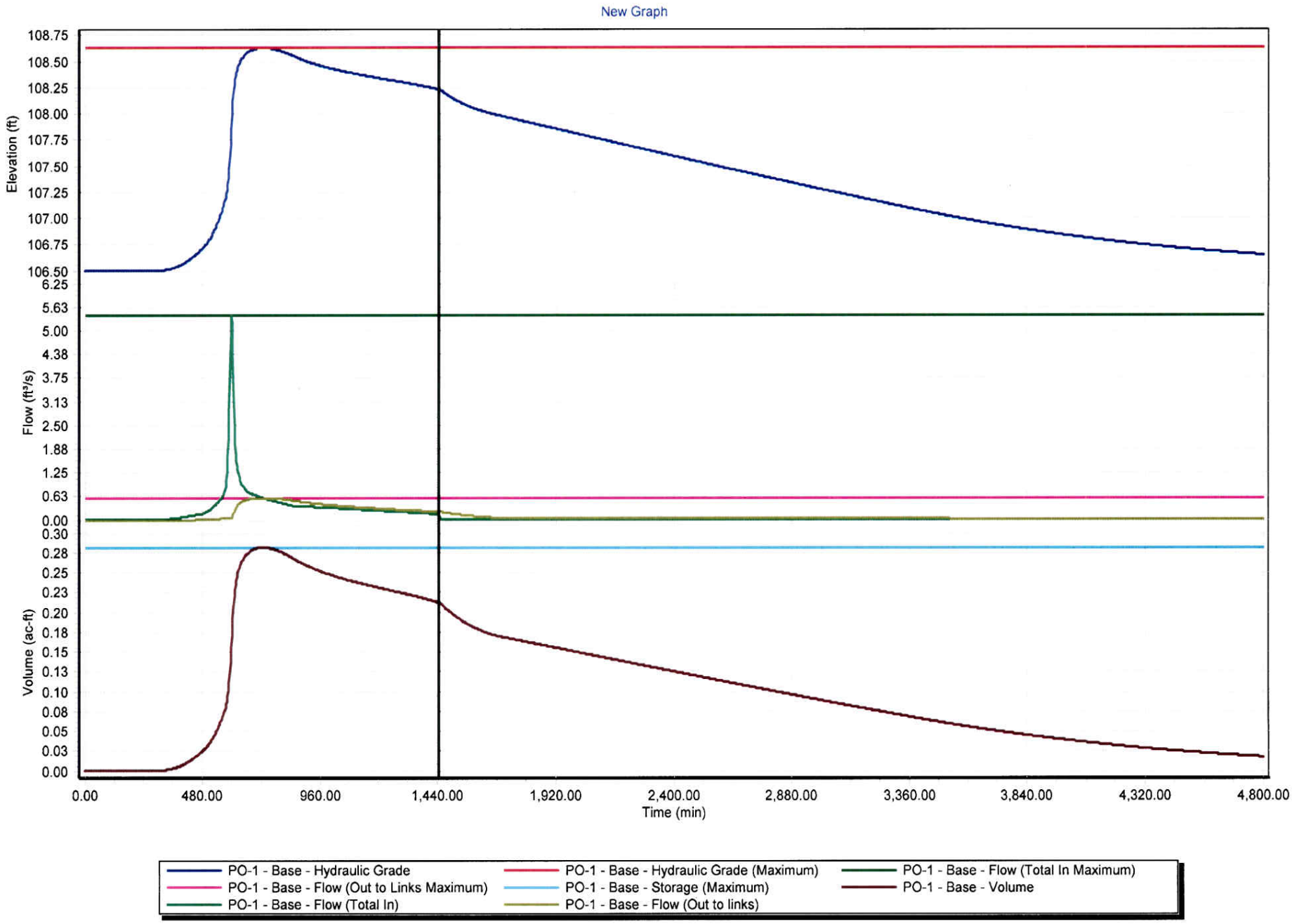
Label	Element Type	Branch	Time to Maximum Inflow (min)	Flow (Total In Maximum) (ft^3/s)	Time To Maximum Inlet Flow (min)	Flow (Surface Maximum) (ft^3/s)	Time To Maximum Captured Flow (min)	Flow (Captured Maximum) (ft^3/s)
OF-7	Outfall	2	(N/A)	(N/A)	---	---	---	---
PO-1	Pond	1	598.48	17.73	---	---	---	---

