Appendix H
Plans

APPENDIX H
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AQUIFER TESTING AND WELL INTERFERENCE ANALYSIS PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO COUNTY, CALIFORNIA
KLEINFELDER PROJECT NO. 20154702.001A

MARCH 24, 2015

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AQUIFER TESTING AND WELL INTERFERENCE ANALYSIS PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO COUNTY, CALIFORNIA 95043

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AQUIFER TESTING AND WELL INTERFERENCE ANALYSIS PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO, CALIFORNIA 95043

1 INTRODUCTION

On behalf of AMEC Kamtech, Inc., a division of Amec Foster Wheeler (AMEC / Client), and at the request of the County of San Benito, California, Kleinfelder, Inc. (Kleinfelder) has prepared this *Draft Groundwater Monitoring and Reporting Plan* (Plan) for the Panoche Valley Solar Project (Site), located in the unincorporated community of Paicines, California (see Figure 1). This work plan was prepared in accordance with County Mitigation Measures (December 17, 2014) MM WR-1.2, Aquifer Testing and Well Interference Analysis. The Site consists primarily of vacant land located in the Panoche Valley drainage basin, within the County of San Benito (see Figures 1 and 2). Kleinfelder understands that this work is being performed to satisfy permit requirements for the development of a solar photovoltaic power generation facility on the Site.

This Plan provides proposed procedures and methods for aquifer testing and well interference analysis that will be used to evaluate potential adverse well interference effects prior to the onset of sustained pumping for the Site's construction and post-construction activities. This Plan was prepared in accordance with Kleinfelder's authorized scope of services described in its *Proposal for Groundwater Monitoring and Reporting, Panoche Valley Solar Project, Paicines, San Benito County, CA, d*ated January 14, 2015. The proposed scope of work is in general accordance with the recommendations in *Memorandum, Panoche Valley Solar Project, Groundwater Extraction Impact Evaluation* (Geologica, 2014).

2 SITE BACKGROUND INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The Site is located within the northwest trending Panoche Valley drainage basin in the unincorporated community of Paicines, San Benito County, California (See Figures 1 and 2). The Valley is bounded to the northwest by the easternmost Diablo Range and to the northeast and southeast by Upper Cretaceous marine sedimentary rocks of the Great Valley sequence (Geologica, 2010). The Site is primarily comprised of vacant land that is being developed with a photovoltaic solar power generation facility. Based on client-provided information, approximately 26,677 acres of land have been purchased by Panoche Valley Solar of which approximately 2,492 acres will encompass the power generation facility.

A more comprehensive description of Site hydrogeology and geology is included in a 2010 hydrogeologic study (Geologica, 2010). The most recent groundwater data for the Site is included in a 2014 Technical Memorandum (Geologica, 2014). Based on review of the provided groundwater information, depth to groundwater is expected to range between 40 to 75 feet bgs and flow generally to the southeast.

2.2 PREVIOUS SITE ASSESSMENTS

A Site hydrogeologic study was performed to evaluate the geologic and hydrogeological setting of the Site, its underlying aquifers, historical and existing groundwater levels, and the viability of existing groundwater wells within the project area (Geologica, 2010). The study described the Panoche Valley drainage basin as filled with coarse-grained sediments and interlayered fine-grained sediments deposited in streams and on terraces draining the rising Diablo Range mountains to the west. As a result deposits within the basin can be laterally discontinuous and variable. This study identified approximately 46 groundwater wells within the valley, for which a review of available data suggested that most of the wells produced water from one or more gravelly zones within 80 to 400 feet of valley fill and that these zones could vary between wells that were less than 100 feet apart (Geologica, 2010). A review of the available well location and construction data was used to create the groundwater well information table included in this Plan (see Table 1).

Since the 1970s through the early 2000s, water levels within the project area historically rose from approximately 100 feet below ground surface (bgs) to approximately 30 to 60 feet bgs due to a decrease in pumping for local agricultural irrigation since the early 1970s (Geologica, 2010). Development of the proposed solar power facility, which estimated a groundwater extraction rate of 25.5 acre-feet per year (AFY) during construction and 3.74 AFY during operation, is not expected to significantly impact the estimated annual groundwater recharge rate of 2,700 AFY in the valley (Geologica, 2010).

An assessment of potential hydrogeologic issues associated with the proposed groundwater extraction needs for the proposed Panoche Valley Solar Project evaluated the impact of water demands for the project during construction and operation and potential impacts to the aquifer and provided recommendations for additional investigation of the aquifer (Geologica, 2014). A maximum extraction rate of approximately 800,000 gallons per day (gpd) is projected to occur during the anticipated 18-month construction phase of the project (Geologica, 2014).

Based on a review of water level measurements collected on May 16, 2014, and Department of Water Resources (DWR) water level measurements available for a number of wells in the Panoche Valley, groundwater elevations in the Valley have generally decreased since the 2010 hydrogeologic study, presumably due to the drought conditions experienced in California over the last few years (Geologica, 2014). Based on numerical modeling, it was estimated that a maximum drawdown of 3 feet bgs near the edge of the southern project boundary would occur, with 1 to 2 feet of drawdown off-Site and 0.5 foot of drawdown or less close to the model boundaries (Geologica, 2014). Drawdown effects are expected to be transient and are expected to dissipate following the end of construction, in approximately the same amount of time as the construction phase. As a result, construction and long-term operation water use is not likely to significantly impair the existing water supply in the valley Geologica, 2014).

3 PROPOSED SCOPE OF WORK

This Plan has been prepared, at the request of the County of San Benito, to meet the following objective:

- Evaluate the impact of groundwater use in the project vicinity due to extraction for project construction and ongoing maintenance.

Based on our understanding of the project, a 72-hour constant-rate pumping test is proposed to gather and evaluate the hydraulic parameters of the aquifer under pumping conditions and meet the above described objective. The following tasks are described in this work plan:

- Task 1 – Pre-field coordination and planning
- Task 2 – Well construction information research
- Task 3 – Step-drawdown and 72-hour constant rate pumping tests
- Task 4 – Interference modeling and aquifer testing report.

3.1 PRE-FIELD COORDINATION AND PLANNING

Prior to the field investigation, Kleinfelder will coordinate site access, conduct an internal kick-off meeting, and acquire water-level pressure transducers and aquifer testing equipment. Upon receipt of the equipment, Kleinfelder will test the equipment and prepare it for field use. A Site-Specific Health and Safety Plan (HASP) will be prepared prior to implementing field activities to address the health and safety of Kleinfelder's workers and provide contingency plans for emergencies that may arise. The HASP will provide guidelines for personal protection equipment and safety procedures to be used by Kleinfelder's staff during field operations. Kleinfelder will also review and comply with AMEC's project-specific Incident Prevention Plan.

A Worker Environmental Awareness handout will be reviewed with crews prior to the start of work and be kept on site during all work activities. Equipment and vehicle access to well sites should occur via existing roadways (including ranch roads) and overland travel through natural habitat should be avoided. All individual sensitive wildlife species, all burrows, and areas of ponded water will be avoided by vehicles and equipment. Dusk to dawn is when most sensitive species occurring on site are active. Working and driving on the site will only occur during daylight hours to avoid potential collisions. Any wildlife encountered by crews will not be handled and will be allowed to leave work areas on their own. If they do not leave the area, an avoidance buffer will be established in coordination with the Project Biologist and work will be redirected to avoid the occupied habitat and buffer zone. Discharge of water will be directed toward nearby natural stream channels and away from burrow concentrations and any sensitive species observed. If sensitive species are observed, work will cease or be reduced until coordination occurs with the Project Biologist.

3.2 WELL CONSTRUCTION INFORMATION

Kleinfelder will compile available well construction details for the existing wells that will be used in the proposed aquifer pumping test activities. Additionally, wells proposed for the pumping test and those adjacent to proposed construction water-storage ponds will be video logged to evaluate conditions prior to testing. Kleinfelder plans to video log the following wells: Well #0, #4, #19, #20, and #44 (Figure 2). Final well construction information will be presented in the investigation report.

The wells will be inspected to assess the condition of the pumps, casing, electrical supply, and other well components for long-term operational needs. Existing equipment (i.e., pump and discharge piping, etc.) will be removed from each well prior to evaluation to provide access for video logging. Because they are currently in active use, logging will be performed in wells #0 and #44 without removing equipment, if possible. Video logging will be performed 48 hours following pump and equipment removal to allow for well stabilization and clearing of potential turbidity. Note also that equipment removed from the wells may not be in a suitable condition for reinstallation, and may need to be stored or disposed (with the exception of wells #0 and #44 which appear to be actively used). In the event that well #4 (proposed test well) is found to be in poor condition, due to a long period of disuse, the well will be rehabilitated prior to performing the aquifer testing.

3.3 AQUIFER TESTING

Kleinfelder reviewed available data from previous aquifer tests performed in wells #19 and #20. A 16-hour pumping test was performed in well #20 by the driller following its installation in 1976. Although the testing data is relatively old, aquifer behavior is expected to remain similar to the 1976 results, and indicates that well #20 may serve as a potential source of water during construction and post-construction maintenance activities at the Site. Additionally, a pumping test was performed on well #19 in 2010 (Geologica, 2010), which establishing known performance parameters for the well. As for well #20, aquifer behavior at the well is expected to remain similar to the results reported in 2010.

Based on our review of the above described previous testing information, Kleinfelder proposes to perform a step-drawdown test, followed by a 72-hour constant rate pumping test, in well #4. Well #4 does not have a record of previous aquifer testing and it has a significant screen interval with relatively shallow groundwater, which could produce an observable influence on observation wells further from the extraction well unlike previous testing.

The observation wells selected for the aquifer test are #0, #19, #20, and #44. Similar to previous aquifer testing events, extracted groundwater will be discharged to the ground surface several hundred feet away and downgradient from the well, and a National Pollutant Discharge Elimination System (NPDES) permit is not expected to be required. Approximately 2.5 million gallons of water are expected to be discharged during this test, and a water diffusing device will be used at the discharge point. The discharge rate and volume of the extraction well will be monitored using a flow meter and totalizer connected to the discharge piping, and the data from both will be recorded regularly throughout the test.

Water levels will be measured in each well using a combination of pressure transducers and a manual electronic water level meter. Water level measurements will be collected in the observation and extraction wells before, during, and after a step-drawdown test, a 72-hour constant-rate constant pumping test, and recovery period. Water-level measurements will be collected starting the week prior to testing to establish any potential existing trends. The pressure transducers will be programmed to record frequent water level measurements (i.e. 1-second intervals) during the beginning of the step and constant-rate pumping tests and during the beginning of the recovery test, with less frequent measurements following the initial drawdown and recovery periods. Transducer measurements will be normalized to a water-level measurement taken in their respective wells. Furthermore, manual water level measurement will be collected prior to removing transducers form wells to confirm the long-term accuracy of the transducer readings.

The transducers will be installed in each well at a depth below the water surface, such that they do not exceed the pressure rating of the transducers. The transducers will be placed approximately 20 feet below the initial water surface in the observation wells and approximately 100 feet below the initial water surface in the pumping well. Potential barometric effects on water levels will be evaluated using a barologger placed in one observation well.

3.3.1 Step-Drawdown Test

The step-drawdown test is a single-well test that involves the pumping of a groundwater well at incrementally higher pumping rates at approximately equal durations. It is proposed to pump the test well at approximately 200, 300, 450, and 600 gallons per minute (gpm), each step lasting a maximum of 2 hours and less if the water level stabilizes. If substantial drawdown is experienced, the discharge rate and duration will be adjusted accordingly in consultation with the Kleinfelder Technical Lead. Before the start of the step-drawdown test, the groundwater level will be tagged. Manual groundwater levels will be measured during the test at a frequency decided in the field.

To provide sufficient time for the aquifer to equilibrate following the step-drawdown test, a minimum of one day will be permitted prior to commencement of the constant-rate test. Water levels will be monitored with transducers and electronic meters to evaluate groundwater conditions. The constant-rate test will commence when water levels have recovered at least 90 percent. The constant-rate pumping and recovery tests are discussed below.

3.3.2 Constant-Rate Aquifer Pumping Test

A 72-hour constant-rate pumping test will be conducted at a rate of approximately 80 percent of the maximum yield, depending on the results of step-drawdown testing, although a constant rate of approximately 500 gpm is anticipated, based on prior testing in the area. The proposed duration should provide ample time for the aquifer to react to the pumping stress, including identification of nearby hydraulic boundaries if present. The starting time of pumping will be clearly marked and a stop-watch will be used to record times of manual groundwater measurements. It is important to synchronize all timing devices that will be used during the constant-rate pumping test.

At the start of and during the constant-rate pumping test, Kleinfelder personnel will collect manual depth-to-water measurements as specified below.

Wells	Time Since Start of Pumping	Time Interval
Pumping well	0 to 10 minutes	0.5 minute
Observation well #19	0 to 10 minutes	0.5 minute
Pumping well	10 to 60 minutes	5 minutes
Observation well #19	10 to 60 minutes	5 minutes
Observation wells #0 and #20	0 to 120 minutes	10 minutes
Pumping well	60 to 120 minutes	20 minutes
Observation well #19	60 to 120 minutes	20 minutes
Pumping well	120 to 240 minutes	30 minutes
Observation wells	120 to 240 minutes	30 minutes
Pumping well	240 minutes to pump shutdown	60 minutes
Observation wells	240 minutes to pump shutdown	60 minutes

If adjustment to the measurement frequency is required (e.g., due to distance between observation wells), site personnel will consult the Kleinfelder Technical Lead. At the end of the constant-rate pumping test, the pump will be turned off and the time will be recorded. If water levels are still trending significantly at the end of 72 hours, the test period may be extended.

The discharge rate of the pumping well will also be monitored throughout the event to maintain a consistent rate. The discharge rate will be recorded at approximate 5 to 10 minute intervals for the first hour, and then every few hours until the pump is shut down. Both the total volume pumped and instantaneous pumping rate will be recorded. Periodically throughout the test period, the transducers will be checked to ensure they are working properly and recording data accurately.

3.3.3 Recovery Test

Once the pump is shut down, depth-to-water measurements will be collected in each well (pumping and observation) following a similar schedule as above. Following approximately 72 hours of recovery, equipment will be removed from wells and demobilized from the site.

3.4 INTERFERENCE MODELING AND AQUIFER TESTING REPORT

The primary objective of the aquifer test and well interference analysis is to “evaluate potential adverse well interference effects prior to the onset of sustained pumping for the project.”

Pumping test results will be used to calculate aquifer parameters that will be used to predict, via modeling, long-term drawdown throughout the project area and in adjacent areas at nearby off-site wells.

3.4.1 Aquifer Pumping Test Analysis

A number of aquifer pumping test analysis methods are available for use in analyzing the step-drawdown and constant-rate pumping test data to calculate hydraulic parameters of the aquifer, including the Theis equation. The results of the pumping test will be evaluated using derivative and other analyses to select appropriate methods. The estimated aquifer hydraulic parameters will then be used to evaluate pumping interference. Additionally, data from the step and constant-rate tests will be used to extrapolate potential water infiltration rates for any possible leakage from the planned project construction ponds.

3.4.2 Interference Modeling

Kleinfelder will develop a model to evaluate the long-term effects of groundwater extraction for project construction and maintenance on groundwater levels in the basin and at nearby private wells. Because Geologica has already developed a simple numerical model of the valley and the local aquifer system, Kleinfelder will attempt to acquire this model, and will update it based on the evaluations and testing for this project. While analytic element modeling takes multiple-well interference (principle of superposition) into account, a numerical model is preferred in this case, because of the limited size of the basin and the irregular boundaries. If the existing model is not available, Kleinfelder will construct a numerical model using MODFLOW for use in interference modeling. Each known well will be included in the model so pumping effects can be evaluated at each location, and the transient pumping schedule expected during project construction and subsequent operation and maintenance will be incorporated. The model will also assume that the construction water storage ponds will be lined and will not affect the aquifer via recharge and mounding. The *Interference Modeling and Aquifer Testing Report* will be submitted to San Benito County at least 15 days prior to commencing sustained groundwater extraction for the project.

4 SCHEDULE

We anticipate commencing the video survey and aquifer testing activities in April 2015. As indicated above, a report will be submitted at least 15 days prior to commencing sustained groundwater extraction for the project.

5 LIMITATIONS

The preparation of this Plan was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This Plan may be used only by the Client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than 2 years from the date of the Plan. Non-commercial and scientific use of this document by regulatory agencies is regarded as a "fair use" and not a violation of copyright.

The work performed was based on project information provided by the Client. If the Client does not retain Kleinfelder to review any plans and specifications, including any revisions or modifications to the plans and specifications, Kleinfelder assumes no responsibility for the suitability of our recommendations. In addition, if there are any changes in the field to the plans and specifications, the Client must obtain written approval from Kleinfelder's engineer that such changes do not affect our recommendations. Failure to do so will vitiate Kleinfelder's recommendations

Regulations and professional standards applicable to Kleinfelder's services are continually evolving. Techniques are, by necessity, often new and relatively untried. Different professionals may reasonably adopt different approaches to similar problems. Therefore, no warranty or guarantee, expressed or implied, is included in Kleinfelder's scope of service.

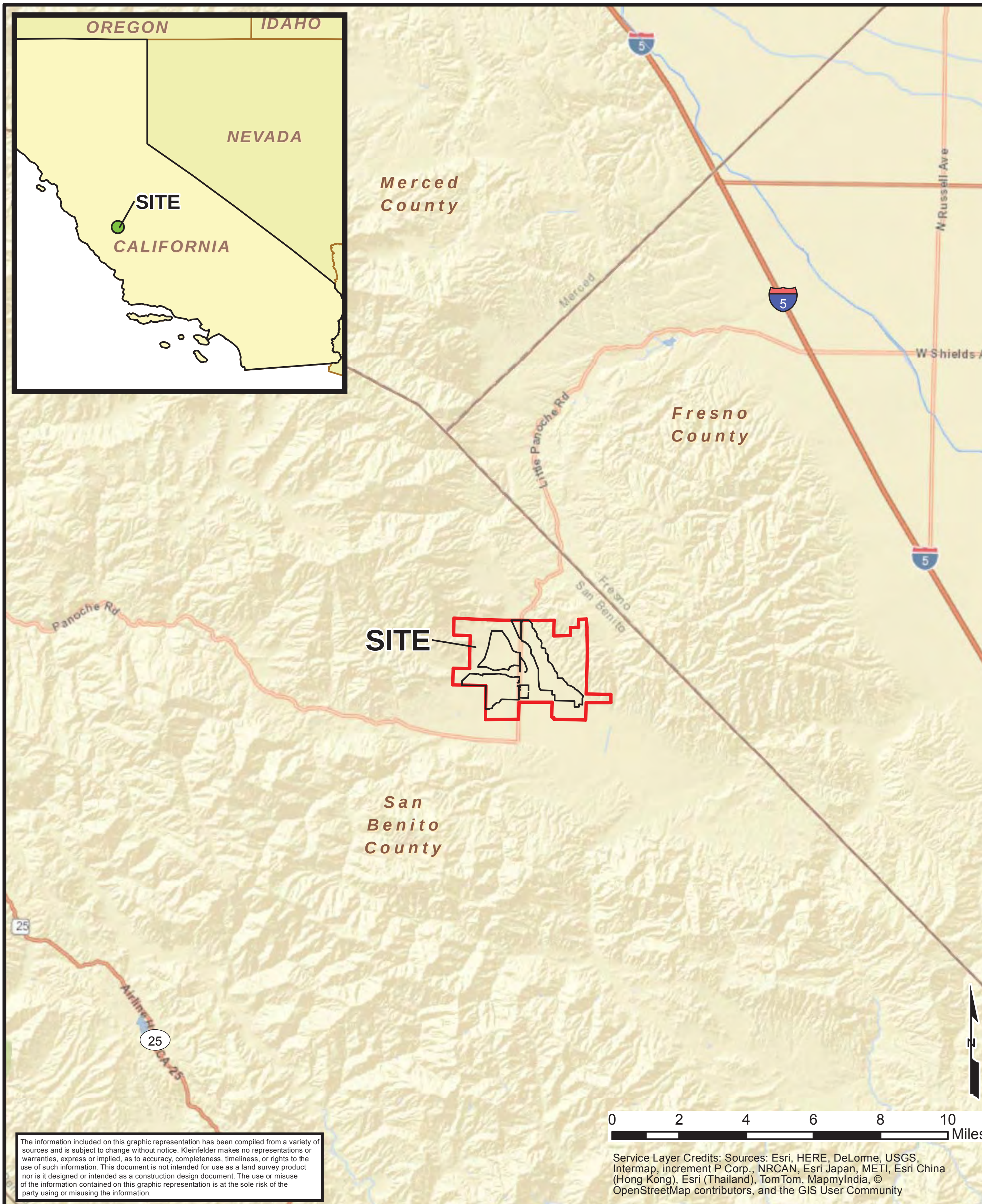
Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of geologic and environmental conditions comprise a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more-detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including subsurface studies or field tests, should be performed to reduce uncertainties. The Client's acceptance of this Plan will indicate that the Client has reviewed the document and determined that it does not need or want a greater level of service than provided.

6 REFERENCES

Geologica, 2010, Panoche Valley Hydrogeologic Study, SolarGen Panoche Valley Solar Farm, Panoche Valley, California, June 1.

Geologica, 2014, Technical Memorandum, Panoche Valley Solar Project, Groundwater Extraction Impact Evaluation, Panoche Valley, California. December 15.

FIGURES



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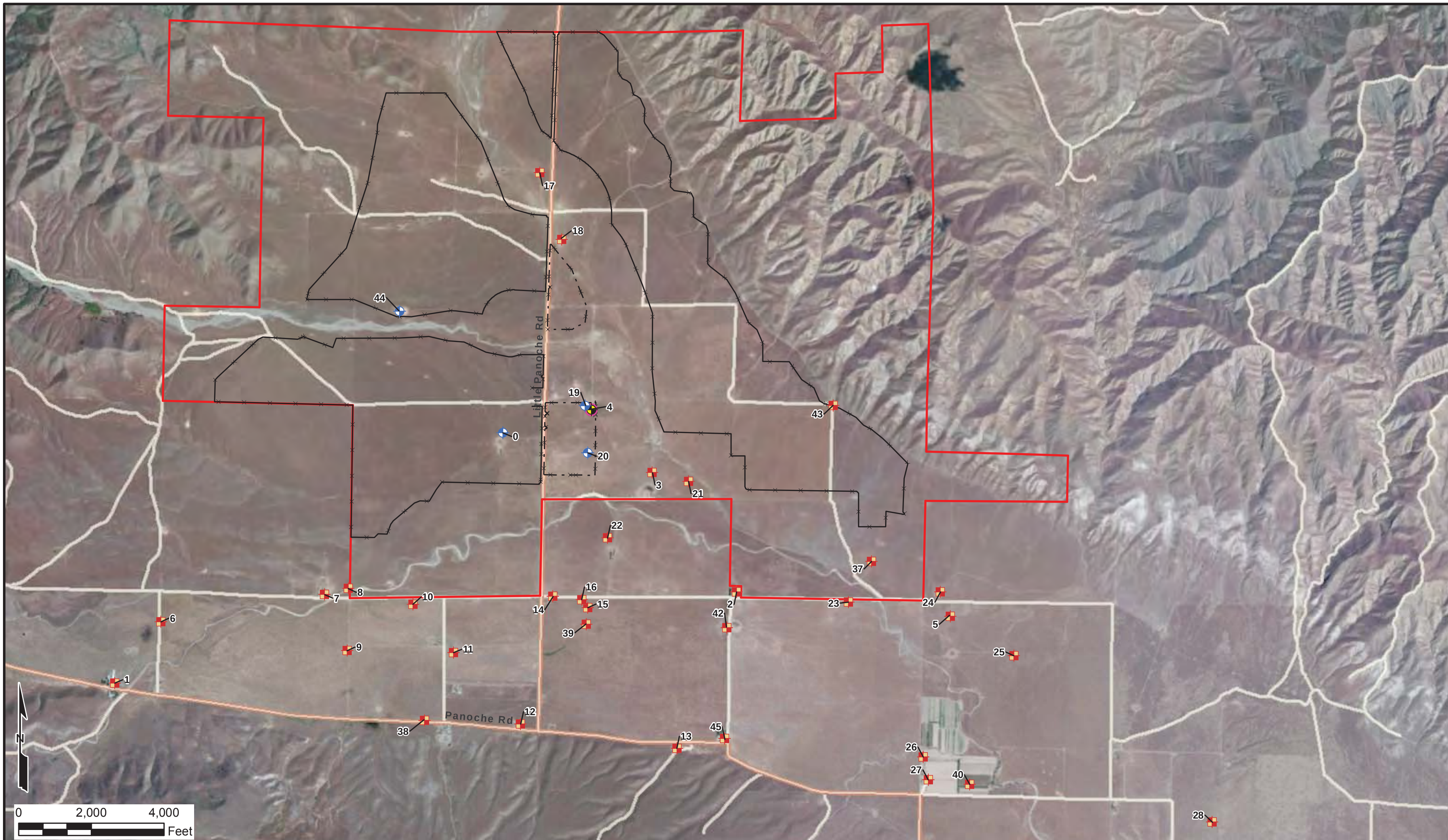
Site Location Map

AQUIFER TESTING AND WELL
INTERFERENCE ANALYSIS PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO COUNTY, CALIFORNIA 95053

FIGURE
1



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Explanation

- Aquifer Test - Observation Well
- Aquifer Test - Pumping Well
- Well
- Property Boundary
- Perimeter Fence
- Temporary Fence

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Site Plan with Well Locations

AQUIFER TESTING AND WELL
INTERFERENCE ANALYSIS PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO COUNTY, CALIFORNIA 95053

FIGURE
2

TABLES

Table 1
Well Information

Panoche Valley Solar Project
Paicines, San Benito County, California

Geologica Well Number	State DWR Well ID Number	Latitude	Longitude	Easting (feet)	Northing (feet)	Ground Surface Elevation (ft AMSL)	Total Well Depth (ft bgs)	Screen Interval (ft bgs)	Casing Diameter (inches)	Comment
0	15S10E16A001M	36.629200000	-120.880400000	6009941.77	2117572.99	1323	n/a	58-300	n/a	Observation Well
1	15S10E19H001M	36.609700000	-120.916300000	5999268.16	2110683.55	1420	n/a	n/a	n/a	
2	15S10E14N001M	36.617500000	-120.858200000	6016372.21	2113187.57	1275	n/a	n/a	n/a	
3	15S10E15G001M	36.626400000	-120.866300000	6014058.50	2116473.13	1282	n/a	n/a	12	
4	15S10E10P002M	36.631900000	-120.871000000	6012718.60	2118501.89	1300	422	182-422	14	Extraction Well
5	15S10E13N001M	36.615977000	-120.838097195	6022260.10	2112519.70	1300	n/a	n/a	n/a	
6	15S10E20D001M	36.614400000	-120.912100000	6000534.68	2112369.70	1395	n/a	n/a	n/a	
7	15S10E17R001M	36.616700000	-120.896800000	6005040.62	2113117.82	1358	n/a	n/a	n/a	
8	15S10E17R002M	36.617200000	-120.894600000	6005689.73	2113287.07	1352	n/a	n/a	n/a	
9	15S10E20H001M	36.612500000	-120.894600000	6005655.98	2111576.35	1350	n/a	n/a	n/a	
10	15S10E21C001M	36.616100000	-120.888500000	6007471.69	2112851.43	1338	n/a	n/a	n/a	
11	15S10E21G001M	36.612500000	-120.884600000	6008590.32	2111518.61	1340	n/a	n/a	n/a	
12	15S10E21.1001M	36.607200000	-120.878200000	6010430.56	2109552.70	1325	n/a	n/a	n/a	
13	15S10E22Q001M	36.605600000	-120.863500000	6014733.04	2108886.28	1273	n/a	n/a	n/a	
14	15S10E22D003M	36.616900000	-120.875400000	6011321.19	2113067.29	1300	n/a	n/a	n/a	
15	15S10E22D004M	36.616100000	-120.872100000	6012283.79	2112757.21	1300	n/a	n/a	n/a	
16	15S10E22D002M	36.616700000	-120.872700000	6012112.00	2112979.03	1300	n/a	n/a	n/a	
17	15S10E04R001M	36.648900000	-120.877400000	6010962.07	2124726.29	1330	n/a	n/a	24	
18	15S10E03N001M	36.646400000	-120.875700000	6011442.90	2123806.58	1320	n/a	n/a	12	
19	15S10E10P001M	36.632200000	-120.871600000	6012544.72	2118614.51	1300	168	90-168	12	Observation Well
20	15S10E15F001M	36.627800000	-120.872400000	6012278.80	2117017.55	1304	380	90-120/280-360	16	Observation Well
21	15S10E15G002M	36.625800000	-120.862900000	6015051.76	2116235.37	1282	262	n/a	16	
22	15S10E15L001M	36.621400000	-120.870400000	6012820.18	2114676.61	1293	n/a	n/a	n/a	
23	15S10E23B001M	36.616900000	-120.847700000	6019448.88	2112909.73	1246	n/a	n/a	n/a	
24	15S10E13N001M	36.617800000	-120.839100000	6021978.56	2113188.88	n/a	n/a	n/a	n/a	
25	15S10E24F001M	36.613100000	-120.832100000	6023999.84	2111438.87	1245	n/a	n/a	n/a	
26	15S10E24N002M	36.605300000	-120.840400000	6021509.92	2108646.35	1240	n/a	n/a	n/a	
27	15S10E24N003M	36.603600000	-120.839900000	6021644.80	2108024.76	1240	n/a	n/a	n/a	
28	15S11E30C001M	36.600800000	-120.813200000	6029461.23	2106856.55	1210	n/a	n/a	n/a	
29	15S11E30E002M	36.597800000	-120.819300000	6027650.30	2105798.45	1191	n/a	n/a	n/a	
30	15S11E30M001M	36.595000000	-120.819900000	6027454.89	2104782.62	1184	n/a	n/a	n/a	
31	15S11E30F001M	36.597200000	-120.811600000	6029906.08	2105537.33	1190	n/a	n/a	n/a	
32	15S11E30K001M	36.593100000	-120.805700000	6031609.65	2104012.36	1177	n/a	n/a	n/a	
33	15S11E30R001M	36.590600000	-120.798800000	6033617.83	2103064.38	1160	n/a	n/a	n/a	
34	15S11E29E001M	36.596100000	-120.795400000	6034653.24	2105047.64	1180	n/a	n/a	n/a	
35	15S11E29.1001M	36.594700000	-120.784900000	6037725.53	2104480.61	1140	n/a	n/a	n/a	
36	15S11E32A001M	36.587800000	-120.782900000	6038265.92	2101958.17	1111	n/a	n/a	n/a	
37	15S10E14Q001M	36.620000000	-120.845600000	6020086.75	2114026.24	n/a	n/a	n/a	8	
38	15S10E21L001M	36.607341000	-120.887226218	6007782.79	2109655.96	1394	n/a	n/a	n/a	
39	15S10E22D001M	36.614843000	-120.872218355	6012240.14	2112300.36	1300	n/a	n/a	n/a	
40	15S10E24N001M	36.603300000	-120.836000000	6022787.24	2107893.66	1225	n/a	n/a	n/a	
41	15S10E25J001M	36.592500000	-120.833500000	6023445.87	2103948.58	n/a	n/a	n/a	n/a	
42	15S10E22J001M	36.614796000	-120.859037763	6016107.34	2112208.11	n/a	n/a	n/a	n/a	
43	15S10E14A001M	36.631757000	-120.849465472	6019035.01	2118327.46	n/a	n/a	n/a	n/a	
44	DOODLEBUG	36.637261000	-120.891620846	6006707.70	2120571.72	1381	n/a	n/a	n/a	Observation Well
45	PANOCHE SCHOOL	36.606405000	-120.859057392	6016042.45	2109154.02	1286	n/a	n/a	n/a	
46	15S10E25J002M	36.593100000	-120.833800000	6023361.98	2104168.66	n/a	n/a	n/a	n/a	
47	15S11E30E003M	36.597200000	-120.819300000	6027646.16	2105580.05	n/a	n/a	n/a	n/a	
48	15S11E30M002M	36.595000000	-120.816600000	6028423.45	2104764.28	n/a	n/a	n/a	n/a	
49	15S11E28R001M	36.588100000	-120.766800000	6042993.82	2101980.02	n/a	n/a	n/a	n/a	
50	15S09E24C001M	36.616100000	-120.950700000	5989221.09	2113216.27	n/a	n/a	n/a	n/a	

Notes:
Well location and construction information compiled from available information provded in the Geologica 2010 and 2014 reports
Northing and easting coordinates based on State Plane Zone IV coordinate grid, per the Site's American Land Title Association (ALTA) su
n/a = information not available

Avian Conservation Strategy

Panoche Valley Solar Facility
San Benito County, California

September 11, 2015

Prepared for:
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Acronyms, Abbreviations, and Definitions

ACE	Avian Conservation Strategy
APLIC	Avian Power Line Interaction Committee
BGEPA	Bald and Golden Eagle Protection Plan
BLM	Bureau of Land Management
BMPs	Best Management Practices
CBC	Christmas Bird Count
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
Conservation Lands	Areas to be preserved in perpetuity for the benefit wildlife, totaling 24,176 acres
County	San Benito County
dBA	A-weighted decibels
DC	direct current
EIS	Environmental Impact Statement
FESA	Federal Endangered Species Act
°F	Fahrenheit
FSEIR	Final Environmental Impact Report
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HMMP	Habitat Management and Monitoring Plan
km	kilometer
MBTA	Migratory Bird Treaty Act
MW	megawatts

NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
PG&E	Pacific Gas & Electric
Project Footprint	The portion of the Proposed Project that includes the solar arrays and associated transportation corridors and equipment
Proposed Project	Panoche Valley Solar Project
PV	photovoltaic
PVS	Panoche Valley Solar, LLC
SCRCL	Silver Creek Ranch Conservation Lands
UDA	Utilization Distribution Assessment
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands
WEGs	USFWS Land-based Wind Energy Guidelines

1.0 INTRODUCTION

Panoche Valley Solar LLC (PVS) proposes to construct and operate an approximately 247 megawatt (MW) solar photovoltaic energy generating facility in San Benito County, California by the name of the Panoche Valley Solar Facility. The Panoche Valley Solar Facility is referred to herein as the "Project". The Project would be located on 2,506 acres with 1,794 acres of permanent impacts and 712 acres of temporary impacts in the Panoche Valley of eastern San Benito County. The Project includes construction and operation of the photovoltaic (PV) solar array complexes, an operations and maintenance (O&M) building, a project perimeter road including emergency access and egress, electricity collection lines, DC-AC inverters, an electrical substation and switchyard, associated Pacific Gas and Electric (PG&E) telecommunications upgrades, and decommissioning of the Project. Construction of the PVS Facility is anticipated to commence in late 2015 and span approximately 18 months, to be completed by the end of 2016.

The Project incorporates important general and species specific conservation measures proposed by PVS to avoid and minimize impacts on biological resources including avian resources. The Project will implement a conservation package consisting of permanent preservation, enhancement, and management of three large parcels of land in the vicinity of the Project to offset potential impacts to special status species and associated habitat. These conservation lands include approximately 2,514 acres of Valley Floor Conservation Lands, 10,772 acres of Valadeao Ranch Conservation Lands, and 10,890 acres of Silver Creek Ranch Conservation Lands. Together the three parcels total approximately 24,176 acres of high quality conservation land that will provide local mitigation, preserve core populations of special status species, and create permanent movement corridors with adjacent lands controlled by the U.S Department of Interior's Bureau of Land Management (BLM) for those species.

1.1 Purpose of the Avian Conservation Strategy

The following site-specific Avian Conservation Strategy (ACS) outlines various processes that PVS will implement to: 1) comply with all state and federal avian conservation and protection laws and regulations at the Project; 2) to ensure that any impacts to avian resources are identified, quantified, and analyzed; and 3) implement various conservation, avoidance, minimization, mitigation and adaptive management measures to address any impacts that result from operation of the Project.

Lastly, this Plan is being prepared in accordance with the 2015 Final Supplemental Environmental Impact Report (FSEIR), mitigation measure BR-14.2 which states,

> *Prior to the issuance of a construction permit, the Avian Conservation Strategy and Eagle Conservation Plans shall be reviewed and approved by the County. The final plans will be developed in consultation with California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS). These plans have been prepared in general accordance with the USFWS Land based Wind Energy Guidelines (USFWS, 2012), Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2 Guidance (USFWS, 2013) and with information provided in the Avian Protection Plan guidelines outlined by APLIC (2005).*

Bird mortality study. *The bird mortality component of the Avian Conservation Strategy shall include at a minimum: detailed specifications on data, a carcass collection protocol, and a rationale justifying the proposed schedule of carcass searches. The study shall also include seasonal trials to assess bias from carcass removal by scavengers as well as searcher bias.*

Polarized light and insectivorous birds study. *The study of polarized light impacts on insectivorous birds shall include at a minimum: detailed specifications regarding data requirements, including protocols for collection and identification of insect eggs found on solar panels and a rationale for a data collection schedule. During construction and for one year following the beginning of the solar farm operation the biologist shall submit annual reports to the County describing the dates, durations, and results of monitoring and data collection. The annual reports shall provide a detailed description of any project-related bird or wildlife deaths or injuries detected during the monitoring study or at any other time and data collected for the study of polarized light impacts on insectivorous birds. The report shall analyze any project-related bird fatalities or injuries detected, and provides recommendations (in consultation with the County) for future monitoring and any adaptive management actions needed.*

Thresholds. *Thresholds will be determined by the County in consultation with CDFW and/or USFWS. If the County determines that either (1) bird mortality caused by solar facilities is substantial and is having potentially adverse impacts on special-status bird populations, or that (2) the attraction of polarized light from solar panels is causing reproductive failure of aquatic insect populations at high enough levels to adversely affect insectivorous special-status birds, the Applicant shall be required to implement some or all of the mitigation measures below.*

Implementation Measures. *To minimize bird mortality caused by solar facilities, the Applicant may be required to install additional bird flight diverters alterations to project components that have been identified as key mortality features, or implement other appropriate actions approved by the County and regulatory agencies based on the findings of the Avian Conservation Strategy and Eagle Conservation Plan.*

If mitigation actions are required, the annual reporting shall continue until the County, in consultation with CDFW and USFWS, determines whether more years of monitoring are needed, and whether additional mitigation and adaptive management measures are necessary. After the Avian Conservation Strategy and Eagle Conservation Plan is determined by the County to be complete, the Applicant shall prepare papers that describe the design and monitoring results of the two studies to be submitted to peer-reviewed scientific journals. Proof of submittal shall be provided to the County, CDFW and USFWS within one year of concluding the monitoring studies.

1.2 Regulatory Framework

Native birds in North America are protected under federal and state regulations: these include the Federal Endangered Species Act (FESA), the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), the California Endangered Species Act (CESA), and California Department of Fish and Game (CDFG) codes administered by the California Department of Fish and Wildlife (CDFW). These regulations are described in the following sub-sections.

1.2.1 Federal Endangered Species Act

The purpose of the FESA is "to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of these species." Section 9 of the FESA prohibits "take" of federally-listed threatened or endangered species. "Take" under the FESA includes activities such as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" which includes harming a listed species or its habitat. Any activity that may result in the "incidental take" of a threatened or endangered species requires authorization pursuant to the FESA by means of the Section 7 consultation process with the United States Fish and Wildlife Service (USFWS), or through a Section 10 permit issued from the USFWS in conjunction with development of an approved Habitat Conservation Plan (HCP).

In addition, an amendment to the Fish and Wildlife Conservation Act (1988) mandates that the USFWS must identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the FESA.

1.2.2 Bald and Golden Eagle Protection Act

The BGEPA of 1940 is the primary law protecting eagles in the United States. The BGEPA (United States Code [USC] Title 16, Chapter 5A, Subchapter II, § 668 a-d), as amended provides for the protection of Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*) by prohibiting the taking, possession, and commerce of such birds and establishes civil penalties for violation of this Act. BGEPA defines "take" to include "pursue, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb," and prohibits take of individuals and their parts, nests, or eggs. On November 10, 2009 the USFWS implemented new rules (74 FR 46835) governing the "take" of Golden and Bald Eagles under the existing BGEPA. The USFWS expanded the definition of "take" to include the term "destroy" to ensure that "take" includes destruction of eagle nests. The term "disturb" is further defined by regulation as "to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, injury to an eagle, a decrease in productivity, or nest abandonment" (50 Federal Regulation [FR] 22.3). USFWS guidance on the applicability of current Eagle Act statutes and mitigation is currently under review. The definition of disturb (72 FR 31132) includes interfering with normal breeding, feeding, or sheltering behavior to the degree that it causes or is likely to cause decreased productivity or nest abandonment. All activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this act.

Because large-scale solar projects could result in the loss of Golden Eagle foraging habitat, there are concerns about the cumulative impacts to Golden Eagles. These concerns have been addressed in the site-specific Eagle Conservation Plan prepared by PVS.

1.2.3 Migratory Bird Treaty Act

The MBTA (Title 16 USC 703-712, as amended) governs take, possession, import, export, transport, selling, purchasing, or bartering of migratory birds, their eggs, parts and nests except as authorized by a valid permit (50 Code of Federal Regulations [CFR] 21.11 or under Section 704, as prescribed by the Secretary of the Interior. The USFWS is responsible for overseeing compliance with the MBTA. The MBTA requires that disturbance of active nesting territories be reduced or eliminated during critical phases of the nesting cycle for birds that may be present and nesting in the vicinity of a project. This Act offers protection to 836 species of migratory birds which includes waterfowl, shorebirds, seabirds, wading birds, raptors, passerines, and their occupied nests and eggs. Most bird species and their occupied nests that occur within the Project Footprint are protected under the MBTA. Most actions that result in taking of or the permanent or temporary possession of a protected avian species constitute violations of the MBTA. The Migratory Bird Permit Memorandum dated April 15, 2003, clarifies that destruction of most unoccupied bird nests is permissible under the MBTA; exceptions include nests of federally listed threatened or endangered migratory birds, Bald Eagles, and Golden Eagles.