Time to Maximum Overflow (min)	Flow (Overflow Maximum) (ft^3/s)
(N/A)	(N/A)
0.00	0.00

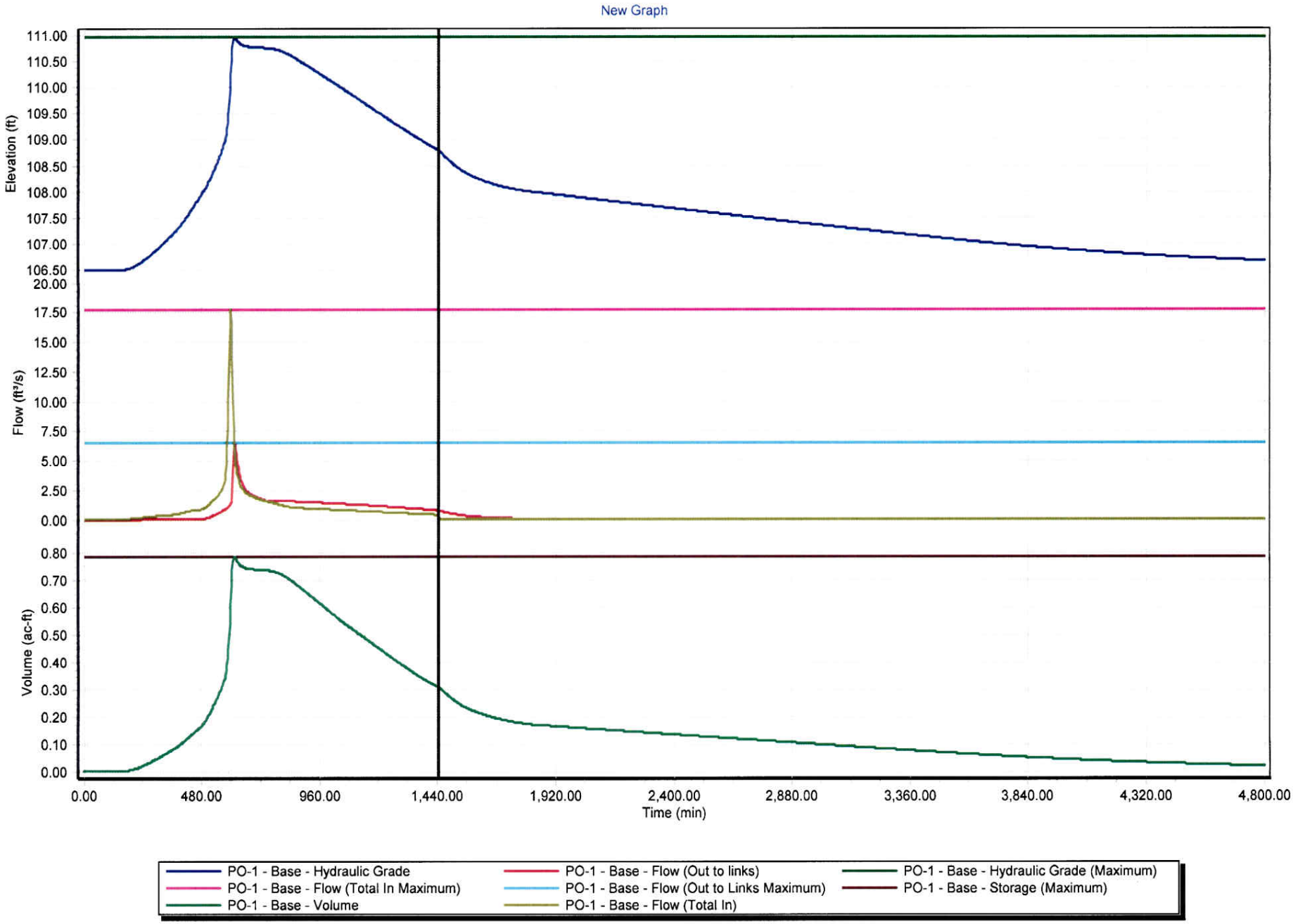
Gutter Calculation Summary

Label	Open Cross Section	Flow (Maximum) (ft^3/s)	Time to Maximum Flow (min)	Velocity (Maximum) (ft/s)

2 YR STORM


New Graph
Elevation (ft)
108.75
108.50
108.25
108.00
107.75
107.50
107.25
107.00
106.75
106.50
Flow (ft³/s)
6.25
5.63
5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
Volume (ac-ft)
0.30
0.28
0.25
0.23
0.20
0.18
0.15
0.13
0.10
0.08
0.05
0.03
0.00
0.00
480.00
960.00
1,440.00
1,920.00
2,400.00
2,880.00
3,360.00
3,840.00
4,320.00
4,800.00
Time (min)
PO-1 - Base - Hydraulic Grade
PO-1 - Base - Hydraulic Grade (Maximum)
PO-1 - Base - Flow (Total In Maximum)
PO-1 - Base - Flow (Out to Links Maximum)
PO-1 - Base - Storage (Maximum)
PO-1 - Base - Volume
PO-1 - Base - Flow (Total In)
PO-1 - Base - Flow (Out to links)

100 YR STORM


New Graph
Elevation (ft)
111.00
110.50
110.00
109.50
109.00
108.50
108.00
107.50
107.00
106.50
Flow (ft³/s)
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
Volume (ac-ft)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
480.00
960.00
1,440.00
1,920.00
2,400.00
2,880.00
3,360.00
3,840.00
4,320.00
4,800.00
Time (min)
PO-1 - Base - Hydraulic Grade