1.2.4 California Endangered Species Act and Other State Fish and Game Codes

The California Endangered Species Act (CESA) of 1970 is administered by the CDFW and states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved. The CESA prohibits the take (hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill) of species listed under CESA.

In addition, California Fish and Game Code Subsections 3503, 3503.5, and 3800 prohibit the possession, incidental take, or needless destruction of eagles and other birds, as well as their nests and eggs. California Fish and Game Code Section 3511 lists birds that are “fully protected” as those that may not be taken or possessed except under specific permit. Lastly California Fish and Game Code Section 3513 prohibits any take or possession of birds that are designated by the MBTA as migratory non-game birds except as allowed by federal rules and regulations promulgated pursuant to the MBTA.

1.3 Corporate Policy

Panoche Valley Solar, LLC (PVS) maintains a commitment to work with local, state, and federal agencies regarding the protection of special status and migratory birds. PVS recognizes the importance of coordination with agency personnel to understand the scope of the Project and discuss facilities and features that may require specific attention for special status and migratory bird species. PVS and their representatives (e.g. environmental consultants) have been working in coordination with state and federal agency personnel regarding surveys and Project considerations to ensure that everyone understands the scope of the Project and potential issues identified early in the Project's planning process.

This Avian Conservation Strategy (ACS) has been prepared in general accordance with the USFWS Land-based Wind Energy Guidelines (WEGs) (USFWS 2013) which contain a tier-based approach for assessing risk to wildlife in the course of siting, constructing, and operating wind energy facilities. While the WEGs were not specifically developed to address risk for solar projects, the process developed provides a useful framework for assessing wildlife risk at the Project and developing this ACS. This strategy is considered to be a living document that will be updated periodically as new information becomes available.

2.0 PROJECT INFORMATION

2.1 Project Location

The Project is located near the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County and western Fresno County, approximately two miles north of the intersection of Panoche Road and Little Panoche Road. This location is approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley. The Project Footprint would be located within Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 of the United States Geologic Survey's Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche 7.5-minute topographic quadrangle maps.

In addition to the Project Footprint, the Conservation Lands associated with the Proposed Project are located within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27, and 32-36; Township 14S, Range 11E, Sections 19, and 29-32; Township 15S, Range 10E, Sections 1-8, and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6, and 8-12.

The Project is bordered by rangeland to the north and south, by the Gabilan Range to the west, and by the Panoche Hills to the east. The Project Footprint elevation ranges from approximately 1,200 feet above mean sea level (amsl) near the southeastern end of the Project site to approximately 1,400 feet amsl near the western end of the Project site. The Project site was historically used for crop production, but during the past forty years the primary land use has been livestock grazing.

2.2 Project Description

PVS proposes to construct and operate a solar PV energy generating facility located in San Benito County, California (Figure 1, Appendix A). The Project Footprint consists of approximately 2,506 acres in the Panoche Valley of eastern San Benito County, California (Figure 2, Appendix A). The Project includes construction and operation of the PV solar array complexes, an O&M building, a project perimeter road including emergency access and egress, electricity collection lines, DC-AC inverters, an electrical substation and switchyard, associated PG&E telecommunications upgrades, and decommissioning of the Project. Construction of the PVS Facility is anticipated to span approximately 18 months, with construction estimated to be completed by 2016. The Project also includes the permanent preservation and management of approximately 24,176 acres of high quality Conservation Lands that are contiguous with the Project Footprint when taken as a whole (Figure 3, Appendix A).

As part of those high quality Conservation Lands, approximately 2,514 acres of the high quality land is interspersed throughout and adjacent to the Project Footprint which would be undisturbed and designated as the Valley Floor Conservation Lands (VFCL). The VFCL would include wildlife movement corridors within on-site drainages and 100-year floodplains, as well as open space in the southern portion of the Project area (Figure 3, Appendix A).

In addition to the designation of the VFCL, the Project will include two large ranches for conservation/mitigation purposes due to impacts to waters, sensitive species and habitat. These ranches, the Valadeao Ranch Conservation Lands (VRCL; 10,772 acres) and the Silver Creek Ranch Conservation Lands (SCRCL; 10,890 acres), are contiguous with the Project Footprint and each other (Figure 3, Appendix A). The combined total acreage to be placed in permanent preservation and management is approximately 24,176 acres.

3.0 EXISTING CONDITIONS

3.1 Project Footprint

The Project Footprint consists of the area within the fence line of the solar facility (approximately 2,506 acres). The site is surrounded by rangeland and bordered by hills of the Gabilan Range to the west and the Panoche Hills to the east. The topography of the site dips gently down to the east-southeast. The site elevation ranges from approximately 1,200 feet amsl near the southeast end of the site to approximately 1,400 feet amsl near the west end.

The Project area experiences a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates into the site’s soils and flows in creeks and drainages when soil capacity has been reached.

Panoche Creek and Las Aquilas Creek run adjacent to portions of the Project Footprint but are contained entirely within the VFCL (Figure 3, Appendix A). They are ephemeral creeks that are dry in the summer. Smaller washes and drainages feed these larger creeks. The Project Footprint supports several seasonally flooded pools and stock ponds, predominantly in the northern portion of the Project Footprint along unnamed washes. Habitat for aquatic species and breeding habitat for amphibians within the Project Footprint is limited to the stock ponds and ephemeral pools.

There is no urban development on the Project Footprint or surrounding area. Two ranching communities are located within the Panoche Valley, Panoche and Llanada. Both communities are within two miles of the Project Footprint. The nearest rural community is Firebaugh, approximately 15 miles from the perimeter of the Project Footprint.

Prominent grass species within the Project Footprint include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Areas which have not been previously disturbed by grazing or historic cultivation also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitatum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*) (LOA 2009).

3.2 Conservation Lands

Project Conservation Lands include three areas totaling 24,176 acres that would be preserved in perpetuity for the benefit of the special status species, as well as many other species of wildlife including avian species.

3.2.1 Valley Floor Conservation Lands

The VFCL (approximately 2,514 acres) are contiguous with the Project Footprint, and primarily consist of the non-native annual grassland habitat found within the Project Footprint with some seasonal ponds and vernal and ephemeral pools, as well as the seasonally dry Panoche and Los Aquilas Creeks. The VFCL also includes the entire 100-year floodplain within the Proposed Project boundary on the valley floor.

The dominant vegetation in the VFCL includes ripgut brome, soft chess, red brome, foxtail barley, rat-tail fescue, broad-leaved filaree, red-stemmed filaree, shining peppergrass, and vinegarweed. Fiddleneck, devils lettuce, shepherds purse, turkey mullein, and bur clover were also common, especially in disturbed areas. Areas which have not been previously disturbed include a variety of native wildflowers such as blow wives, blue dicks, California gold fields, yellow daisy tidy-tips, and California creamcups.

3.2.2 Valadeao Ranch Conservation Lands

The VRCL (approximately 10,772 acres) are contiguous with the Project Footprint directly to the west, east, and northeast of the site (Figure 3, Appendix A). These lands are also contiguous with the VFCL and Silver Creek Ranch Conservation Lands (SCRCL). The VRCL include several seasonal drainages. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent. Elevations on the VRCL range from approximately 1,400 feet to 2,100 feet amsl. The property which is currently grazed is dominated by introduced annual grasslands (approximately 6,700 acres), which have a very similar species makeup to the Project Footprint and VFCL. This property also includes of ephedra shrubland (approximately 2,700 acres), barrens, and saltbush shrubland.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*Ephedra californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This three to 15 foot tall shrub rarely achieves greater than 10 percent cover, but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to introduced annual grasslands.

Plant associations that are noted to occur within the *Ephedra* shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub. Ephedra shrublands occur in the VRCL portion of Las Aquilas Creek in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, ephemeral drainages, and steep, rocky, and thin-soiled south-facing slopes.

Barrens are ridgelines and south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity at barrens is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia microstachys*.

The saltbush shrubland habitat consists of nearly pure to mixed stands of saltbush (*Atriplex polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest saltbush cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two plant associations exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages 5 to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *Eriogonum fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens that are often present on adjacent slopes of similar aspect. Shrub canopies are confined to wash edges due to trampling by cattle, and average cover rarely exceeds 10 percent (County of San Benito, 2010).

3.2.3 Silver Creek Ranch Conservation Lands

The SCRCL (approximately 10,890 acres), which is currently being grazed with livestock, is located southeast of the Project Footprint (Figure 3, Appendix A). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well drained and moderately permeable. SCRCL contains approximately 5,765 acres with slopes between 0 and 11 percent.

SCRCL are dominated by non-native species (approximately 8,400 acres), with the same species found on the Project Footprint and on the other conservation lands distributed sparsely over the landscape. The other major habitats on these conservation lands include ephedra shrubland (approximately 2,260 acres) with similar species noted on the VRCL and riparian/wetland habitat.

The riparian habitats occur along the Panoche and Silver Creeks. The Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.). Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site, both upstream and downstream. In this area, saltgrass (*Distichlis spicata*) appears to be the native species most tolerant of the soil salinity and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site was observed to be completely dry and largely devoid of plants for at least three miles. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (*Typha* Herbaceous Alliance) centrally, *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge and *Frankenia salina* and *Juncus mexicanus*. Trees are largely absent, as are species adapted to a floating or submerged habitats (County of San Benito, 2010).

3.3 Literature Review and Initial Site Assessment (Tiers 1 and 2)

Existing information of avian resources in the vicinity of the Project Footprint was reviewed prior to the development of this ACS. Information sources included the California Natural Diversity Database (CNDDB), the National Audubon Society's Important Bird Area database (National Audubon Society 2013) and Christmas Bird Count (CBC) database, and habitat assessments and field-based evaluations determining the potential for special status species as well as observation that were made during site visits between 2009 through 2013.

3.3.1 Special Status Avian Species

The review of existing information and literature pertaining to avian special status species occurrences on the Project Footprint, combined with field-based habitat evaluations of the potential for special status avian species occurrence, revealed 15 avian species that have been observed on or near the Project Footprint or have potential to occur on the Project Footprint. Table 1 presents a list of the special status avian species and their potential for occurrence on the Project Footprint. Species were considered special status if they are currently afforded federal or state protection or have Species of Special Concern status with the USFWS or CDFW.

Table 1. Potential special status bird species of the Panoche Valley Solar Facility.

Common/Scientific Name	State Status	Federal Status	Potential to Occur on Project Footprint
Tricolored Blackbird *Agelaius tricolor*	SSC (breeding)	NA	Present (non-breeding observation)
Grasshopper Sparrow *Ammodramus savannarum*	SSC (breeding)	NA	Moderate
Golden Eagle *Aquila chrysaetos*	FP	BGEPA	Present (non-breeding observation)
Short-Eared Owl *Asio flammeus*	SSC (breeding)	NA	Moderate
Long-Eared Owl *Asio otus*	SSC (breeding)	NA	Moderate
Burrowing Owl *Athene cunicularia*	SSC (breeding)	NA	Present
Swainson's Hawk *Buteo swainsonii*	ST	NA	Low
Mountain Plover *Charadrius montanus*	SSC (wintering)	NA	Present
Northern Harrier *Circus cyaneus*	SSC (breeding)	NA	Present (non-breeding observation)
White-Tailed Kite *Elanus leucurus*	FP	NA	Low
California Condor *Gymnogyps californianus*	SE and FP	FE	Low
Bald Eagle *Haliaeetus leucocephalus*	SE and FP	BGEPA	Not Likely To Occur
Loggerhead Shrike *Lanius ludovicianus*	SSC (breeding)	NA	Present (non-breeding observation)
Oregon Vesper Sparrow *Pooecetes gramineus affinis*	SSC (wintering)	NA	High
Yellow-Headed Blackbird *Xanthocephalus xanthocephalus*	SSC (breeding)	NA	Not Likely To Occur

State Status: SE – State Endangered, ST – State Threatened, FP – State Fully Protected, SSC – Species of Special Concern
Federal Status: FE – Federal Endangered, BGEPA – Bald and Golden Eagle Protection Act, NA – Not Applicable

3.3.2 Important Bird Area

The Panoche Valley is considered an Important Bird Area (Panoche Valley IBA) (National Audubon Society 2013) due to the notable high concentrations of wintering raptors, large sparrow flocks, resident population of Burrowing Owls (*Athene cunicularia*), and other grassland avian species. The Project Footprint consists of 2,506 acres located within the 91,399-acre Panoche Valley IBA covering portions of Merced, Fresno, and San Benito Counties (National Audubon Society 2013). Grasshopper Sparrows (*Ammodramus savannarum*) and Short-eared Owls (*Asio flammeus*) use the Panoche Valley as breeding habitat, as both have been almost eliminated as nesters elsewhere in the San Joaquin Valley. During the winter, Mountain Plovers (*Charadrius montanus*) use the grassland habitat within the Panoche Valley IBA as foraging areas. The Panoche Valley IBA is one of the few areas within the state where this species still winters in semi-natural habitat. Hundreds of Tricolored Blackbirds (*Agelaius tricolor*) breed each year at Little Panoche Reservoir near Interstate 5, which is approximately nine miles north of the northernmost extent of the Project Footprint (National Audubon Society 2013). The Panoche Valley was noted to be an Audubon Important Bird Area of global concern because it is important for the wintering Mountain Plover (CDFG 2010).

3.3.3 Christmas Bird Count Data

The Christmas Bird Count (CBC) is a 24-hour census of birds administered by the National Audubon Society that is performed annually in the early winter by volunteers to gather avian population data. The surveys of the CBC count circles, which are 15 miles in diameter, are conducted in the period from December 14 to January 5 each year (National Audubon Society). The center of the Panoche Valley CBC survey circle is located two miles north of the junction of Panoche Valley Road and Little Panoche Valley Road. The Panoche Valley CBC count circle includes the Project Footprint and the VFCL and a majority of the VRCL and the SCRCL.

From 2003 through 2011 the CBC data indicated an average of 80 avian species per survey season. The entire period between 2003 and 2011 is noted to have approximately 127 total species observed. The entire list of species observed is shown in Appendix B.

3.4 Previous Avian Surveys, Methods, and Results (Tiers 2 and 3)

Focused avian surveys and general wildlife surveys have been conducted on the Project Footprint and conservation lands from 2009 to 2014. Data collected during wildlife reconnaissance and transect surveys, Golden Eagle/raptor aerial nest surveys; Golden Eagle point counts and Utilization Distribution Assessments (UDA) provide information on baseline avian conditions at the Project Site and surrounding area. Additionally, incidental observations of special status avian species were recorded during these surveys and other previous biological surveys conducted on the Project Footprint and conservation lands.

3.4.1 Golden Eagle

Point Count Surveys

Point count surveys focusing on Golden Eagles were conducted at established point count stations (Cooperrider et al. 1986; Hamel et al. 1996; Ralph et al. 1993; Ralph et al. 1995) every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. Six point count stations were located within Project Footprint/VFCL (Figure 4, Appendix A) to ensure a minimum spatial coverage of at least 30 percent of the Project Footprint (USFWS 2013). Six point count stations were also located within the VRCL and the SCRCL. Three point count stations were located in the VRCL (Figure 5 Appendix A) and three point count stations in the SCRCL (Figure 6 Appendix A). The coverage for the VRCL and SCRCL was less than 30 percent, but provided adequate observations of Golden Eagle use in these areas for general comparison purposes.

The survey locations were established by creating point count stations within an 800 meter (2,625 feet) radius observation area. The center point of each plot was geo-referenced using a global positioning system (GPS) unit. The point count surveys consisted of observers recording detections of Golden Eagles from the point count stations for two hours at each point count station (Figures 4, and 5 Appendix A). Observations were recorded on point count field forms (Pagel et al. 2010; USFWS 2013). The Golden Eagle surveys were conducted between daylight hours (sunrise to sunset) on a bi-weekly basis from September 3, 2013 to January 24, 2014. During the fall migration, when possible, surveys were completed during midday to increase sampling efficiency by temporally stratifying surveys to cover the midday period during migration (CA Energy Commission 2007; USFWS 2013).

The data collected during each point count station survey beyond the typical conditions information (e.g. date, time, temperature, wind speed and direction, and visibility) included the number of Golden Eagles seen, age class, activity/behavior, flight paths, estimated flight height and location in plot, and general description of observations.

With the data from the point count surveys, the age classes of the Golden Eagles were broken down into juvenile eagles, immature or sub-adult eagles, adult eagles, or unknown (eagles where age class could not be determined due to distance, etc.). The activity/behavior data collected noted the prevalent behavior during each one-minute interval as soaring flight (circling broadly with wings outstretched), unidirectional flapping gliding, kiting-hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or other bird species, undulating/territorial flight, perched, or other. The flight path data included Golden Eagles inside, as well as outside the point count plot. The flights were recorded on the point count data forms for each point count station (Appendix C).

Project Footprint/Valley Floor Conservation Lands

The Golden Eagle observations in the Project Footprint/VFCL totaled 43 Golden Eagles, with 15 observations within the point count plot boundaries and 28 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class. The Golden Eagles observation on the Project Footprint/VFCL were made up of four juveniles, three inside the point count plot boundaries and one observation outside the plot boundaries. There were two sub-adult Golden Eagles observed within the point count plot boundaries and none outside. The surveys also found 14 adult Golden Eagles observations within the Project Footprint/VFCL areas, with seven adults being seen inside the plot boundaries, and seven adult

Golden Eagles observed outside the plot boundaries. Furthermore, there were 33 Golden Eagles observations where the age class could not be determined and were categorized as unknown (Table 1). A majority of the unknown age class observations were due to the distance between the observer and the Golden Eagles. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix C of this Plan.

The point count station with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries, was the station located in the northwestern portion of the Project Footprint/VFCL (P-01) (Figure 4 Appendix A) with a total of 23 Golden Eagle observations (10 inside/13 outside). Note that the high number of Golden Eagles observations at this point count station was due to numerous Golden Eagles observed utilizing the hills of the VRCL and the hills to the west of the VRCL for perching, foraging, etc. An additional event elevated the number of Golden Eagles observed at this point. During the second survey event (September 17-19, 2013), seven Golden Eagles were observed feeding on a carcass of a dead animal (i.e. cattle) during the entire point count survey period (Table 2). The point count station with the lowest number of Golden Eagle observations during the survey season was the point count station located in the southeastern portion of the Project Footprint/VFCL (P-06) (Figure 4 Appendix A) with no Golden Eagles observed during any of the point count surveys. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix C of this Plan.

Of the 15 Golden Eagles observations within the Project Footprint/VFCL point count plots, over half of the observations (eight Golden Eagles) were seen within the month of September. As previously stated, during the second survey event (September 17-19, 2013), seven Golden Eagles were observed feeding on a carcass of a dead animal during the entire point count survey period. The next highest number of observations during a month was the events in October with four Golden Eagles. The observation numbers for the other months included two observations in January, one Golden Eagle observation in December, and no observations of Golden Eagles in November within the Project Footprint/VFCL during the point count surveys. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix C of this Plan.

Valadeao Ranch Conservation Lands

The Golden Eagle observations in the VRCL totaled 11 Golden Eagles with four observations within the point count plot boundaries and seven observations outside the plot boundaries for the entire survey season (Appendix C). These observations were also categorized by their age class. The Golden Eagle observations on the VRCL were made up of two juveniles, all inside the point count plot boundaries. There were no sub-adult Golden Eagles observed within the point count plot boundaries or outside the plot boundaries. The surveys also found two adult Golden Eagle observations within the VRCL areas, all being seen inside the plot boundaries. Furthermore, there were seven unknown age class observations that were observed outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the Golden Eagles.

The point count station with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries was located in the central portion of the VRCL (V-02) (Figure 5 Appendix

A) with a total of seven Golden Eagles observations (two inside/five outside). The point count stations within the VRCL with the lowest number of Golden Eagles observations during the survey season was the point count station located in the southern and northern portions of the VRCL (V-01 and V-03) (Figure 5 Appendix A) with two Golden Eagle observations each during the entire study (Appendix C).

Of the four Golden Eagle observations within the VRCL observed within the point count plots, 75 percent of the observations (three Golden Eagles) were seen within the month of September (Table 4). The next highest number of observations during a month was the events in January with one Golden Eagle observation. For the months of October, November, and December, no observations of Golden Eagles were made within the VRCL during the point count surveys. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix C of this Plan.

Silver Creek Ranch Conservation Lands

The Golden Eagle observations in the SCRCL totaled seven Golden Eagles with four observations within the point count plot boundaries and three observations outside the plot boundaries for the entire survey season (Figure 6 Appendix A). These observations were also categorized by their age class. The Golden Eagle observations on the SCRCL had no juvenile or sub-adult eagles inside or outside the point count plot boundaries. The surveys found four adult Golden Eagle observations within the SCRCL areas with three observations inside the plot boundaries and one observation outside the plot boundaries. Furthermore, there were three unknown age class observations with one observation inside the plot boundaries and two observations outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the Golden Eagles (Appendix C).

The point count station in the SCRCL with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries was S-03 (Figure 6 Appendix A) SCRCL with a total of four Golden Eagle observations (2 inside/2 outside) (Appendix C). The point count station with the lowest number of Golden Eagle observations during the survey season was located in the western portion of the SCRCL (S-01) (Figure 6 Appendix A) with no Golden Eagles observed during all of the point count surveys.

Of the four Golden Eagle observations within the SCRCL observed within the point count plots, 75 percent of the observations (three Golden Eagles) were seen within the month of January. The next highest number of observations during a month was the events in October with one Golden Eagle observation. For the months of September, November, and December, no observations of Golden Eagles were made within the SCRCL during the point count surveys.

Overall, the results of the point count surveys included a total of 61 observations of Golden Eagles. This total includes 23 individual observations of Golden Eagles seen within the point count plot boundaries and 38 observations outside the plot boundaries.

The results of the point count surveys indicated that 93 percent of the Golden Eagle observations made within the Project Footprint and VFCL point count station boundaries were from the western point count stations, which are in close proximity to the hills located within the western portion of the VRCL. Of the 15 total Golden Eagle observations made during the entire study within point count plots, approximately 47 percent of those observations were seen during a single survey event (September 17-19, 2013), where seven Golden Eagles were observed feeding on a carcass of a dead animal within the proposed Project Footprint. The data gathered during this fall migration/winter survey period indicates that unless there is an attractant (i.e. food) found within the Project Footprint and the VFCL, that Golden Eagles' usage of the Project Footprint is nominal. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix C of this Plan.

2010 Golden Eagle Non-Breeding Season Surveys and Raptor Survey

The 2010 surveys, conducted during a non-breeding period, were specifically targeted for Golden Eagle occupancy via individual and nest sightings according to the USFWS Interim Guidelines for Golden Eagle Surveys. Two qualified observation biologists flew over the Project Footprint and areas within a 10-mile radius of the Project. Fifteen Golden Eagle nests were observed within the 10-mile radius of the Project. Four of those nests showed evidence of having fledged young. The survey noted no Golden Eagle nests occurring within two miles of the Project Footprint boundary and no other raptor or *Corvus* spp. found within the Project Footprint. The number of nests and species observed are indicated in Table 2.

Table 2. Raptor species' nest and/or individuals observed during 2010 Aerial Survey.

Species	Number of Nests/Individuals
Turkey Vulture	1
Red-tailed Hawk	24
Golden Eagle	15
Prairie Falcon	17
Common Barn Owl	1
Great-horned Owl	1

2013 – 2014 Golden Eagle/Raptor Nesting Survey

As per guidance provided by the USFWS, an initial round of helicopter surveys was performed over a 10-day period during the early breeding season, from January 15 to 24, 2014. The second round of aerial surveys were conducted over a 7-day period from April 2 to 8, 2014, when active nests were expected to contain eggs or young nestlings.

All surveys were conducted by qualified observers in a helicopter operated by a pilot experienced in conducting aerial Golden Eagle nesting surveys. Survey methodology described in USFWS Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Eagle Management and Permit Issuance (Pagel et al. 2010) was followed to the extent possible. The biologists conducted an aerial examination of all appropriate nesting habitats with ten miles of the Project Footprint. During aerial surveys, the observers searched for large stick nests of Golden Eagles and other raptors on cliff faces, rocky outcrops, trees, transmission towers, and other suitable nesting substrates.

A total of 492 nests were documented by Bloom Biological, Inc. (BBI) within the nesting study survey area, including 46 Golden Eagle nests. Nests classified as belonging to species other than Golden Eagles included nests of 226 Common Ravens (*Corvus corax*), 146 Red-tailed Hawks (*Buteo jamaicensis*), 62 Prairie Falcons (*Falco mexicanus*), eight Barn Owls (*Tyto alba*), three Great Horned Owls (*Bubo virginianus*), and one Turkey Vulture (*Cathartes aura*).

It was estimated that the 46 Golden Eagle nests discovered during this survey effort comprise approximately 30 breeding territories, some of which contain one or more alternate nests. The actual number of territories could be slightly higher or lower than 30, and the exact number of territories depends, in part, on how alternate nests of a single territory are defined. Golden Eagle nesting density (and territory size) is driven primarily by habitat quality, with higher nesting density in better quality habitat. Given that habitat quality in the nesting study survey area varies from quite high (in the northwestern quadrant, where most nests were located), to quite low, in extreme eastern portions, it would not be surprising for nests in some areas to be located as close together as one mile, or even rarely 0.5 miles, particularly in the areas of better quality habitat.

In total, nine Golden Eagle nests were classified as "used" in the 2014 season, each representing a separate territory. Thus, nesting occurred in almost one-third (9 of about 30) of the territories identified in this survey. Of these nine nests, eggs are presumed to have been laid in at least four. Adults were observed on nests in incubating posture and two un-incubated eggs were observed in (presumed failed) nests in April. Finally, two chicks were observed being tended to by a female Golden Eagle in early April. Of the remaining five Golden Eagle nests that were identified as active in 2014, none were known to contain eggs or nestlings as of the April 8th survey date. A nest was considered active if any of the following three conditions was met: (1) fresh (live or dead) sticks had been added during the current nesting season, (2) the nest was found to contain eggs or young (dead or alive), or (3) an adult was observed on the nest in an incubating (or brooding) posture. Given that Golden Eagles in this region normally lay eggs on or before this date, it is very unlikely that any of these five nests went on to successfully fledge young during the 2014 nesting season.

No Golden Eagle nests were identified within three miles of the Project Footprint, though four nests were located within four miles of the Project Footprint. Two of these four nests were active in 2014, though neither nest was ever found to contain eggs or nestlings. The next closest active Golden Eagle nest to the Project in 2014 was located approximately 5.79 miles north-northwest of the Project Footprint.

3.4.2 Miscellaneous Avian Observations

The wildlife and plant field reconnaissance surveys conducted in April 2009 of the Project Footprint and conservation lands noted miscellaneous observations of Greater Roadrunner (*Geococcyx californianus*), Burrowing Owl, Anna's Hummingbird (*Calypte anna*), Loggerhead Shrike (*Lanius ludovicianus*), Yellow-billed Magpie (*Pica nuttalli*), American Crow (*Corvus brachyrhynchos*), and Common Raven. Additional surveys in February 2010 noted raptor species made up of Turkey Vulture, Northern Harrier (*Circus cyaneus*), Red-tailed Hawk (*Buteo jamaicensis*), Ferruginous Hawk (*Buteo regalis*), Golden Eagle, American Kestrel (*Falco sparverius*), and Prairie Falcon.

Additional miscellaneous avian species observed during various biological surveys for the Project from 2009 to 2015 included the American Pipit (*Anthus rubescens*), Barn Swallow (*Hirundo rustica*), Violet-green Swallow (*Tachycineta thalassina*), Mountain Plover, Killdeer (*Charadrius vociferus*), Long-billed Curlew (*Numenius americanus*), Brewer's Blackbird (*Euphagus cyanocephalus*), Mourning Dove (*Zenaida macroura*), Barn Owl, Cooper's Hawk (*Accipiter cooperii*), Lesser Nighthawk (*Chordeiles acutipennis*), Western Kingbird (*Tyrannus verticalis*), Say's Phoebe (*Sayornis saya*), California Horned Lark (*Eremophila alpestris actia*), Rock Wren (*Salpinctes obsoletus*), Mountain Bluebird (*Sialia currucoides*), Hermit Thrush (*Catharus guttatus*), California Thrasher (*Toxostoma redivivum*), European Starling (*Sturnus vulgaris*), Savannah Sparrow (*Passerculus sandwichensis*), Lark Sparrow (*Chondestes grammacus*), Sagebrush Sparrow (*Artemisiospiza nevadensis*), White-crowned Sparrow (*Zonotrichia leucophrys*), Red-winged Blackbird (*Agelaius phoeniceus*), Tricolored Blackbird (*Agelaius tricolor*), Western Meadowlark (*Sturnella neglecta*), Yellow-rumped Warbler (*Setophaga coronata*), Lesser Goldfinch (*Spinus psaltria*), Great Egret (*Ardea alba*), California Quail (*Callipepla californica*), House Finch (*Haemorhous mexicanus*), and Purple Finch (*Carpodacus purpureus*).

4.0 AVIAN IMPACT ASSESSMENT (TIER 3)

This section outlines the potential risks to avian species and supports the implementation of avoidance and minimization measures and compensatory mitigation. There is not a significant amount of information pertaining to the impacts of PV solar energy developments on avian resources. Some components of solar development (overhead lines, transmission lines, project lighting) are common to other types of energy developments, and the mechanisms of bird impacts resulting from those project components may be applicable to solar energy development. Potential risks to avian species can be broken into several categories: lighting, collision, noise, electrocution and habitat loss.

4.1 Lighting

For avian species around a solar facility, increased lighting during low-light periods can cause some species to leave the area and can disrupt foraging, breeding, or other activities. The lighting from construction and O&M may disturb the nighttime rest and sleep periods of diurnal avian species, including most passerine birds, causing them to abandon nests that are otherwise undisturbed. Nest site selection by some avian species may also be affected by light, resulting in nests being established farther from light sources (Deda et. al., 2007 Longcore and Rich, 2004).

During construction, lighting from construction vehicles during nighttime hours, external lights on support buildings, and down-shielded temporary lighting necessary for worker safety during nighttime construction. During operation of the Project majority of the lighting will be motion-censored, although constant low level lighting will be required at the O&M building. During operation truck lights associated with nighttime security will also occur. All lighting will point downward and be shielded to preserve dark skies.

Given the lack of artificial night lighting in the area surrounding the Project Footprint prior to construction of the solar facility, the overall change in ambient lighting conditions could disturb the nesting and foraging activities of birds. However with the avoidance and minimization measures discussed in Section 5.0, the effects of lighting will be reduced to less than significant levels.

Polarized light pollution has the potential for effects on habitat selection, egg laying foraging, navigation and orientation, predation, and population dynamics of numerous species (Horvath et al. 2009). Artificial surfaces such as the PV panels planned within the Project Footprint could reflect light and become polarization signals to which different species are attracted. The highly polarizing nature of solar panels may negatively affect the ability of animals to judge suitable habitats and egg laying sites, especially for organisms normally associated with water; artificial polarizing surfaces can be more attractive than water due to a stronger polarization signature. This can result in the attraction of insects which either waste resources (time and energy) on the surfaces, lay eggs on them resulting in reproductive failure, become easy targets for predators, or dehydrate and die (Horvath et al., 2009). Many insect families, including mayflies (*Ephemeroptera*), stoneflies (*Trichoptera*), dipterans, and horse and deer flies (*Tabanidae*) are very attracted to the polarized light reflected by solar panels and will lay eggs above solar panels (Horvath et al. 2010).

This could have a negative effect if avian predators that are attracted by and feed on these insect, benefit from the abundance of prey attracted to these artificial surfaces, or become prey themselves. For instance, nest predators such as Common Raven that would gather near aquatic insect congregations that are attracted by the polarized light reflected by solar panels could represent an enhanced predatory risk for the eggs and chicks of other avian species that nest in the immediate vicinity of the Project such as California Horned Larks (Keller 2010).

At this time, due to little conclusive scientist evidence, it is unknown the level of effect the polarization light pollution on insectivorous birds. PVS may be required to add additional avoidance, minimization or mitigative measures to reduce impacts to a less than significant level due to the results of the monitoring reports.

4.2 Collision

Avian interactions with transmission lines and panels and the risks those interactions impose vary greatly by location within the Project Footprint. Bird collisions with power lines generally occur when a power line or other aerial structure transects a daily flight path used by a concentration of birds or migrants traveling at reduced altitudes (Brown, 1993). Collision rates generally increase in low light conditions; during inclement weather, such as rain or snow; during strong winds; and during panic flushes when birds are startled by a disturbance or are fleeing from danger. Collisions are more probable near wetlands, valleys that are bisected by power lines, and within narrow passes where power lines run perpendicular to flight paths.

Passerines (e.g., songbirds) and waterfowl (e.g., mallard ducks) are known to collide with wires (APLIC, 2012), particularly during nocturnal migrations or poor weather conditions (Avery et al., 1980). Passerines and waterfowl tend to fly under power lines, while larger species generally fly over lines and risk colliding with higher static lines. Also, many smaller birds tend to reduce their flight activity during poor weather conditions (Avery et al., 1978). Due to the limited amount of overhead power lines (e.g. feeder and distribution lines) proposed for the Project, and the construction of those structures and lines will be in constructed with Avian Power Line Interaction Committee

(APLIC) guidelines (2012), the effects of collision with power lines should be reduced to less than significant levels.

In addition to the collision risk to overhead power lines there is the possibility that the polarized glare or the "lake effect" can occur with huge photovoltaic projects (Kagan et al. 2014). An open upland environment with a large expanse of reflective panels could emulate a large body of water. Avian species such as coots, grebes, and cormorants that utilize open water as their primary habitat have been noted to land due to confusion of the solar panels with water (Kagan et al. 2014). This landing could lead to potential blunt force impact trauma or stranding from landing on artificial reflectors (Keller 2010).

PVS will conduct post-construction monitoring on the Project Footprint (Section 6.0). The monitoring would estimate the overall annual avian injury, harm, or potential mortality associated with the solar facility; determine the species impacted at the solar facility; and determine whether there is spatial differentiation within the solar field. If the San Benito County and regulatory agencies deemed the mortality excessive, PVS would take corrective actions as noted in the 2015 Final Supplemental Environmental Impact Report (FSEIR).

4.3 Noise

Increased noise from heavy equipment, during construction and O&M activities could alter bird behavior (e.g., foraging, breeding) including disturbance that could lead to nest failure or abandonment. The construction activities would include PV panel assembly, grading and recontouring; support post, panel, electrical equipment installation, and perimeter road construction.

Noise generated by the pile-drivers and other heavy equipment would be expected to result in temporary threshold shifts in hearing sensitivity. Threshold shifts could last for an extended period of time; loss of hearing could result in increased mortality as certain avian species relies on its ability to detect prey by sound and communicate with conspecifics such as the Burrowing Owl. Noise and vibrations could also disrupt intraspecific communication and cause the owls to leave burrows, where they may be more susceptible to predation or Project-related injury or mortality (County of San Benito 2010).

Noise associated with construction activities may temporarily displace avian species from the Project Footprint and/or immediate Project vicinity. Foraging impacts associated with noise-driven displacement may become evident. Declines in foraging efficiency would be more evident in cleared or disturbed areas than in undisturbed habitat. Noise tolerance varies amongst avian species. Some species are attributed with robust adaptive abilities, while others demonstrate sensitivity to anthropogenic disturbances. Thus, impacts to species, resultant of construction-related noise disturbances, is possible. However, under the implementation of species-specific avoidance and minimization practices, as outlined by Mitigation Measures **BR-6.1** (Pre-construction Surveys for Nesting and Breeding Birds and Implementation of Avoidance Measures), **BR-13.1** (Focused Pre-construction Burrowing Owl Surveys and Implementation of Avoidance Measures) and **BR-16.2**

(Minimize Impacts of Foundation Support Installations) of the FSEIR (County of San Benito 2015), causation of mortality due to elevated noise levels is unlikely.

Only minor noise at insignificant levels would be created during operation at the proposed facility. This noise would be created by security patrols, maintenance crews, wash crews, and the sound of electrical equipment, such as the inverters and transformers. Security and maintenance staff would routinely traverse the site in lightweight vehicles and all-terrain vehicles. Panel washing crews would be scheduled to clean the panels twice per year. They would traverse the site in a small all-terrain vehicle which would be fitted with a trailer containing a water tank and pump to operate a high-pressure sprayer.

4.4 Electrocution

Avian species are known to be electrocuted by electrical power lines, energized substation/switchyard and interconnect structures found within the Project Footprint due to two known factors (APLIC 2006):

- Topography, vegetation, availability prey and other behavioral or biological factors.
- Inadequate separation between two energized conductors or and energized conductor and the grounding hardware.

Electrical utility lines could result in electrocution of avian species such as large raptor and members of the Family *Corvidae* (e.g. crows and ravens) that have wing-spans large enough to simultaneously contact two energized conductors or an energized conductor and grounded hardware. Furthermore, nests built in areas that do not have adequate clearances or coverings are susceptible to arcing of electrical charges that could result in fire as well as an electrocution of adults and young. Therefore, any structures with energized jumper wires or hardware, such as transformers, can be especially hazardous, even to small birds, as they contain numerous, closely-spaced energized parts (APLIC 2006).

The biggest potential for electrocution to avian species on the Project Footprint will be from the energized equipment in the substation and switch station. The substation will be located directly adjacent to the existing PG&E transmission line. The substation output will be connected to a 230-kV switching station which will be owned and operated by PG&E; the switching station will provide protective relays and breakers to manage interface with the 230-kV grid system.

PVS will construct all electrical facilities including transmission and distributions lines, substations and switchyards in accordance with guidelines set forth in the *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC 2006), to avoid and/or minimize any avian electrocution risks as a result of the construction and operation of the Project. Details of design components will be indicated on all construction plans which will be submitted with the construction permit application to the County of San Benito. PVS will incorporate new versions of APLIC guidelines and update designs or implement new measures as needed during the Project's operations provided these actions do not require the purchase or replacement of previously constructed electrical or transmission line structures. Therefore, with those measures in place, electrocution to avian species including large raptors would be unlikely.

4.5 Habitat Loss

The construction and operation of the Project will result in modification of approximately 2,506 acres of habitat due to the construction and operation of the solar array complexes, an O&M building, a project perimeter road, electricity collection lines, DC-AC inverters, an electrical substation and switching station. Breeding and wintering bird composition on the Project Footprint appears to be typical of densities found in annual brome grasslands of central California. The annual, non-native grassland habitat found within the Project Footprint that will be impacted is not significantly unique or limited on the landscape. Avian species should have other comparable or better breeding, foraging and roosting opportunities within the surrounding areas including the proposed Conservation Lands that will be protected through avoidance and minimization measures as well as conservation easements for compensatory mitigation of proposed impacts within the Project Footprint.

Upon the completion of construction, annual grassland vegetation will recover in interstitial spaces between arrays and along the Project edges between arrays and the perimeter fence. In addition, annual vegetation will recover under panels that may be capable of supporting foraging and nesting activity by some species.

The implementation of avoidance and minimization measures set forth in the 2015 FSEIR would reduce impacts to avian species due to habitat loss.

The Project will also implement a conservation package consisting of the permanent preservation and management of three large parcels of land to offset potential habitat impacts totaling approximately 24,176 acres. These Conservation Lands will be enhanced and managed for the species through implementation of a Habitat Management Plan. The lands were selected to provide local mitigation for habitat losses, preserve core populations of special status species and create permanent movement corridors with adjacent BLM controlled lands.

With the protection of these Conservation Lands, PVS shall compensate for permanent impacts to foraging and nesting habitat for avian species with the creation of permanent conservation easements. Conservation easements shall provide habitat preservation. Preserved habitat shall be of equal or greater quality after any restoration activity compared to the impacted habitat within the Project Footprint. This mitigation may occur on lands used simultaneously as mitigation for impacts to other species.

4.6 Potential Impacts to Special Status Avian Species

The Project area provides potential habitat for cover, breeding, foraging for 15 special status bird species (Section 3.3.1, Table 1). Of those 15 species, there is the potential for 13 of those species to use the Project Footprint for nesting and foraging. Those species are: Mountain Plover, Golden Eagle, California Condor (*Gymnogyps californianus*), Burrowing Owl, Tricolored Blackbird, Grasshopper Sparrow, Short-eared Owl, Long-eared Owl (*Asio otus*), Swainson's Hawk (*Buteo* *swainsonii*), Northern Harrier, White-tailed Kite (*Elanus leucurus*), Loggerhead Shrike, and Oregon Vesper Sparrow (*Pooecetes gramineus affinis*). Additional information on impacts to each of the abovementioned species is presented below.

4.6.1 Mountain Plover

Nearly the entire 2,506 acre Project Footprint provides suitable wintering habitat for Mountain Plovers. The Panoche Valley is an important wintering area for Mountain Plovers in central California. Due to impacts to Mountain Plover habitat, PVS will provide compensatory mitigation for permanent impacts to habitat for wintering Mountain Plovers with the creation of permanent conservation easements (Conservation Lands). Some of the approximately 24,176 acres of high quality Conservation Lands will provide habitat preservation in perpetuity at or above a ratio of 1:1 for wintering habitat acreage subject to impacts associated with construction of the Project. Preserved habitat shall be of equal or greater quality after any restoration activity compared to the impacted habitat. This mitigation may occur on lands used simultaneously as mitigation for impacts to other species.

Therefore, any potential for injury, mortality, or disturbance, or loss or degradation of wintering foraging habitat as a result of permanent or temporary construction-related activities would constitute a potential impact to the Mountain Plover. However, implementation of Mitigation Measures noted in Sections 4.6.4 and 4.6.5 as well as other avoidance and minimization measures (Section 5.0) would reduce potential impacts to Mountain Plovers to less than significant levels.