PO-1 - Base - Flow (Total In Maximum)
PO-1 - Base - Volume
PO-1 - Base - Flow (Out to links)
PO-1 - Base - Flow (Out to Links Maximum)
PO-1 - Base - Flow (Total In)
PO-1 - Base - Hydraulic Grade (Maximum)
PO-1 - Base - Storage (Maximum)

Kelso CT Project
Water Quality Capture Volume (WQCV)
Calculation Sheet
Reference: Alameda County Flood Control &
Water Conservation District
C.3 Stormwater Technical Guidance, V1.0, 8/2006

Perimeter Site

ft^2	Acres
323761	7.43

Total Infield ft^2						
211412	117222	17461	17832	26399	16485	16013

Road ft^2	Road SqYd	Road Acres	Rational C	CA
112348.60	12483.18	2.58	0.70	1.81

Bldg & Equip ft^2		
10535	4	2633.69
3120	4	780.00
1465		
4445		
194		
1512	2	756.00
2000		
1145		
5113		
5107		
840		
1590		
314		
1257		
125		
80		
20		
80		
3410		

Total Bldg ft^2	Total Bldg SqYd	Total Bldg Acres	Rational C	CA
42353	4705.91	0.97	0.80	0.78

Gravel Area ft^2	Gravel Area SqYd	Gravel Area Acres	Rational C	CA
169059	18784.31	3.88	0.10	0.39

Total Area	8.12 Acres

Composite C	% Impervious
0.37	44%

Alameda County Flood Control &
Water Conservation District
C.3 Stormwater Technical Guidance V1.0
Appedix E

Mean Average Rainfall Map Inches
12

Alameda County Flood Control &
Water Conservation District
C.3 Stormwater Technical Guidance V1.0
Table 5-2