4.6.2 Golden Eagle

Based on the point count, UDA, and aerial nesting survey information noted in Section 3.4.1 and incidental observations, it is apparent that Golden Eagles forage around the Panoche Valley throughout the year. The overall activity levels within the Project Footprint appear low with a majority of the activity taking place on adjacent conservation lands with significant slopes and elevations ranging from approximately 1,400 feet to 2,100 feet amsl. Additionally, as found during the point count and the UDA studies, unless there is an attractant (i.e. food, carcass) found within the Project Footprint and the VFCL, the Golden Eagles usage of the site is nominal. The UDA study also indicated that the Golden Eagles are mostly flying across or through the Panoche Valley (i.e. Project Footprint/VFCL) to other habitats to forage or perch.

Furthermore, the 2010 aerial nesting study identified no Golden Eagle nests within two miles of the Project Footprint. In 2014, the nesting study identified no Golden Eagle nests within three miles of the Project Footprint. The next closest active Golden Eagle nest to the Project in 2014 was located approximately 5.79 miles north-northwest of the Project Footprint.

PVS will adhere to the avoidance measures and conservation approach described below. During construction and operation the maintenance avoidance and minimization measures are expected to result in the avoidance of direct adverse effects to Golden Eagles. Furthermore, the proposed compensatory mitigation as stated below will ensure that any impacts to Golden Eagle foraging habitat is mitigated to the approved ratio determined by the appropriate state and federal agencies. With implementation of these measures and particularly the compensatory mitigation, effects will be avoided, minimized, and mitigated, resulting in no net loss to the Golden Eagle population in the vicinity of the Project.

The Conservation Lands will provide habitat preservation, in perpetuity at a ratio of 2:1 or greater for all impacted Golden Eagle foraging habitat impacted. Preserved habitat is of equal quality compared to the impacted habitat and will be equal or greater quality after any restoration activity compared to the impacted habitat. This mitigation may occur on lands used simultaneously as mitigation for impacts to other species. In addition, the implementation of Mitigation Measures as well as other avoidance and minimization measures (Section 5.0) would reduce potential impacts to Golden Eagles to less than significant levels.

4.6.3 California Condor

No California condors have been observed in or near the Project Footprint during any surveys, though USFWS radio-tracking efforts have recorded California condors over the Project Footprint and/or Conservation Lands in the past. The Project Footprint contains 2,506 acres of potential foraging habitat for the California condors which would be impacted permanently as the result of Project implementation. The Project Footprint is surrounded by potential foraging habitat; the loss of this foraging habitat is so small compared to the remaining available habitat that it would not noticeably have an impact on the California condors. The Project Footprint does not contain suitable nesting habitat for California condors.

The Conservation Lands represent 24,176 acres of potential foraging habitat for the California condors that would be preserved in perpetuity. There is no suitable nesting habitat for the condor on any of the Conservation Lands. Should a condor land within the Project Footprint or Valley Floor Conservation Lands, all work shall be stopped within 500 feet of the condor until the bird has left the area on its own. If the bird fails to leave the area because of injury or other factors PVS shall contact the USFWS, CDFW and/or San Benito County for direction. Should a condor(s) be incidentally observed roosting within 0.5 miles of the construction area, no construction activity shall occur between 1 hour before sunset to 1 hour after sunrise, or until the condors leave the area. Should condors be found nesting within 1.5 miles of the construction area, no construction activity will occur until further authorization from the USFWS. All California condor sightings in the Project area will be reported directly to the USFWS by the County qualified biologist.

Any Project-related electric distribution and substation structures will be constructed using APLIC-based avian protection guidelines. Therefore, with the implementation of Mitigation Measures stated in the FSEIR (MM BR-6.1 and BR-12.2) as well as other avoidance and minimization measures (Section 5.0) potential impacts to condors would be reduced to less than significant levels.

4.6.4 Burrowing Owl

Nearly the entire 2,506 acres Project Footprint provides suitable foraging, nesting, and roosting habitat for Burrowing Owls. Numerous observations of Burrowing Owls have been made within the Project Footprint and Conservation Lands, and there are several CNDDB (2014) records of Burrowing Owls within a 10-mile radius of the Project Footprint.

The loss of occupied Burrowing Owl habitat and the loss of individuals (including eggs or young) as a result of construction and operation could result in impacts to this species in the Panoche Valley.

Open grasslands that recover in suitable interstitial spaces between arrays and along the Project perimeter will provide suitable habitat for this species during the operations phase. Avoidance and minimization measures noted in Section 5.0 and the Mitigation Measures found in the 2015 FSEIR for the Burrowing Owl and other species will avoid, minimize, and mitigate for any negative effects on the owl. The Mitigation Measures include the following provisions,

No more than 30 days and no less than 14 days prior to the commencement of initial ground disturbing activities, the Applicant shall implement focused pre-construction reconnaissance level surveys for burrowing owls. Surveys shall be conducted prior to the initiation of ground disturbance and be conducted by County-approved, qualified biologist(s) with experience surveying for burrowing owls. Surveys for burrowing owls shall be conducted in conformance with the *Staff Report on Burrowing Owl Mitigation* (CDFG, 2012) protocols. Surveys shall be completed within all areas proposed for ground disturbance and shall include the following avoidance measures:

1. Occupied burrows shall not be disturbed during the nesting season (1 February through 31 August) unless a qualified County-approved biologist verifies through non-invasive methods that either the birds have not begun egg-laying and incubation or that juveniles from the occupied burrows are foraging independently and are capable of independent survival. Owls present on site after 1 February will be assumed to be nesting unless evidence indicates otherwise. If western burrowing owls are present at the site, a qualified biologist will determine whether an exclusion zone can be established in accordance with the Staff Report on Burrowing Owl Mitigation (CDFG, 2012) protocols. This protected buffer area will remain in effect until 31 August, or based upon monitoring evidence, until the young owls are foraging independently or the nest is no longer active. If a buffer consistent with the staff report (CDFG, 2012) cannot be established, an experienced burrowing owl biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls. If a biologist experienced with burrowing owl determines the relocation of owls is necessary, a passive relocation effort may be conducted in coordination with CDFW as appropriate. During the nonbreeding season (generally 1 September–31 January), a qualified biologist may passively relocate burrowing owls found within construction areas in accordance with Staff Report on Burrowing Owl Mitigation (CDFG, 2012). Prior to passively relocating burrowing owls, a Burrowing Owl Exclusion Plan shall be prepared by a qualified biologist in accordance with Appendix E of the *Staff Report on Burrowing Owl Mitigation* (CDFW, 2012). The Burrowing Owl Exclusion Plan shall be submitted to the CDFW for review prior to

implementation, or as otherwise required by the CDFW during the permitting process.

2. For burrowing owls present during the non-breeding season (generally 1 September to 31 January), a 150-ft buffer zone will be maintained around the occupied burrow(s).
3. If there is any danger that owls will be injured or killed as a result of construction activity, during the non-breeding season, the birds may be Katz & Associates-evicted during the non-breeding season. Relocation of owls during the non-breeding season will be performed by a qualified biologist using one-way doors, which should be installed in all burrows within the impact area and left in place for at least two nights. These one-way doors will then be removed and the burrows excavated to ensure no burrowing owl is within the burrow and then backfilled immediately prior to the initiation of grading. To avoid the potential for owls evicted from a burrow to occupy other burrows within the impact area, one-way doors will be placed in all potentially suitable burrows within the impact area when eviction occurs.

PG&E will retain a qualified biologist to conduct preconstruction surveys for active burrows no more than 30 and no less than 14 days prior to the start of construction in accordance with the Staff Report on Burrowing Owl Mitigation (CDFG, 2012).

If western burrowing owls are present at the site, a qualified biologist will work with staff to determine whether an exclusion zone can be established in accordance with the Staff Report on Burrowing Owl Mitigation (CDFG, 2012). If it cannot, an experienced burrowing owl biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls. If a biologist experienced with burrowing owl determines the relocation of owls is necessary, a passive relocation effort may be conducted as described below, in coordination with CDFW as appropriate. During the nonbreeding season (generally 1 September–31 January), a qualified biologist may passively relocate burrowing owls found within construction areas. Prior to passively relocating burrowing owls, a Burrowing Owl Exclusion Plan shall be prepared by a qualified biologist in accordance with Appendix E of the Staff Report on Burrowing Owl Mitigation (CDFW, 2012). The Burrowing Owl Exclusion Plan shall be submitted to the CDFW for review as required.

The biologist shall accomplish such relocations using one-way burrow doors installed and left in place for at least two nights; owls exiting their burrows will not be able to re-enter. Then, immediately before the start of construction activities, the biologists shall remove all doors and excavate the burrows to ensure that no animals are present the burrow. The excavated burrows shall then be backfilled. To prevent evicted owls from occupying other burrows in the impact area, the biologist shall, before eviction occurs, (1) install one- way doors and backfill all potentially suitable burrows within the impact area, and (2) install one-way doors in all suitable burrows located within approximately 50 feet of the active burrow, then remove them once the displaced owls have settled elsewhere. When temporary or permanent burrow-exclusion methods are implemented, the following steps shall be taken:

Prior to excavation, a qualified biologist shall verify that evicted owls have access to multiple, unoccupied, alternative burrows, located nearby (within 250 feet) and outside of the projected disturbance zone. If no suitable alternative natural burrows are available for the owls, then, for each owl that is evicted, at least two artificial burrows shall be installed in suitable nearby habitat areas. Installation of any required artificial burrows preferably shall occur at least two to three weeks before the relevant evictions occur, to give the owls time to become familiar with the new burrow locations before being evicted. The artificial burrow design and installation shall be described in the Burrowing Owl Exclusion Plan per Appendix E of the Staff Report on Burrowing Owl Mitigation (CDFW, 2012).

Passive relocation of burrowing owls shall be limited in areas adjacent to Project activities that have a sustained or low-level disturbance regime; this approach shall allow burrowing owls that are tolerant of Project activities to occupy quality, suitable nesting and refuge burrows. The use of passive relocation techniques in a given area shall be determined by a qualified biologist who may consult with CDFW, and shall depend on existing and future conditions (e.g., time of year, vegetation/topographic screening, and disturbance regimes).

In addition, PVS will compensate for permanent impacts to Burrowing Owls or their habitat through the recording of easements for the Conservation Lands (24,176 acres). The Conservation Lands will be of equal or greater habitat quality after any restoration activity compared to the affected habitat. In accordance with California Burrowing Owl Consortium (1995) guidelines, an area of 6.5 acres per pair will be preserved and managed for this species. This mitigation may occur on lands used simultaneously as mitigation for impacts to other species. Given the habitat requirements for several of the Covered Species overlaps with burrowing owl, separate management activities would not be necessary. Therefore, with the implementation of Mitigation Measures as well as other avoidance and minimization measures (Section 5.0); potential impacts to Burrowing Owls would be reduced to less than significant levels.

4.6.5 Tricolored Blackbird

Tricolored Blackbirds have been observed (non-breeding observation) on the Proposed Project site and suitable foraging habitat for Tricolored Blackbirds is present throughout, although nesting habitat (i.e., cattail marshes, blackberry thickets, thistle stands) is absent. A large Tricolored Blackbird colony is known to occur approximately eight miles north of the Project Footprint at Little Panoche Reservoir (CNDDB, 2014).

These Blackbirds could forage in all areas of the Project Footprint and could be directly affected by the construction of the solar arrays, buildings, substation, and other infrastructure or activities.

Therefore, the Project has the potential to impact Tricolored Blackbirds foraging habitat. Incidental observations made during previous field surveys, confirmed the presence of potentially foraging Tricolored Blackbirds within the Project Footprint/Conservation Lands (County of San Benito 2010). Due to the extent of suitable foraging habitat, the overlap of the species' ranges with the Panoche Valley, and historic (CNDDB 2014) records, it appears that the Project Footprint is part of a larger annual grassland area within the Panoche Valley that is used as foraging habitat by Tricolored Blackbirds.

Any injury, mortality, or a substantial loss or degradation of foraging habitat as a result of permanent or temporary construction-related activities would constitute an impact to the Tricolored Blackbird. Implementation of mitigation measures found in the FSEIR require PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance prior to ground-disturbing activities would result in avoidance and minimization of potential impacts to Tricolored Blackbirds that may forage on the Project Footprint. With the implementation of mitigation measures BR-G.1, BR-G.2, BR-6.1, BR-7a.1 as well as other avoidance and minimization measures (Section 5.0), potential impacts to Tricolored Blackbirds would be reduced to less than significant levels within the Project Footprint.

4.6.6 Grasshopper Sparrow

The grassland habitats of the Project Footprint are heavily grazed, and therefore generally lack the heterogeneous structure this species typically prefers. However, suitable conditions may occur within the Proposed Project site during some years, especially following periods of above average rainfall. Grasshopper Sparrows are known to have nested in the Proposed Project vicinity (National Audubon Society 2013) and the Panoche Valley Solar Project is within the range of this species. Although Grasshopper Sparrows could occur on the Project Footprint or Conservation Lands, there are no CNDDB (2014) records of them occurring with a 10-mile radius of the Project Footprint. Biological surveys conducted on the Project Footprint and Conservation Lands from 2009 through 2014, did not detect Grasshopper Sparrows.

Any potential for injury, mortality, or disturbance (particularly of nesting Grasshopper Sparrows), or loss or degradation of nesting or foraging habitat as a result of permanent or temporary construction-related activities would constitute a potentially impact to the Grasshopper Sparrow. With the implementation of mitigation measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for nesting and breeding birds (BR-6.1 of the FSEIR) and pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to Grasshopper Sparrows on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to Grasshopper Sparrows would be reduced to less than significant levels within the Project Footprint.

4.6.7 Short-Eared Owl

Short-eared Owls require open country that supports concentrations of rodents (e.g. voles) and adequate herbaceous cover to conceal their ground nests from predators. Suitable habitats may include irrigated alfalfa or grain fields, ungrazed grasslands and old pastures (Shuford 2008). The grassland habitats of the Project Footprint are heavily grazed, and therefore generally lacking the structure this species typically prefers for nesting. However, suitable conditions may occur within the Project Footprint during some years, especially in response to vole population irruptions following exceptional rain years (Shuford 2008). Conditions on the Project Footprint or Conservation Lands on the site are more xeric than short-eared owls prefer during most years. There are no CNDDB (2014) records of short-eared owl occurring with a 10-mile radius of the Project Footprint. Biological surveys conducted on the Project Footprint and Conservation Lands from 2009 through 2014 did not detect short-eared Owls.

With the implementation of mitigation measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for nesting and breeding birds (BR-6.1 of the FSEIR) and pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to short-eared Owls on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to Short-eared Owls would be reduced to less than significant levels within the Project Footprint.

4.6.8 Long-Eared Owl

Long-eared Owls prefer to nest in conifer, oak, riparian, pinyon-juniper, and desert woodlands that are open or are adjacent to grasslands, meadows, or shrublands. Key habitat components are some dense cover for nesting and roosting, suitable nest platforms, and open foraging areas (Shuford 2008). Suitable foraging habitat for long-eared owls is present throughout the Project Footprint, although only marginally suitable nesting habitat is present in the few trees associated with structure or small *Eucalyptus* sp. groves planted for shading of cattle. Long-eared Owls have been observed nesting approximately three miles north of the Project Footprint at Mercy Hot Springs. The Panoche Valley is within the range of this species and they could forage on the Project Footprint, however, nesting is unlikely. No observations of long-eared owls have been made during any biological surveys conducted on the Project Footprint or adjacent Conservation Lands from 2009 to 2014.

Any potential for injury, mortality, or disturbance (particularly of nesting Long-eared owls), or loss or degradation of habitat as a result of permanent or temporary construction-related activities would constitute a potentially significant impact to the Long-eared Owl. With the implementation of Mitigation Measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for nesting and breeding birds (BR-6.1 of the FSEIR) and pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to

Long-eared Owls on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to Long-eared Owls would be reduced to less than significant levels within the Project Footprint.

4.6.9 Swainson's Hawk

The Swainson's Hawk breeds in the western United States and Canada and winters in South America as far south as Argentina. The hawk is adapted to the open grasslands, it has become increasingly dependent on agriculture, especially alfalfa crops, as native communities are converted to agricultural lands. Nearly the entire 2,506 acres Project Footprint could provide suitable foraging habitat for Swainson's Hawks. Three small *Eucalyptus* sp. stands present on the Project Footprint represent marginal potential nesting habitat. The trees in these stands are not mature and this species of hawk does not typically select eucalyptus as nest sites. The most recent status surveys did not locate any Swainson's Hawk nests in San Benito County and indicated on range maps that the Panoche Valley is outside of the current known range for the species, although the Panoche Valley is in the historic range (Anderson et. al. 2007). Additional potentially suitable nest trees are found outside the Project Footprint. If Swainson's Hawks were to nest in the vicinity, they could use the site for foraging. This hawk migrates to South America for the winter. Swainson's Hawks have not been detected during any biological surveys conducted on the Project Footprint or Conservation Lands from 2009 and 2014 including the aerial nesting surveys completed in 2010 and 2013/2014 and no CNDDB observations of this hawk species within over three miles of the Project Footprint (CNDDB, 2014).

Any potential for injury, mortality, or disturbance, or loss or degradation of habitat as a result of permanent or temporary construction-related activities would constitute a potentially significant impact to the Swainson's hawk. With the implementation of Mitigation Measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for nesting and breeding birds (BR-6.1 of the FSEIR) and pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to Swainson's Hawks on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to Swainson's Hawks would be reduced to less than significant levels within the Project Footprint.

4.6.10 Northern Harrier

Northern Harriers breed and forage in a variety of open, treeless habitats that provide a sufficient vegetative cover, an abundance of preferred prey. In California, harriers can be found in freshwater marshes, brackish and saltwater marshes, wet meadows, weedy borders of lakes, rivers and streams, annual and perennial grasslands (including those with vernal pools), weed fields, ungrazed or lightly grazed pastures, some croplands, sagebrush flats, and desert sinks. Northern harriers require adequate herbaceous cover to conceal their ground nests from predators typically, patches of dense, often tall, vegetation in undisturbed areas (Shuford 2008).

Nearly the entire 2,506 acres Project Footprint currently provides suitable foraging habitat for Northern Harriers due to observations of harriers foraging over the Project Footprint and Conservation Lands. However, the grassland habitats of the Project Footprint are heavily grazed, and therefore generally lacking the structure this species typically prefers for nesting. However, suitable conditions for nesting could occur within the Project Footprint during some years following exceptional rain years (Shuford 2008) with altered grazing management. As stated previously, Northern Harriers have been detected foraging on the Project Footprint and Conservation Lands, but no nesting Northern Harriers have been observed during any biological surveys conducted on the Project Footprint or Conservation Lands from 2009 and 2014 including the aerial nesting surveys completed in 2010 and 2013/2014.

Any potential for injury, mortality, or disturbance (particularly of nesting Northern Harriers), or loss or degradation of habitat as a result of permanent or temporary construction-related activities during the right conditions would constitute a potentially impact to the Northern Harrier. With the implementation of mitigation measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for nesting and breeding birds (BR-6.1 of the FSEIR) and pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to Northern Harriers on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to Northern Harriers would be reduced to less than significant levels within the Project Footprint.

4.6.11 White-Tailed Kite

The White-tailed Kite is found in California throughout the year associated with coastal and valley lowlands where it is mostly found foraging and nesting near agricultural areas. This kite needs substantial groves of dense, broad-leafed deciduous trees used for nesting and roosting (Zeiner et. al. 1990). Some of the 2,506 acre Project Footprint or nearby properties could be considered foraging habitat for White-tailed Kites. However, a majority of the grassland habitats of the Project Footprint and Conservation Lands are heavily grazed, and therefore lack the preferred habitat for foraging and any nearby structure this species typically prefers for nesting with the exception of some riparian areas along Silver and Panoche Creeks in the SCRCL. Furthermore, no observations of White-tailed Kites foraging over the Project Footprint, Conservation Lands or in its immediate vicinity during any biological surveys conducted from 2009 and 2014 including the aerial nesting surveys completed in 2010 and 2013/2014. In addition, there have been no CNDDB observations of White-tailed Kites within 10 miles of the site (CNDDB, 2014).

Any potential for injury, mortality, or disturbance (particularly of nesting White-tailed Kites), or loss or degradation of habitat as a result of permanent or temporary construction-related activities during the right conditions would constitute a potentially significant impact to the White-tailed Kite. With the implementation of mitigation measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for nesting and breeding birds (BR-6.1 of the FSEIR) and pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the

FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to White-tailed Kites on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to White-tailed Kites would be reduced to less than significant levels within the Project Footprint.

4.6.12 Loggerhead Shrike

Suitable foraging habitat for Loggerhead Shrikes is present throughout the Project Footprint, and there is abundant prey for this species (e.g. small lizards, grasshoppers); however, only marginally suitable nesting habitat is present in the few trees associated with structures on or adjacent to the Project Footprint. Shrubs that may be used by this species are not present on the Project Footprint, but are abundant on Conservation Lands. This species could occur in all areas of the Project Footprint and could be directly affected by the construction of the solar arrays, buildings, substation, and other infrastructure or activities. Therefore, the Project has the potential to impact Loggerhead Shrikes, impede their movement, and alter occupied habitat. Field surveys have confirmed the presence of Loggerhead Shrikes within the Project Footprint and adjacent Conservation Lands.