San Jose

Inches	Composite C	0.25	0.50
14	inches	0.14	0.28

Unit Basin Storage Volume (unadjusted)

inches	0.20

Unit Basin Storage Volume (adjusted)

inches	0.17

Capture Volume
CuFt 4511.34

Required Capture Volume
10 % Increase
CuFt 4962

Precipitation Frequency Data Output

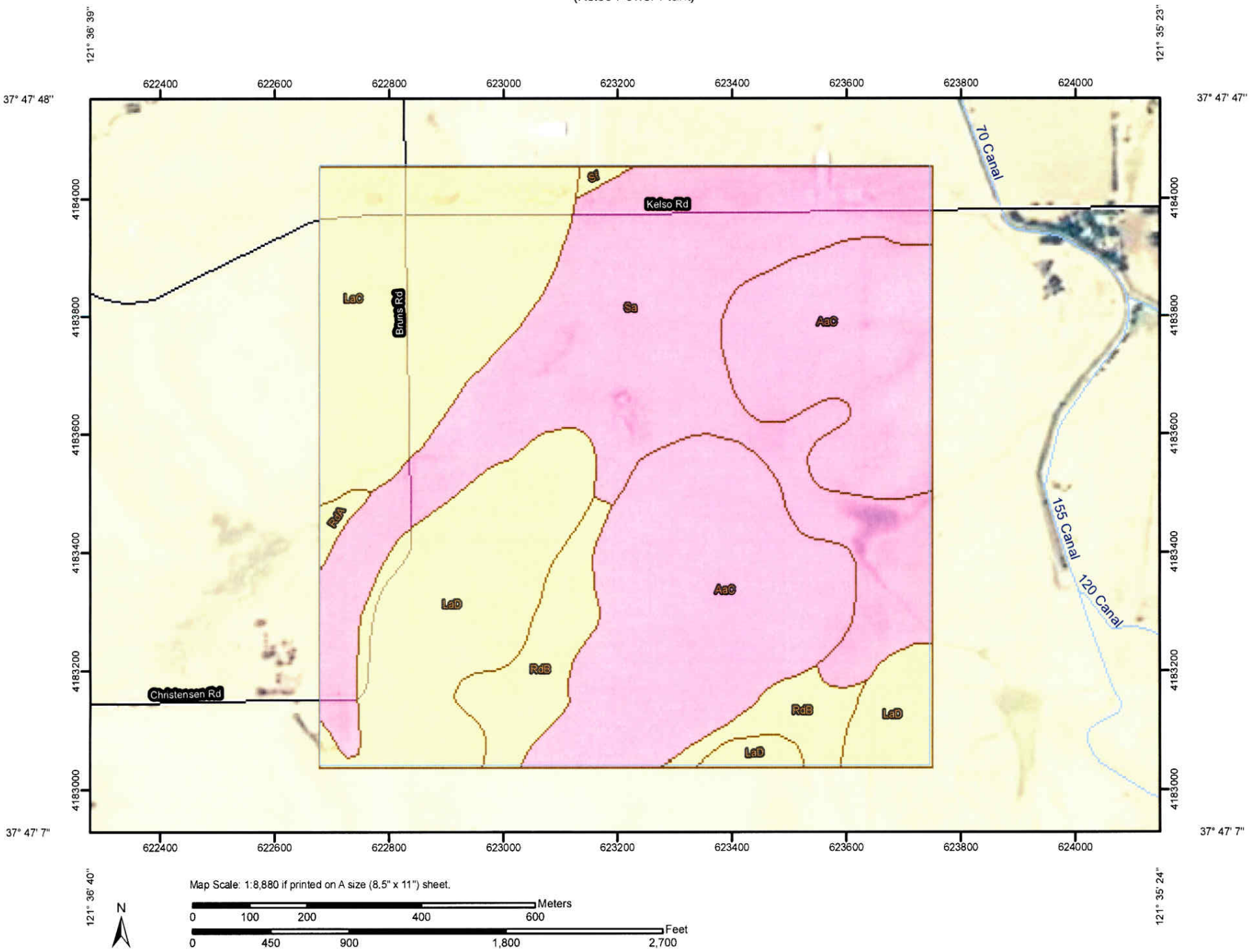
14

NOAA Atlas 2
California 37.7905?N 121.6012?W
Site-specific Estimates

Map	Precipitation (inches)	Precipitation Intensity (in/hr)
2-year 6-hour	1.02	0.17
2-year 24-hour	1.64	0.07
100-year 6-hour	2.07	0.35
100-year 24-hour	4.00	0.17

Hydrometeorological Design Studies Center - NOAA/National Weather Service
1325 East-West Highway - Silver Spring, MD 20910 - (301) 713-1669
Mon Feb 2 17:08:46 2009

Hydrologic Soil Group—Alameda Area, California
(Kelso Power Plant)



15

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:8,880 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 5, Jul 22, 2008

Date(s) aerial images were photographed: 6/30/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Alameda Area, California				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
AaC	Altamont clay, 3 to 15 percent slopes	D	78.1	29.2%
LaC	Linne clay loam, 3 to 15 percent slopes	C	43.8	16.4%
LaD	Linne clay loam, 15 to 30 percent slopes	C	41.9	15.6%
RdA	Rincon clay loam, 0 to 3 percent slopes	C	1.2	0.5%
RdB	Rincon clay loam, 3 to 7 percent slopes	C	17.4	6.5%
Sa	San Ysidro loam	D	84.8	31.6%
Sf	Solano fine sandy loam	C	0.7	0.3%
Totals for Area of Interest			**267.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

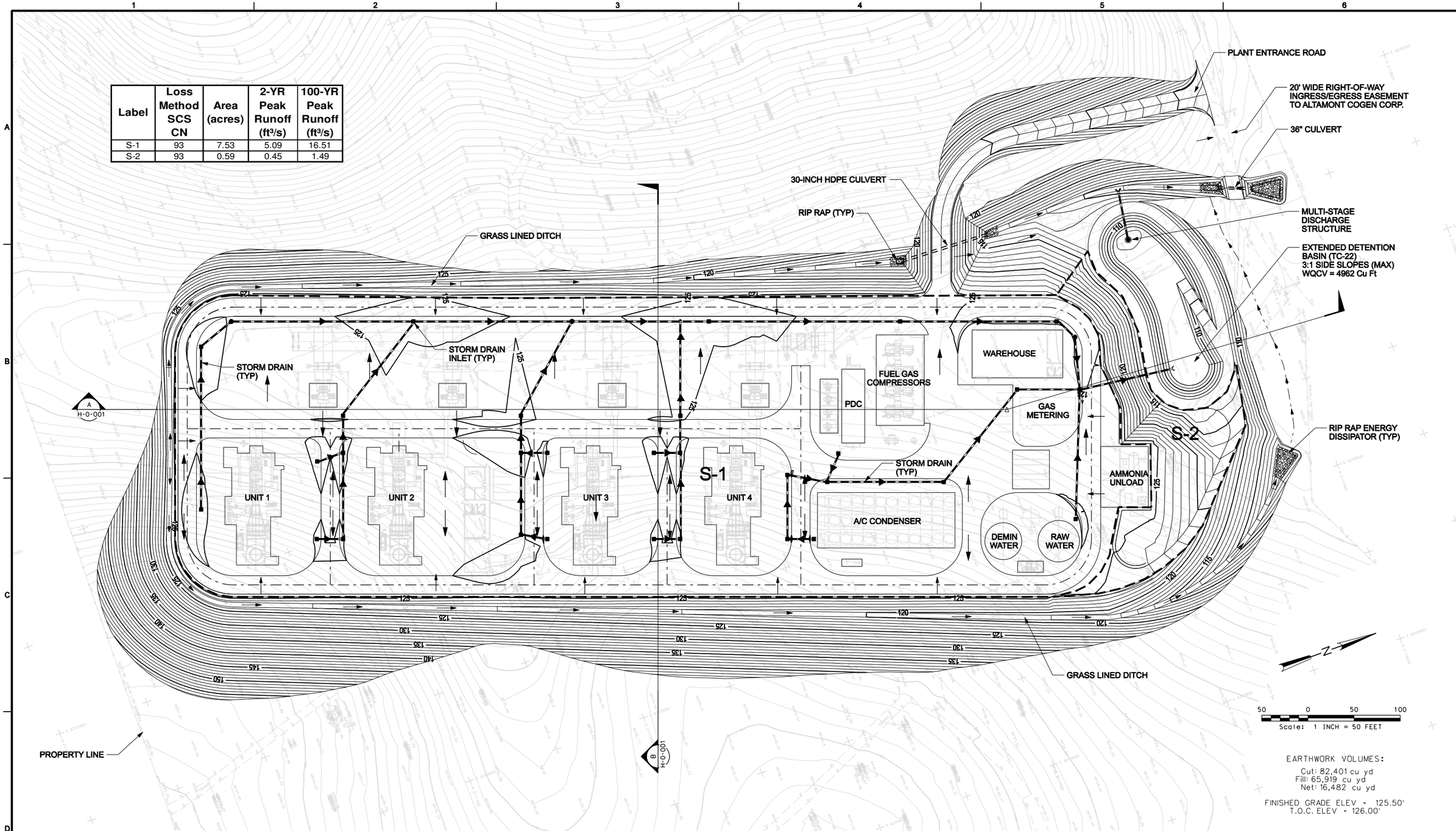
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Label	Loss Method SCS CN	Area (acres)	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
S-1	93	7.53	5.09	16.51
S-2	93	0.59	0.45	1.49