Any potential for injury, mortality, or disturbance (particularly of nesting Loggerhead Shrikes), or loss or degradation of habitat as a result of permanent or temporary construction-related activities would constitute a potentially significant impact to the Loggerhead Shrike. With the implementation of mitigation measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for nesting and breeding birds (BR-6.1 of the FSEIR) and pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to Loggerhead Shrikes on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to Loggerhead Shrikes would be reduced to less than significant levels within the Project Footprint.

4.6.13 Oregon Vesper Sparrow

The Oregon Vesper Sparrow is considered an obligate grassland species that feeds on both invertebrates and seeds procured on the ground and in vegetation (Shuford 2008). The habitat of Oregon vesper sparrows wintering in California is mainly open ground with little vegetation or grown to short grass and low annuals, including stubble fields, meadows, and road edges (Shuford 2008). Suitable winter foraging habitat is present throughout the Project Footprint and the Conservation Lands. Although Oregon Vesper Sparrow could occur on the Project Footprint and Conservation Lands, there are no CNDDB (2014) records of them occurring with a 10-mile radius of the Project Footprint. Biological surveys conducted on the Project Footprint and Conservation Lands from 2009 through 2014, did not detect Oregon Vesper Sparrow. However, the results of the Audubon Society's Christmas Bird Count in the Panoche Valley from 2003 through 2011 did indicate Vesper Sparrows (*Pooecetes gramineus*) but did not indicate the subspecies. These observations could very well be Oregon Vesper Sparrows.

Any potential for injury, mortality, or disturbance, or loss or degradation of wintering foraging habitat as a result of permanent or temporary construction-related activities would constitute a potentially significant impact to the Oregon Vesper Sparrow. With the implementation of mitigation measures noted in Sections 5.0 and the additional mitigation measure that requires PVS to retain a qualified, County-approved Designated Biologist to conduct pre-construction surveys for non-breeding birds designated as California Species of Special Concern (BR-7b.1 of the FSEIR) in areas proposed for ground disturbance, prior to ground-disturbing activities that would result in potential impacts to Oregon Vesper Sparrows on the Project Footprint. With the implementation of these mitigation measures as well as other avoidance and minimization measures (Section 5.0), potential impacts to Oregon Vesper Sparrows would be reduced to less than significant levels within the Project Footprint.

4.7 Cumulative Impacts

Analysis of cumulative effects typically considers the effects of a proposed project in combination with the effects of past, present, and reasonably foreseeable projects. To date, no other solar projects have been built in the vicinity of the Panoche Valley Solar Project and to the knowledge of PVS; no solar facilities are planned for construction in the future. However, if in the future a solar facility is planned in the vicinity of the Panoche Valley Solar Project, that project will be subject to the same regulations, and will be required to ensure that their effects on avian species are avoided, minimized, and mitigated. Therefore, the cumulative effects on avian species in the general vicinity, directly or indirectly would be considered less than significant.

5.0 AVOIDANCE, MINIMIZATION, AND MORTALITY REDUCTION MEASURES

This section identifies minimization and mortality measures that will be incorporated during construction and O&M of the Project.

5.1 General Avoidance and Minimization Measures

PVS will implement the following best management practices (BMPs) and avoidance and minimization measures in order to minimize potential impacts on avian species. These measures are also described in the FSEIR for the Panoche Valley Solar Project.

- Prior to any project activities on the site (i.e., surveying, mobilization, fencing, grading, or construction), a Worker Environmental Education Program (WEEP) shall be implemented by a qualified biologist or qualified biologists. Both the biologist(s) and the WEEP shall be subject to County approval. The WEEP shall be put into action prior to the beginning of any project activities and implemented throughout the duration of project construction. The WEEP shall include, at a minimum, the following items,
    - Training materials and briefings shall include but not be limited to: a discussion of the Federal and State Endangered Species Acts, Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act; the consequences of non-compliance with

these acts; identification and values of plant and wildlife species and significant natural plant community habitats; a contact person and phone number in the event of the discovery of dead or injured wildlife; and a review of mitigation requirements.

- A discussion of hazardous substance spill prevention and containment measures.

- A discussion of measures to be implemented for avoidance of the sensitive resources discussed above and the identification of an on-site contact on in the event of the discovery of sensitive species on the site. This will include a discussion on microtrash and its potential harmful effects on California condors.

- Protocols to be followed when road kill is encountered in the work area or along access roads to minimize potential for additional mortality of scavengers and the identification of an on-site representative to whom the road kill will be reported. Road kill shall be reported to the appropriate local animal control agency within 24 hours.

- Maps showing the known locations of special-status wildlife, populations of rare plants and sensitive vegetative communities, seasonal depressions and known waterbodies, wetland habitat, exclusion areas, and other construction limitations (e.g., limited operating periods). These features shall be included on the projects plans and specifications drawings.

- Literature and photographs or illustrations of potentially occurring special-status plant and/or wildlife species (e.g. Golden Eagles and California condors) will be provided to all project contractors and heavy equipment operators.

- The Applicant shall provide to the County of San Benito evidence that all on-site construction and security personnel have completed the WEEP prior to the start of site mobilization. A special hardhat sticker or wallet size card shall be issued to all personnel completing the training which shall be carried with the trained personnel at all times while on the project site. All new personnel shall receive this training and may work in the field for no more than five days without participating in the WEEP. A log of all personnel who have completed the WEEP training shall be kept on site.

- A weather protected bulletin board or binder shall be centrally placed or kept on site (e.g., in the break room, construction foreman's vehicle, construction trailer) for the duration of the construction. This board or binder will provide key provisions of regulations or project conditions as they relate to biological resources or as they apply to grading activities. This information shall be easily accessible for personnel in all active work areas.

- Develop a stand-alone version of the WEEP, that covers all previously discussed items above, and that can be used as a reference for maintenance personnel during project operations.

- Before commencing on-site construction activities, PVS will submit to CDFW and USFWS, the name, qualifications, business address, and contact information of one or more County-approved biologists. The Permittee shall ensure that each County-approved biologist is knowledgeable and experienced in the biology, and natural history of the special status avian species that could occur on the Project. The County-approved biologist(s) shall be responsible for monitoring construction activities to minimize and fully mitigate or avoid the take of avian species and to minimize disturbance of foraging habitat. The County-approved biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place. All biological monitors that work on-site will receive instruction from and report to the County-approved biologist(s).

- The Applicant shall provide to the County of San Benito evidence that all on-site construction and security personnel have completed the WEEP prior to the start of site mobilization. A special hardhat sticker or wallet size card shall be issued to all personnel completing the training which shall be carried with the trained personnel at all times while on the project site. All new personnel shall receive this training and may work in the field for no more than five days without participating in the WEEP. A log of all personnel who have completed the WEEP training shall be kept on site.

- Prior to surface disturbance or other covered activity, a County-approved biologist shall conduct a special status species education program (tailgate briefing) for all Project personnel, which familiarizes the PVS employees and contractors with occurrence and distribution of special status species in areas impacted by the Project; take avoidance measures being implemented during the Project; and BMPs. This program is designed to ensure all personnel who work at the Project are aware of and can identify the avian special status species and the measures implemented to protect this species. An employee environmental awareness program will be administered to all new employees and to all other employees every two years. Upon completion of the program, the employees are given a badge that is required for admittance onto the Project site. Badges will include the employee's picture and will be color-coded and dated in order to show that the employee is current with required training.

- Prior to surface disturbance or other covered activity, PVS will conduct pre-construction surveys for non-breeding birds designated as California Species of Special Concern. PVS shall retain a County-approved biologist to conduct pre-construction surveys for avian species designated as California Species of Special Concern in areas proposed for ground disturbance prior to ground-disturbing activities. The timing of surveys shall be determined in consultation with CDFW.

- Prior to surface disturbance or other covered activity, PVS will conduct pre-construction surveys for nesting and breeding birds and implementation of avoidance measures. Prior to any on-site any site disturbance (i.e., mobilization, staging, grading or construction) during the breeding season for any birds that could occur on the Project Footprint, the PVS shall retain a County-approved qualified biologist to conduct pre-construction surveys for nesting birds. Surveys for nesting birds shall be conducted within the recognized breeding season in all areas within 500 feet of solar arrays, staging areas, substation sites, and access road locations. Surveys for raptors shall be conducted for all areas between February 1 and August 15. The required survey dates may be modified based on local conditions, as determined by the County-approved biologist, with the approval of the County of San Benito.

- If breeding birds (non-raptors) with active nests (incubating eggs or fledging young) are found prior to or during construction, a biological monitor, under the supervision of a County-approved biologist, shall establish a 300-foot buffer around the nest for ground-based construction activities and no activities will be allowed within the buffer(s) until the young have fledged from the nest or the nest fails. If raptors with active nests are found, a 500-foot buffer for raptors will be placed around the nest until the young have fledged the nest or the nest is deemed to have failed. If nesting Golden Eagles are identified, a 0.5-mile no activity buffer will be implemented. The exception to these stated buffers is clarified below in Section 6.1 of this document.

- A County-approved biologist or a biological monitor shall be present while ground-disturbing activities are occurring. In addition to conducting preconstruction surveys, the biologist(s) shall aid crews in satisfying "take" avoidance criteria and implementing mitigation measures; will document (weekly) all pertinent information concerning Project effects on protected avian species; and shall assist in minimizing the adverse effects of Project activities on protected avian species.

- PVS shall appoint a company representative (Environmental Manager) who will be the contact source for any employee or contractor who inadvertently kills or injures a protected avian species or who finds a dead, injured, or entrapped protected avian species. The representative will be identified during the pre-performance educational briefing.

- County-approved biologists and biological monitors are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify the Environmental Manager immediately.

- Unless County-approved biologist(s) allow alterations to routes, all Project vehicles shall be confined to designated project roads or prominently staked and/or flagged access routes that are surveyed prior to use.

- Any project-related electric distribution and substation structures will be constructed following applicable APLIC-based avian protection guidelines (2006).

- New light sources will be minimized, and lighting will be designed (e.g., using downcast lights) to limit the lighted area to the minimum necessary.

- If nesting golden eagles are identified, a 0.5-mile no activity buffer will be implemented in accordance with the Eagle Conservation Plan (subject to approval by the USFWS and CDFW). Should condors be found roosting within 0.5 miles of the construction area, no construction activity shall occur between 1 hour before sunset to 1 hour after sunrise, or until the condors leave the area. Should condors be found nesting within 1.5 miles of the construction area, no construction activity will occur until further authorization from the USFWS. All California condor sightings in the project area will be reported directly to the USFWS by the County qualified biologist.

- The County-approved biologist(s) shall keep an accurate tally of the number of sensitive avian resources that are affected by construction activities. Additionally, biologist(s) shall estimate the number of nest damaged, relocated, or nest that were deemed by the County-approved biologist to have abandoned/failed due to construction activities. Total number of nests affected (e.g. nest damaged, relocated, abandoned/failed) by the construction shall be reported in the post-activity compliance reports and entered into a central database developed expressly for that purpose.

- Any contractor, employee(s), or other personnel who inadvertently kills or injures any avian species, including state and federal endangered, threatened, species of concern or state fully protected, shall immediately report the incident to the Environmental Manager or County-approved biologist. In the case of a protected species, the Environmental Manager or County-approved biologist will contact CDFW and/or USFWS immediately in the case of a dead, injured, or entrapped listed avian species. The County-approved biologist will also document all circumstances of death, injury or entrapment of protected avian species. The County-approved biologist will: 1) take all reasonable steps to enable the individual animal to escape should it be entrapped; 2) contact CDFW, USFWS, or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the covered animal be injured; and 3) document circumstances of death in writing and if possible photograph the dead animal in situ prior to moving.

- If a protected avian species is injured or take occurs from Project related activities during construction or operations, the County-approved biologist shall be immediately notified and initial notification shall be made to CDFW by calling the Regional Office and providing information on the location, species, number of animals injured or killed, and the Permit Number. Following the initial notification, the County-approved biologist shall prepare written documentation of the information reported by telephone. Permittee shall send CDFW a written report within two calendar days. The report will include the date, time and location of the finding or incident, location of the carcass, and if possible provide a photograph, and any other pertinent information.

- Any other avian species (excluding protected avian species) found dead incidentally (outside surveys window or transects described in Section 6.2.1 below), will be identified, photographed, and documented in the same manner as the regular surveys. These incidental findings will be noted as incidental discoveries and will not be entered into the statistical calculation of mortality rate.

- The Applicant shall evaluate and implement feasible foundation installation systems to minimize noise and vibration that would affect ground-dwelling wildlife.

- All spills of hazardous materials shall be cleaned up immediately in accordance with the Project's Spill Prevention Control Plan.

- Pets are prohibited at the Project Footprint and Conservation Lands with the exception of working dogs. Working dogs that assist ranchers or those used for San Joaquin kit fox scat detection are not considered pets. Any working dog entering the Project Footprint will be required to provide proof of inoculations to prevent disease transmission.

- Firearms are prohibited within the Project Footprint.

- All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from the Project Footprint.

- Use of rodenticides and herbicides in areas impacted by the Project will be restricted to use within the prescriptions of the Noxious Weed and Invasive Plant Control Plan. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by federal, state, and local requirements.

- Project vehicles shall be confined to existing roads, construction roads, perimeter road, and transportation corridors between panels. Vehicle travel is not permitted off of designated transportation routes, except in the case of emergency or as approved by the designated biologist. A speed limit of 15 miles per hour (mph) will be adhered to on the Project Footprint.

- Upon completion of any section of the Project, all areas that are significantly disturbed and not necessary for future operations, shall be stabilized to resist erosion, and revegetated and re-contoured if necessary, and will follow goals and methods in the Habitat Restoration and Revegetation Plan to promote restoration of the area to pre-Project conditions.

5.2 Other Avian Specific Avoidance and Minimization Measures

To minimize impacts to nesting birds, this conservation strategy includes nesting bird deterrent methods within and adjacent to active construction areas, including substations, laydown yards, and in or on construction-related equipment. PVS or their subcontractors may use all legally available measures to deter initiation of nest building on equipment and structures vital to Project construction. Effective deterrent methods within work areas will reduce the likelihood of avian nests becoming established on Project construction-related materials, equipment, and buildings; thereby reducing potential for impacts to nesting birds due to Project construction. All nesting bird deterrent methods will be evaluated and implemented by PVS or its subcontractors. These methods will be evaluated by the County-approved biologist to assure compliance with the applicable mitigation measures, permits, and regulations.

Specific locations for the use of exclusionary or deterrent devices will be determined in coordination with PVS' Environmental Manager and the County-approved biologist. All nesting deterrents below are intended to prevent nesting attempts and do not include the use of devices that prevent nesting from continuing once a nest is built.

The deterrent methods listed below, either on their own or in combination with other measures, can be effective in discouraging bird nesting within and immediately adjacent to construction areas. The effectiveness of deterrents will be evaluated for the duration of construction and adapted accordingly based on input from PVS' Environmental Manager and the County-approved biologist. PVS will submit a summary of the deterrents used and perceived effectiveness in the Monthly Compliance Report to the USFWS, CDFW and San Benito County during construction.

5.2.1 Vegetation Removal

Removing potential nesting habitat is the first component in effectively excluding nesting birds within the Project Footprint's construction area. To the extent feasible prior to the onset of the nesting bird season and after pre-construction surveys, construction areas will be cleared of vegetation (e.g. trees) to reduce potential conflicts between construction activities and nesting birds during the breeding season.

If trees or existing poles/towers are to be removed as part of Project related construction activities they will be done so outside of the nesting season to avoid additional impacts to nesting raptors. If removal during the nesting season can't be avoided then trees and existing poles/towers the biological monitor must confirm that the nest is vacant prior to its removal. If nests are found within these structures and contain eggs or young the biological monitor shall allow no activities within a 300-foot buffer for nesting birds and/or a 500-foot buffer for raptors until the young have fledged the nest.

5.2.1 Tarps

Where practical, equipment and materials can be covered with tarps; however, tarps must be tied down firmly to secure them against strong winds, and will not be open at the bottom because some species, Rock Wrens in particular, will access the equipment or material from the bottom. Tarps will be inspected at least once per week to identify and correct any openings that may allow cavity-nesting bird species to enter. If openings are found, the tarps will be inspected for trapped wildlife before re-closure.

5.2.1 Mesh Netting

An alternative to tarps is mesh netting to cover equipment, stored materials and equipment, and partially constructed support facilities helps prevent birds from accessing potential nesting sites within the construction areas. Inspections and maintenance of netting will be performed daily to avoid impacts to birds and other wildlife species.

The size of the mesh grid can vary depending on the sizes of birds that are being excluded. Given the diversity of birds that could nest within construction areas across the Project Footprint, a 0.75-inch sized mesh may be suitable for excluding the greatest number of birds, including small birds such as House Finches.

To increase the effectiveness of the mesh netting as a bird exclusion device, equipment or other objects will be completely covered leaving no gaps in the netting through which birds could enter and build a nest under the netting. Mesh netting if used, will be inspected daily to identify and repair any rips or gaps in the netting that could allow birds to pass through, and to look for wildlife that may have become trapped in the netting. If wildlife are observed inside or trapped in the mesh netting, the Environmental Manager or County-approved biologist will be contacted immediately. The County-approved biologist or biological monitor will also inspect netting during monitoring to assure that birds or other wildlife have not become trapped under the netting. Care will be taken to avoid excessive netting on the ground to minimize potential for lizard and snakes to become entangled.

5.2.2 Bird Spikes

Use of plastic or stainless steel spikes can be effective in certain applications to discourage birds from perching on structures and thus deterring nest establishment. Bird spikes typically consist of groupings of stainless steel or UV-resistant polycarbonate spikes that are spaced in such a way as to prevent birds from landing and gaining a foothold on the surface to which the spikes are adhered.

Bird spikes are designed to be affixed to structures to provide longer-term deterrents to birds. Such devices are not likely practical for use on equipment, material storage areas, or contractor yards.

5.2.3 Material and Pipe Covers

Sheltered spaces such as pipes or stacks of stored materials provide potential nesting sites for some birds. To reduce the likelihood that birds will build nests in these areas materials can be covered with mesh netting or tarps (discussed above) or pipe covers. Routinely covering equipment and stored materials is a standard management practice that can be effective in deterring birds from nesting in these areas.

5.2.1 Colored Gravel

Use of colored gravel in construction areas that would typically be rocked and maintained for a long term (e.g., in yards and substations) can be effective in discouraging ground nesting birds. The eggs of ground nesting birds are patterned in a manner to be camouflaged against naturally colored substrates such as soil or pebbles. By covering the ground surface with colored gravel that contrasts sharply with the color of the birds' eggs, ground-nesting birds can be effectively discouraged from nesting in such locations.

6.0 CONSTRUCTION AND POST-CONSTRUCTION MONITORING (TIER 4)

Construction and post-construction monitoring will facilitate documentation of any impacts (e.g. fatalities, injury, and disturbance) that might occur and will identify factors associated with potential avian impacts, which might warrant additional avoidance and minimization measures or improvement or elimination of avoidance and minimization measures found to be ineffective. Implementation of the proposed monitoring program will provide information to the USFWS, CDFW, San Benito County, and PVS to assist in the evaluation of the effectiveness of the avoidance and minimization measures. As part of the Project's monitoring and reporting program, post-construction monitoring and reporting will be completed to determine whether baseline evaluations of impacts on avian species, including Golden Eagles, are consistent with operational outcomes. All workers will participate in WEEP training. This training will assist workers with identifying nests and documenting avian interactions, including mortalities, within the Project Footprint.

Because a significant amount of information pertaining to the methods for surveying PV solar facilities for avian mortalities is not available, several documents were reviewed to assist in the development of this and other sections of this plan. The documents include *Centinela Solar Energy Project Bird and Bat Conservation Strategy* (2012) and *Genesis Solar Revised Bird and Bat Conservation Strategy* (2014).

6.1 Breeding Monitoring and Nesting Management

As noted above, PVS will conduct surveys for nesting and breeding birds and implementation of avoidance measures. Prior to any site disturbance (i.e., mobilization, staging, grading or construction) during the breeding season, PVS will retain a County-approved biologist to conduct pre-construction surveys for nesting birds. Surveys for nesting birds shall be conducted within the recognized breeding season in all areas within 500 feet of solar arrays, staging areas, substation sites, and access road locations for the Project. The surveys will be completed with a frequency of every two weeks during the breeding season utilizing various methods such as point counts/transects as deemed necessary by the County-approved biologist. Surveys for raptors shall be conducted for all construction areas including a 500 feet buffer areas around the Project Footprint between February 1 and August 15 utilizing the frequency and methods as deemed necessary by the County-approved biologist. The required survey dates may be modified based on local conditions, as determined by the County-approved biologist, with the approval of the County of San Benito.

If breeding birds with active nests are found prior to or during construction, a biological monitor shall establish a 300-foot buffer and a 500-foot buffer for raptors until the young have fledged the nest or the nest fails.

The prescribed buffers may be adjusted to reflect existing conditions including ambient noise, topography, and disturbance with the approval of the County as appropriate. Appropriate buffers will be determined by the County-approved biologist(s) and the determination of buffer widths will be site- and species/guild specific and data-driven and not based on generalized assumptions, and will consider the following factors:

- Nesting chronologies
- Geographic/topographic location
- Existing ambient conditions (human activity within line of sight, such as traffic, construction, and noise)
- Type and extent of disturbance (e.g., noise levels and quality)

- Visibility of disturbance
- Duration and timing of disturbance
- Influence of other environmental factors
- Species' site-specific level of habituation to the disturbance, and
- Common and abundant species

As stated above, standard buffer widths recommended for the Project are 300 feet for non-raptor species and 500 feet for raptors. Any exception to the standard buffers will be determined on site by the County-approved biologist(s) and will be based on the factors listed above. The modified buffers are expected to avoid and minimize the potential for Project-related nest abandonment and failure of fledging, and minimize any disturbance to the nesting behavior. If the County-approved biologist determines that Project activities cause or contribute to a bird being flushed from a nest or other signs of disturbance of a nesting bird at a level that has potential to cause nest failure, the modified buffer will be re-evaluated and revised or increased if necessary. Due to common and abundant avian species and avian species that have become habituated to disturbance, these modified buffers can be considered "no-work/no-stop buffers". For example, a modified buffer could allow for only drive-through access with reduced speed. Once a nest buffer is established, the monitoring frequency and construction restrictions for each nest will depend on the bird's sensitivity to disturbance from the specific work activity.

The biological monitor(s) shall conduct regular monitoring of the nest(s) (weekly at a minimum), but frequency will vary depending on the assessment of the County-approved biologist, to determine success/failure and to ensure that unapproved Project activities are not conducted within the buffer(s) until the nesting cycle is complete or the nest fails. The biological monitor(s) shall be responsible for documenting the results of the surveys and ongoing monitoring and will provide a copy of the monitoring reports for impact areas to the respective agencies.

Surveys shall be conducted to include all structural components of the solar arrays and related structures as well as all construction equipment. If birds are found to be nesting in facility structures, buffers as described above shall be implemented. If birds are found to be nesting (incubating eggs or fledging young) in construction equipment, it is possible that the equipment may not be used until the young have fledged the nest, the nest is deemed as failed, no young are present, or until after the breeding season has passed. However, if deemed necessary by the County-approved biologist, an active bird nest can be removed from construction equipment as long as the species is a non-raptor or special status species active nest and concurrence from the USFWS and/or CDFW is received.

If for any reason an active bird nest (incubating eggs or fledging young) must be removed during the nesting season, the PVS shall provide written documentation providing concurrence from the USFWS and/or CDFW authorizing the nest removal and/or relocation. Additionally PVS shall provide a written report documenting the removal efforts. The report shall include what actions were taken to avoid removing the nest, the location of the nest if relocation is possible, what species is being removed/relocated.

If trees or existing poles/towers are to be removed as part of Project-related construction activities they will be done so outside of the nesting season to avoid additional impacts to nesting raptors. If removal during the nesting season can't be avoided then trees and existing poles/towers, a biological monitor must confirm that the trees, poles or existing nests are vacant prior to its removal. If nests are found within these structures and contain eggs or young the biological monitor shall allow no activities within a 300-foot buffer for nesting birds and/or a 500-foot buffer for raptors until the young have fledged the nest with exception of modified buffers as described above.

6.2 Mortality Monitoring

The post-construction mortality monitoring will be comprised of three different types of monitoring. The first is the mortality monitoring which consists of regular, systematic searches of sample blocks of PV solar panels that will be used to estimate the overall annual avian mortality rate associated with the solar facility; determine the species impacted at the solar facility; and determine whether there is spatial differentiation within the Project Footprint during the initial two years of operation. The second monitoring involves the searches of the perimeter fence and power support structures (e.g. switching station) by personnel who have received specialized training. The data gathered during this monitoring will not be used to generate estimates of mortality rates. The post-construction mortality monitoring is anticipated to begin at the start of the first full seasonal interval after the Project is considered fully operational (i.e., sending power to the electrical grid) and this plan has been approved by the appropriate local, state and federal agencies. The post-construction monitoring programs will be completed for a minimum of two years after the Project is considered fully operational (USFWS 2010).

6.2.1 Mortality Monitoring

This section of the Plan describes the procedures for the standard mortality monitoring for avian species on the Project Footprint during post-construction monitoring. The monitoring consists of avian carcass searches conducted at sample blocks of PV solar panels. The number of avian mortalities observed during the monitoring searches would provide a minimum number of fatalities for the Project. This is due to the fact that not all avian mortalities that could occur on the Project Footprint would be found during the monitoring. The use of searcher efficiency trials and carcass persistence trials, described below, would assist in the bias attributable to carcass removal by scavengers and searcher efficiency. The annual mortality rates will then be estimated using statistical methods that adjust the number of avian carcasses found for these bias trials. The annual mortality rates will be calculated for all bird species combined, small (≤ 10 inches) and large (>10 inches) birds, raptors, and special-status avian species regulated by the CDFW and USFWS. The regulated species are listed in Table 1 and also includes other special-status bird species that may be incidentally encountered within the Project Footprint. In some cases, the sample size for a species group of interest, such as eagles or other sensitive species, may be too small to allow for the calculation of accurate mortality estimates. In those circumstances, the total avian mortalities detected during the standard and O&M searches will be total of individual observed which would be substituted in place of rate estimates (see Fatality Rate Estimation below).

The methods below are from wind energy projects (USFWS 2012), because a significant amount of information pertaining to the causes or patterns of avian mortalities associated with solar PV projects is not available. Due to the adaptive nature of this plan, the methodology of the monitoring may be changed to increase the effectiveness and efficiency of the monitoring (e.g., search interval, number of PV rows searched, plot size, analytical method).

Sampling Intensity and Duration

The post-construction mortality monitoring will consist of surveys of 20 percent of the approximately 1,629 acres of the Project Footprint acreage that will be developed with PV arrays and will be conducted for two after the Project is considered fully operational . After the second year of monitoring, PVS in consultation with the USFWS and CDFW will evaluate the results and determine whether additional years of monitoring are necessary. To avoid bias in the mortality estimate, the survey areas will be divided equally between the two portions of the Project, the dividing line will be Little Panoche Road (Figure 2, Appendix A). The areas to be surveyed will be determined by the County-approved biologist six months prior to the estimated fully operational date. All monitoring surveys will be performed by two or more searchers driving transects at no more than five miles per hour on all-terrain vehicles or on foot. If deemed necessary by the County-approved biologist, a closed roof vehicle can be used for safety reasons.

Because the area beneath the PV solar panels will be mostly level and clear of any tall vegetation, the monitoring surveys will consist of searching the space between every other row of panels, and visually scanning the space to the next transect which is approximately 100 feet (30 meters) on each side of the transect within the survey areas. If tall vegetation is present within the survey boundaries, the vegetation will have to be managed to ensure that no potential carcasses would be obscured. Extra attention will be given to the area immediately around the foundations of the solar panel structures, which are the only structures on the ground that might obscure a carcass from view. The same transects will be surveyed in all years of monitoring to avoid confounding effects from location in the solar field with variation among years.

The survey year will be divided into four seasons to allow for the inclusion of seasonal searcher efficiency probabilities and carcass persistence times. Post-construction mortality monitoring will occur over a 4-day period each month during the first year of operation. Initially, all transects will be sampled for four consecutive days at the beginning of each month for 24 months (Strickland et al. 2011). The search interval may be adjusted to reduce bias, if needed, based on searcher efficiency and carcass persistence after the first full year of searches, in coordination with CDFW and USFWS.

Seasons will be defined as follows for sampling:

- Spring: March 1 to May 31
- Summer: June 1 to August 15
- Fall: August 16 to November 15
- Winter: November 16 to February 28

Mortality Documentation

During the initial preparation for each round of carcass surveys, a preparatory survey will be conducted to remove any avian carcasses that have occurred before each round of the surveys is initiated. The mortality surveys will be used to determine the overall estimated mortality rate for birds for the Project. These rates serve as the basis for all comparisons of fatalities, indicators of relationships with site characteristics and environmental variables, and evaluation of mitigation measures implemented at the time of project construction (Strickland et al. 2011). Any carcasses found will be documented and removed in the same manner as those found during the regular carcasses searches. These carcasses will not be included in the statistical analysis because the protocol requires a known search interval.

Surveyors will assume that avian carcasses found within the survey areas are due to the solar facility unless the cause of death can be clearly attributed to a non-facility cause. Avian carcasses found during the carcass surveys will be marked with a unique number, and species, sex, and age if possible will be documented. In addition, the date, time found, Global Positioning System (GPS) location coordinates, condition (e.g., intact, scavenged, feather spot), surveyor, and any comments pertaining cause of death or other pertinent information will be collected. All of the carcasses found whether during the preparatory or regular surveys will be photographed in place. Once the carcasses are documented (with the exception of eagles, state and federal listed species, and/or fully protected species such as California condor and white-tailed kite which will be left where found and agencies notified) will be collected and placed in a dedicated freezer for the surveys.

Any carcasses found incidentally (outside surveys window or transects), will be identified, photographed, and documented in the same manner as the regular surveys. These incidental findings will be noted as incidental discoveries and will not be entered into the statistical calculation of mortality rate.

Carcass Persistence Trials

Carcass persistence trials estimates the amount of time an avian carcass will remain before it disappears due to scavenging or other means (e.g., wind and surface water or decomposition). Carcass persistence trials will be conducted in each season to evaluate seasonal differences in carcass persistence and possible differences in the size of the species being scavenged.

Carcasses to be utilized during the persistence trials will be selected to best represent the size of a range of avian species. If sufficient carcasses have been collected as fatalities at the Project, and are sufficiently fresh, they will be used for these trials. If additional carcasses are needed, commercially available carcasses will be substituted. For large birds, carcasses may include domestic waterfowl, pheasant, or similar species legally obtained from game farms. For small birds, carcasses may include European starlings, house sparrows, or other non-native species not legally protected. Assuming adequate carcass availability, one carcass persistence trial will be conducted during each of the seasons with a goal of at least 5 carcasses of each bird size class (5 large birds and 5 small bird) placed per season.

Estimates of the probability that a carcass persisted between search intervals and therefore was available to be found by searchers, will be used to adjust carcass counts for bias using methods presented in *An Estimator of Wildlife Fatality from Observed Carcasses* (Huso 2011) or equivalent analysis method.

Surveyor Efficiency Trials

The ability of surveyors to find carcasses is influenced by a number of factors (e.g. skill of an individual surveyor, vegetation composition and carcass characteristics). The objective of surveyor efficiency trials is to estimate the percentage of mortalities that the surveyors will be able to locate. Estimates of searcher efficiency are then used to adjust carcass counts for detection bias. Surveyor efficiency trials will be conducted in all seasons to account for seasonal differences in surveyor efficiency. The carcass species used in the trials and marking and placement techniques will be the same as those in the carcass persistence trials.

Surveyor efficiency trials will begin when carcass searches start. The surveyors conducting the searches will not know when trials are being conducted or the location of the efficiency trial carcasses. Trials will be conducted multiple times throughout each season and will incorporate testing of each member of the field crew. The surveyor will not know in advance when or where they are being tested. Assuming adequate carcass availability, a goal of at least 5 carcasses of each size class (5 large birds and 5 small birds) will be placed per season for surveyor efficiency trials.

Mortality Rate Estimation

To calculate the Project's estimated mortality rate (mortalities/megawatt/year) and the total Project fatalities, PVS will utilize the same methods as noted in the carcass persistence trials. The mortality rate will be calculated for large birds, small birds, raptors (including eagles), and special-status species if at least 10 fatalities within the subgroups are found.

The estimation of mortality rates will incorporate fatalities documented during the carcass searches adjusted for bias. Specifically, estimates will take into account:

- Search interval;
- Observed number of carcasses found during searches during the monitoring year for which operation of the facility cannot be ruled out as the cause of death;
- Carcass persistence, expressed as the probability that a carcass is expected to remain in the study area (persist) and be available for detection by the searchers during carcass persistence trials; and
- Surveyor efficiency, expressed as the probability of trial carcasses found by surveyors during searcher efficiency trials.

6.2.1 Operation and Maintenance Monitoring

Operation and maintenance monitoring will consist of searches of areas such as the substation, switching station, area around the O&M building, and the perimeter fence by operations personnel trained in finding and reporting avian mortalities.

Because of this low probability of collisions to these structures, they will be surveyed once each month (search interval of 30 days). Searches will be conducted by operations personnel trained in avian identification and survey techniques. Each survey will consist of the surveyor driving the perimeter fence at approximately five miles per hour on an all-terrain vehicle or other open vehicle or on foot. No surveys will be conducted where it is determined to be unsafe to operations personnel. The surveyors will record observations on the designated reporting form. Any carcasses found that are located in equipment or otherwise deemed to be a safety hazard will be removed ensure safe operation of the facility. All observations will be noted, photographed, and mapped. Personnel will coordination after surveys are complete with the biologist conducting mortality to discuss and document findings.

6.3 Polarized Light and Insectivorous Bird Study

As part of the monitoring for impacts to avian species, a polarized light and insectivorous bird study will be developed in compliance with BR-14.2. This study will be developed to include at a minimum: detailed specifications regarding data requirements, including protocols for collection and identification of insect eggs found on solar panels and a rationale for a data collection schedule.

This study including detailed protocols will be developed in coordination with appropriate wildlife agencies prior to the implementation of the study. The study will include all appropriate data requirements and protocols as described in BR-14.2.

Sampling Intensity and Duration

During the construction of the solar facility and for one year following the start of operation, a County-approved biologist shall perform quarterly polarized light and insectivorous study and submit an annual report on the study to the County describing the dates, durations, and results of monitoring and data collection. The first a polarized light and insectivorous bird construction monitoring study will take place after approximately twenty-five percent of the proposed PV panels have been installed. Additional details of the study in the annual reports will be determined by the County in consultation with CDFW and/or USFWS.

Documentation

Annual reports will be prepared that provide a detailed description of any project-related bird or wildlife deaths or injuries detected during the monitoring study or at any other time. The reports will analyze any Project-related bird fatalities or injuries detected, and provide recommendations (in consultation with the County) for future monitoring and any adaptive management actions needed.

Thresholds

Mitigation Measure BR-14.2 states that thresholds for avian mortality and potential impacts of polarized light from solar panels is causing reproductive failure of aquatic insect populations at high enough levels to adversely affect insectivorous special-status birds, will be determined by the County in consultation with CDFW and/or USFWS prior to approval of this Plan. However, there is not sufficient scientific data to establish thresholds at this time. Therefore, PVS will consult with CDFW, USFWS, and San Benito County following submittal of each quarterly report to determine whether implementation of the mitigation measures as provided in Section 5.0 of this Plan are appropriate.

7.0 REPORTING

7.1 Construction

During the construction of the solar facility, the County-approved biologist will submit a report describing dates, durations, and results of monitoring and data collection in the Monthly Compliance Report to the USFWS, CDFW and San Benito County. The Monthly Compliance Report which describes all natural resources information for the construction of the solar facility will also provide a detailed description of any Project-related avian mortalities or injuries detected. In addition, as noted above, during the construction of the solar facility, a County-approved biologist shall perform the polarized light and insectivorous study quarterly once twenty-five percent of the proposed PV panels have been installed and submit annual report(s) of the study to the County describing the dates, durations, and results of monitoring and data collection.

7.2 Post-Construction

The County-approved biologist will prepare and submit quarterly reports to the USFWS, CDFW, and San Benito County during the first two years of operations. Quarterly monitoring reports will provide the dates, duration, and results of monitoring, including a detailed description of any Project-related avian mortalities or injuries detected during the monitoring study or at any other time; identify any avian species that was killed or injured, the location within the solar facility of any avian species killed or injured; and describe adaptive management measures implemented to avoid or minimize deaths or injuries. Original data sheets, photographs, and relevant shape files (if any) will be attached to the reports.

Following the completion of the fourth quarter of each year of monitoring, the Environmental Manager or County-approved biologist will prepare an annual report that summarizes the year's data, analyzes any Project-related avian mortalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed. The report will be submitted to the USFWS, CDFW, and San Benito County no later than January 31st to report the previous year's findings.

After two years of data collection, the Environmental Manager or County-approved biologist will prepare an overall report that describes the study design and results of the avian mortality monitoring. This second year report will serve as the last quarterly report for the second year of monitoring, as well as the overall report that covers both years of monitoring. This report will also be used to determine if monitoring can be terminated through consultation with USFWS, CDFW, and the County.

In addition to the mortality monitoring, for one year following the start of the solar farm operation, a County-approved biologist shall perform a polarized light and insectivorous study and submit the report on the study to the County describing the dates, durations, and results of monitoring and data collection.

8.0 ADAPTIVE MANAGEMENT (TIER 5)

The purpose of adaptive management in the context of the Project's management and monitoring of avian resources is to provide ways to further improve protection, management, enhancement, and other conservation actions of avian resources on the Project Footprint.

8.1 Regulatory Policy Changes

PVS will work together with the USFWS, CDFW, and San Benito County to ensure the Project complies with all applicable legal requirements or to apply necessary changes to this Plan.

8.2 Post-Construction Agency Consultation

To facilitate evaluations of impacts on regional avian populations, study results will be provided to USFWS, CDFW and/or San Benito County as noted above. PVS will be available for annual meetings with USFWS, CDFW and/or San Benito County to discuss Project-related issues under the jurisdiction of each agency.

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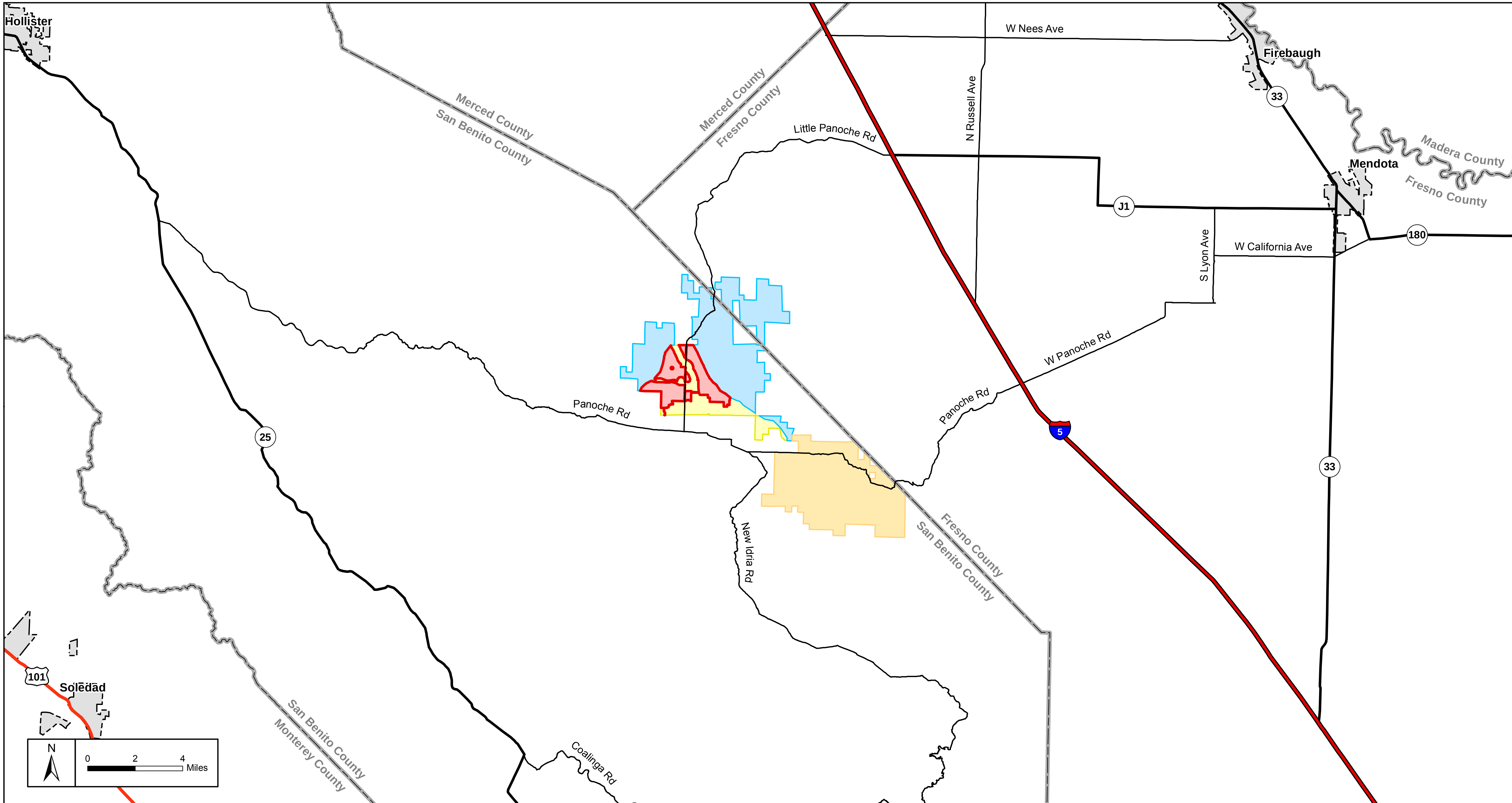
APPENDICES