EARTHWORK VOLUMES:

Cut: 82,401 cu yd
Fill: 65,919 cu yd
Net: 16,482 cu yd

FINISHED GRADE ELEV = 125.50'
T.O.C. ELEV = 126.00'

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RESPONSIBLE ENGINEER

PE #

NO.	DATE	REVISION	BY	CHK
A	2/13/09	ISSUED FOR REVIEW	TC	JP
B	2/26/09	ISSUED FOR REVIEW	TC	JP
C	5/4/09	ISSUED FOR REVIEW	TC	JP
D	5/4/09	ISSUED FOR REVIEW	TC	JP

REVISION APPROVAL — REV C — DATE 5/4/09

DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONT.	
MECHANICAL		ARCH.	
PROCESS		GEN. ARRANG.	
PIPING			

STATUS

ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY	P1	-			
FOR REVIEW AND APPROVAL	D	5/4/09			
APPROVED FOR CONSTRUCTION	0				
REVISED & APPROVED FOR CONSTRUCTION					

SCALE AS SHOWN

Diamond Generating Corporation
A Subsidiary of Mitsubishi Corporation

Mariposa Energy Project

PROJECT NO. 383206

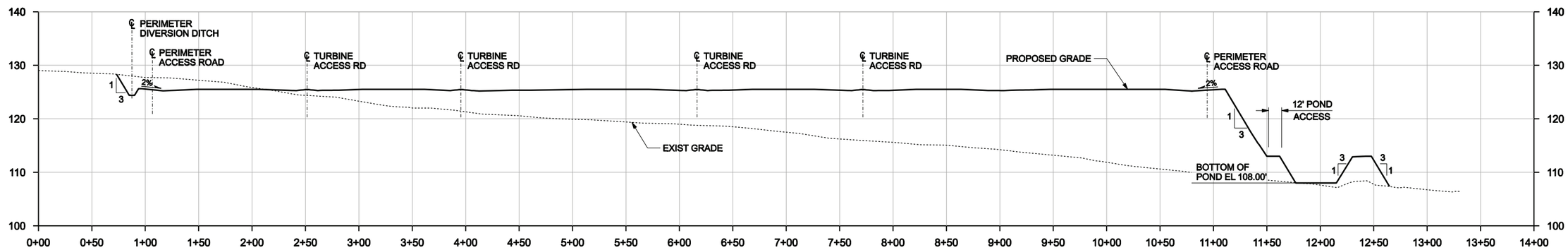
CH2MHILL
CH2MHILL Engineers

CIVIL
PRELIMINARY
GRADING AND DRAINAGE
PLAN

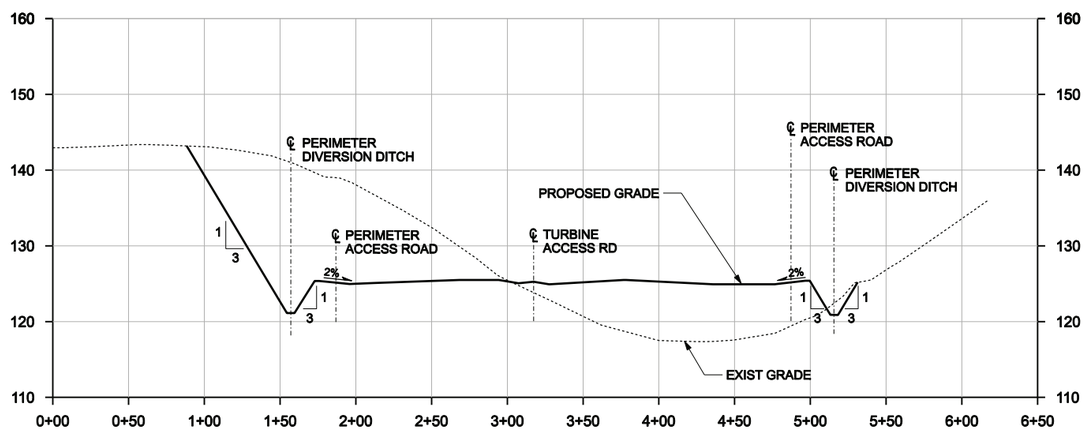
DWG. NO. C-000-W-0-002 REV. D

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: PLOT DATE: PLOT TIME:



SECTION A
SCALE: 1" = 50'
W-0-001



SECTION B
SCALE: 1" = 50'
W-0-001

NO.	DATE	REVISION	BY	CHK
A	2/13/09	ISSUED FOR REVIEW	TC	JP
B	2/26/09	ISSUED FOR REVIEW	TC	TC

REVISION APPROVAL		REV B	DATE 2/26/09
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONT.	
MECHANICAL		ARCH.	
PROCESS		GEN. ARRANG.	
PIPING			

STATUS					
ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY	P1	-			
FOR REVIEW AND APPROVAL	B	2/26/09			
APPROVED FOR CONSTRUCTION	0				
REVISED & APPROVED FOR CONSTRUCTION					

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GRADING AND DRAINAGE
SECTIONS

DWG. NO. C-000-H-0-001

REV. B

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PLOT DATE:
PLOT TIME:

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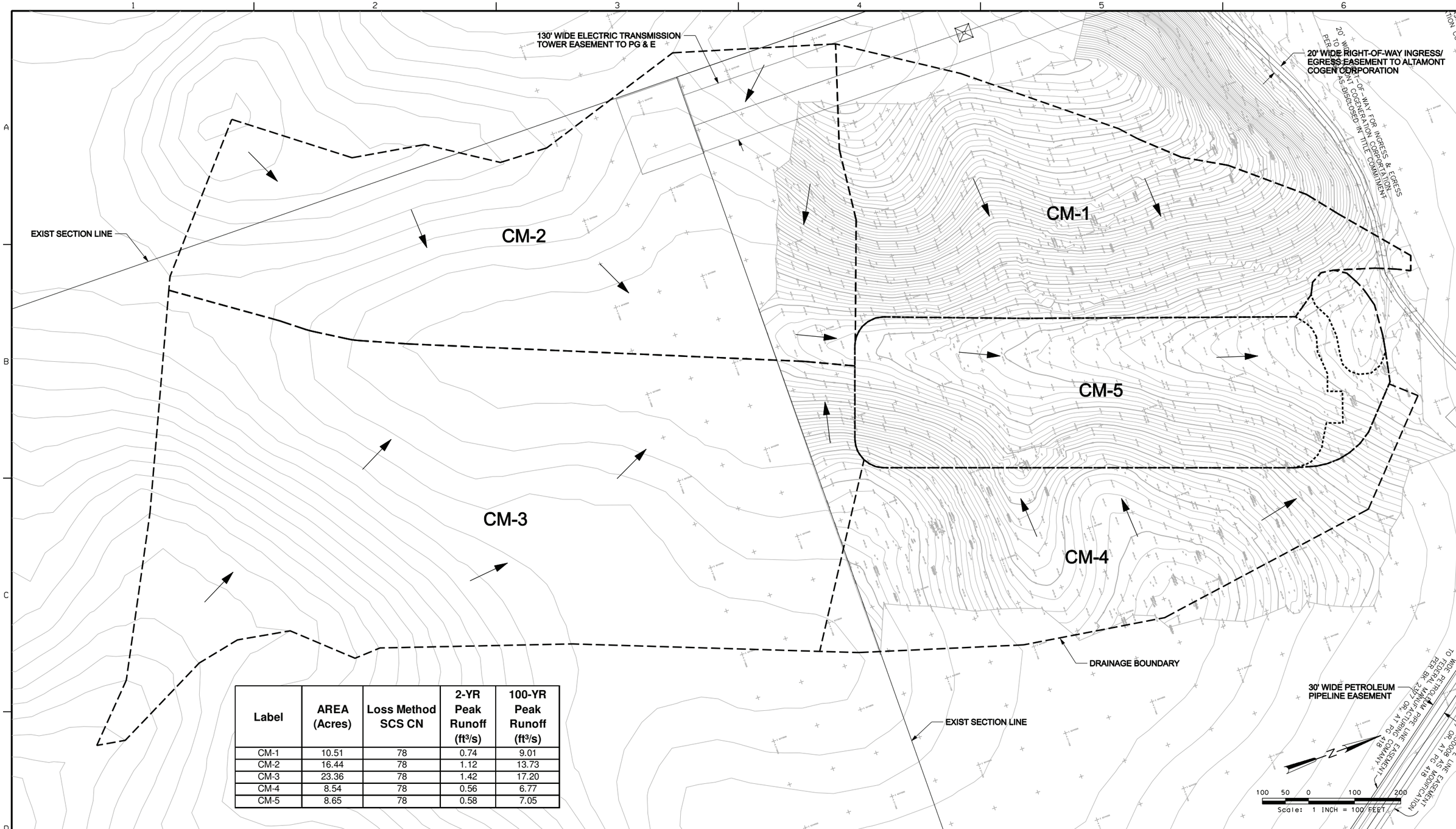

Label	AREA (Acres)	Loss Method SCS CN	2-YR Peak Runoff (ft^3/s)	100-YR Peak Runoff (ft^3/s)
CM-1	10.51	78	0.74	9.01
CM-2	16.44	78	1.12	13.73
CM-3	23.36	78	1.42	17.20
CM-4	8.54	78	0.56	6.77
CM-5	8.65	78	0.58	7.05

RESPONSIBLE ENGINEER

PE #

NO.	DATE	REVISION	BY	CHK
A	2/13/09	ISSUED FOR REVIEW	TC	JP
B	2/26/09	ISSUED FOR REVIEW	TC	JP

REVISION APPROVAL — REV B — DATE 2/26/09

DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONT.	
MECHANICAL		ARCH.	
PROCESS		GEN. ARRANG.	
PIPING			

STATUS					
ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY	P1	-			
FOR REVIEW AND APPROVAL	B	2/26/09			
APPROVED FOR CONSTRUCTION	0				
REVISED & APPROVED FOR CONSTRUCTION					

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CIVIL
PRE-CONSTRUCTION DRAINAGE CONDITIONS

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Appendix D
CASQA Handbook BMP Factsheets

The CASQA Handbook BMP Fact Sheets will be included in the final project DESCP. These fact sheets can be provided for Staff review upon request.