Appendix A
Figures



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512-222-1125
www.energyrenewalpartners.com
Energy Renewal PARTNERS, LLC

Legend

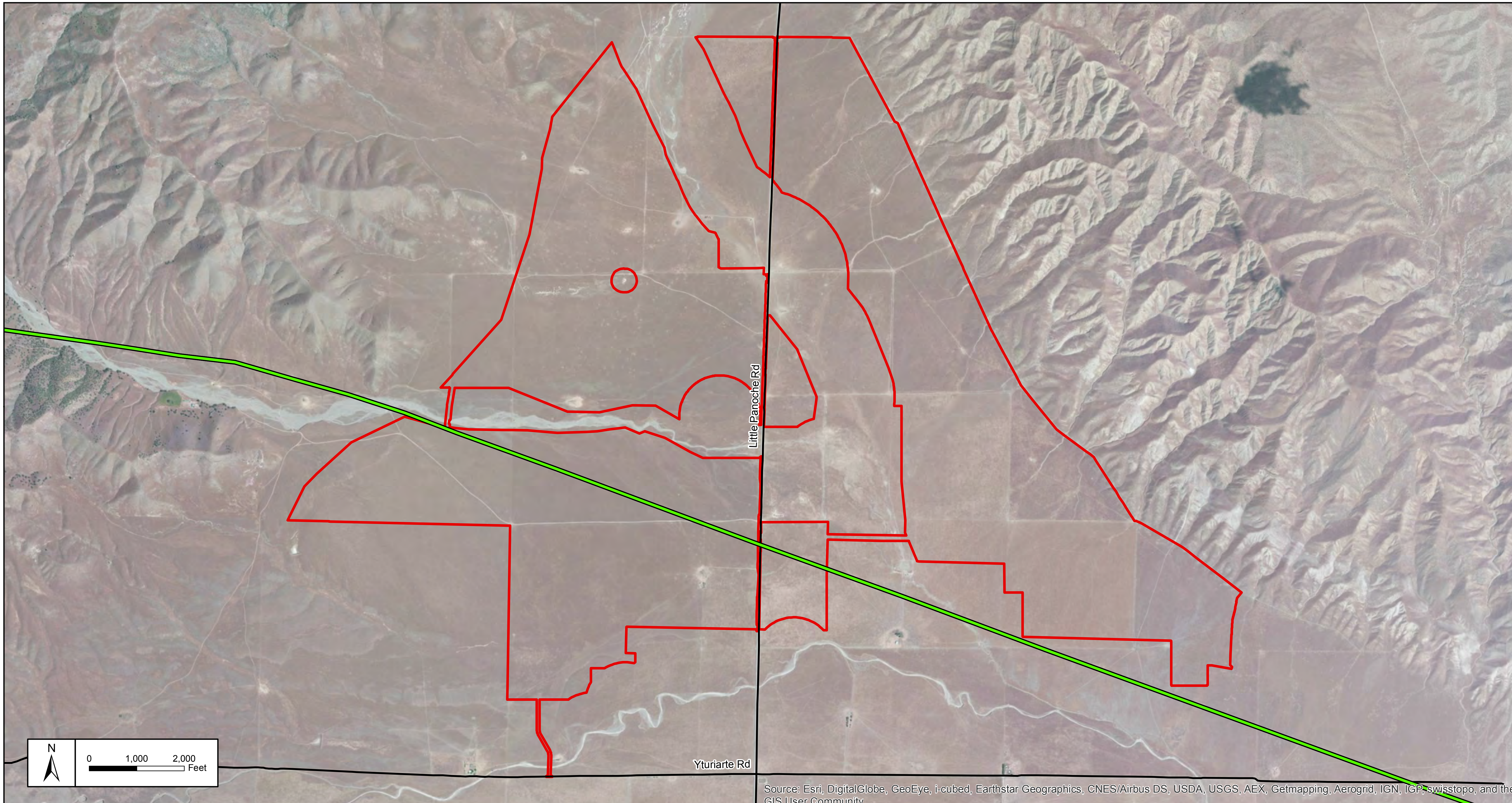
- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

Panoche Valley Solar Project

Project Location

FIGURE
1

JH 2014-12-02



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Legend

Project Footprint

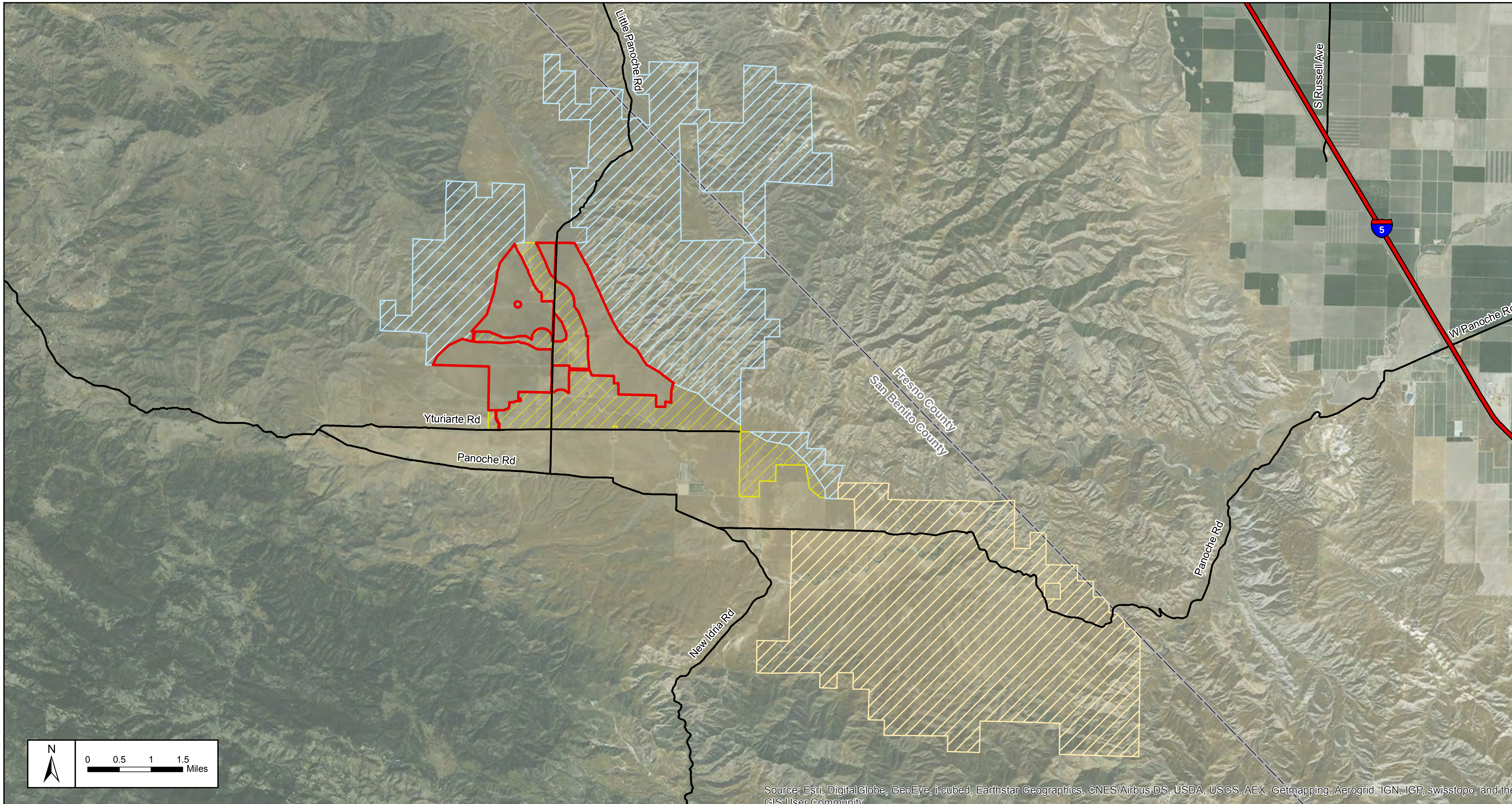
Existing Transmission Line

Panoche Valley Solar Project

Project Footprint

FIGURE 2

JH 2014-12-02



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

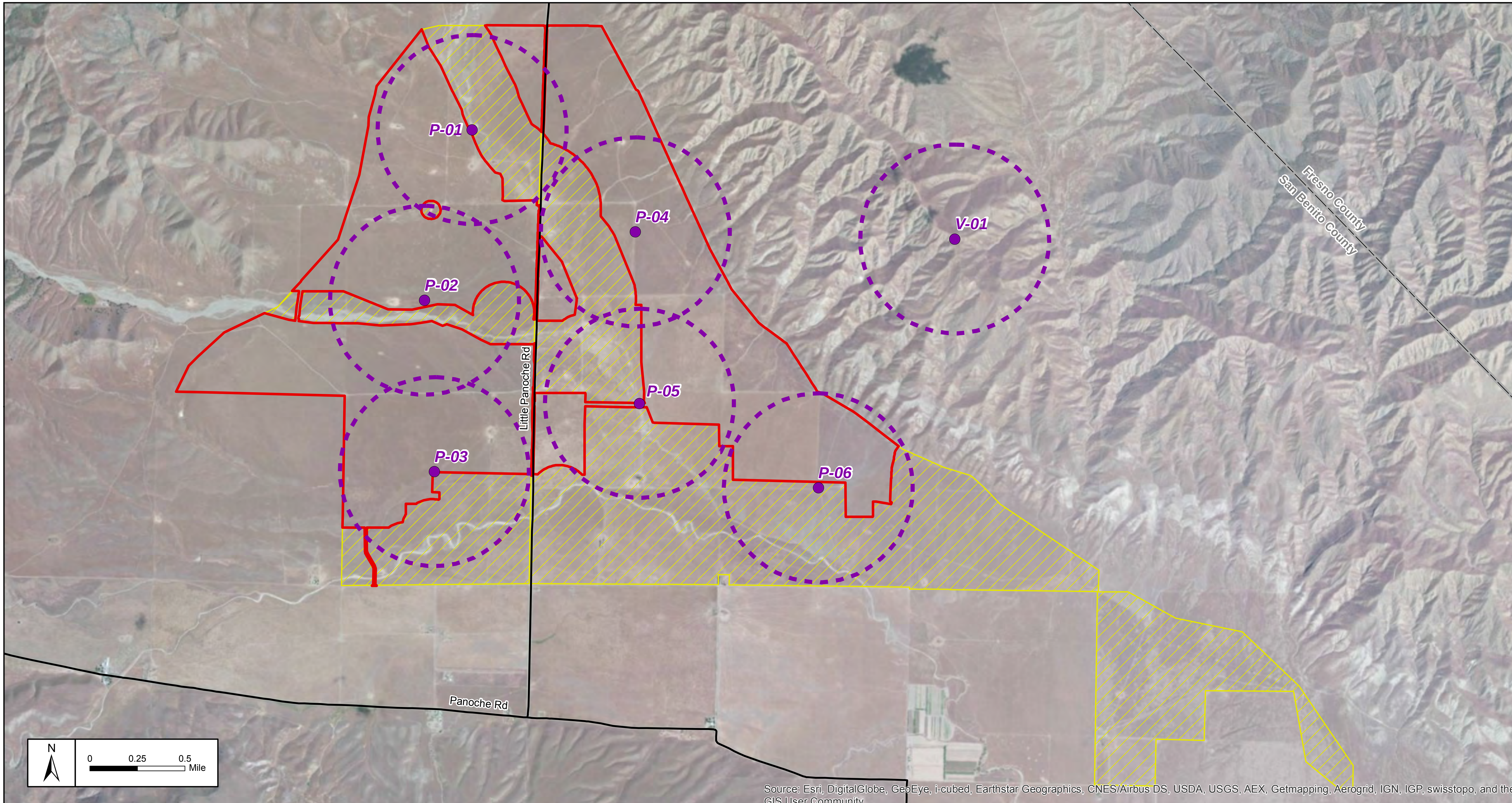
Panoche Valley Solar Project

Project Footprint and Conservation Lands

FIGURE

3

JH 2014-12-02



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Energy Renewal PARTNERS, LLC

Legend

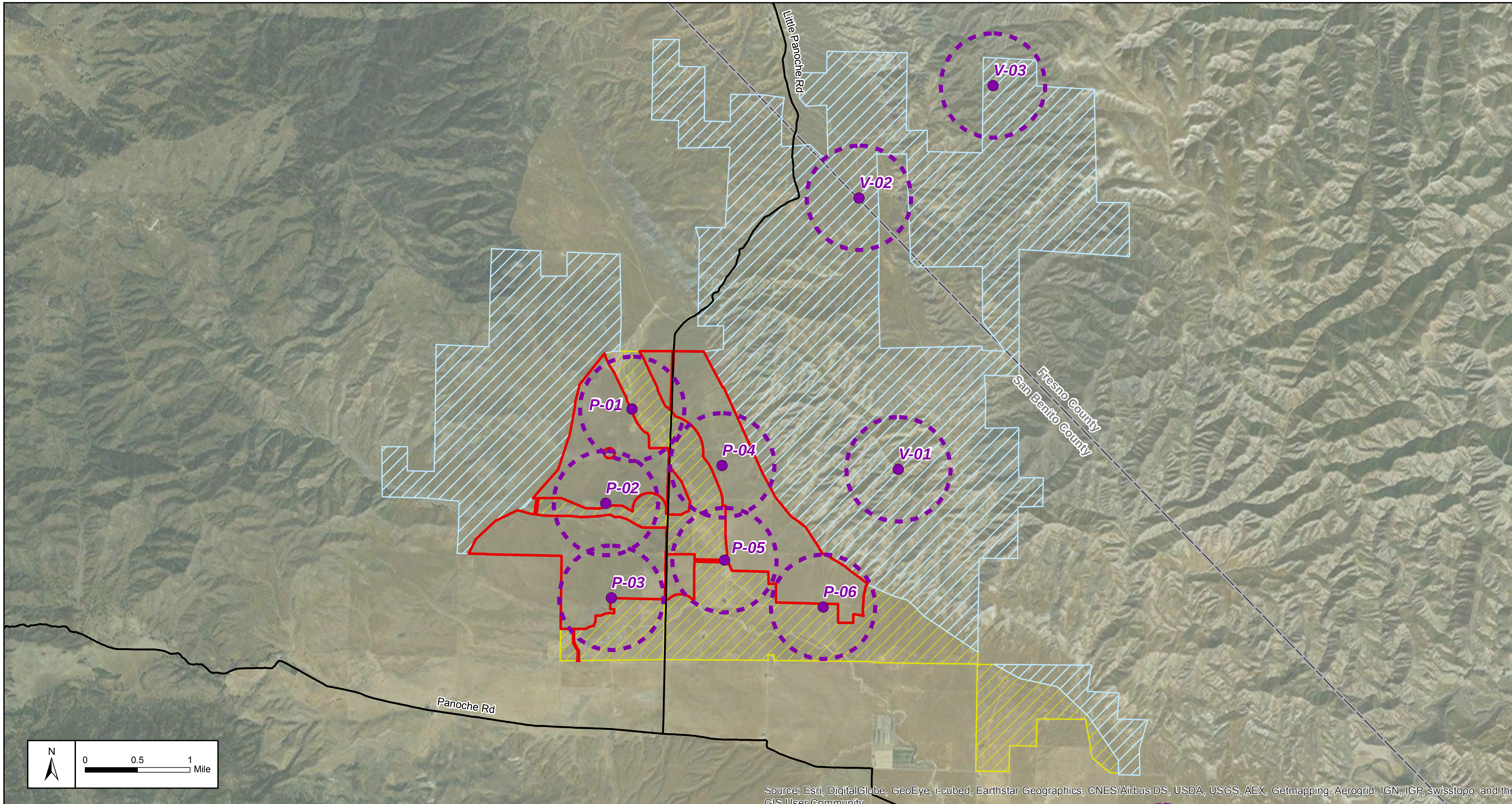
- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valley Floor Conservation Lands

Panoche Valley Solar Project

Point Count Stations
Project Footprint and Valley Floor Conservation Lands

FIGURE
4

JH 2014-12-02



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Energy Renewal PARTNERS, LLC

Legend

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

Panoche Valley Solar Project

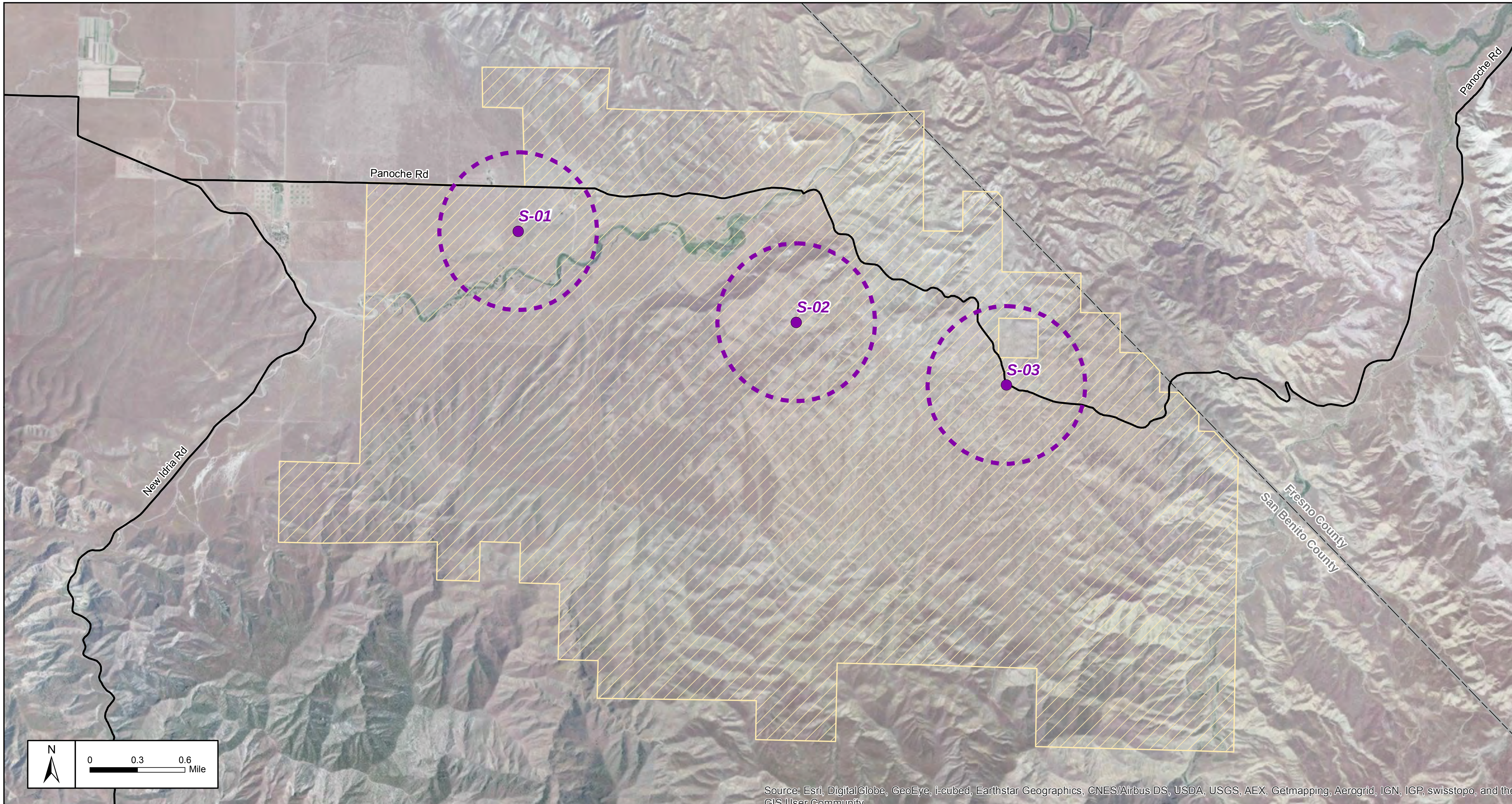
Point Count Stations

Valadeao Ranch Conservation Lands

FIGURE

5

JH 2014-12-02



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Legend

- Point Count Station
- 800-meter Observation Area
- Silver Creek Ranch Conservation Lands

Panoche Valley Solar Project

Point Count Stations
Silver Creek Ranch Conservation Lands

FIGURE
6

JH 2014-12-02

Appendix B

Avian Species Observed During 2003-2011 Audubon Christmas Bird Counts

Avian Species Observed During the 2003 through 2011 Audubon Society Christmas Bird Count

Mallard *Anas platyrhynchos*	Long-eared Owl *Asio otus*	Northern Mockingbird *Mimus polyglottos*
American Green-winged Teal *Anas crecca*	Short-eared Owl *Asio flammeus*	Sage Thrasher *Oreoscoptes montanus*
Canvasback *Aythya valisineria*	White-throated Swift *Aeronautes saxatalis*	California Thrasher *Toxostoma redivivum*
Ring-necked Duck *Aythya collaris*	Anna's Hummingbird *Calypte anna*	European Starling *Sturnus vulgaris*
Common Goldeneye *Bucephala clangula*	Lewis's Woodpecker *Melanerpes lewis*	American Pipit *Anthus rubescens*
Hooded Merganser *Lophodytes cucullatus*	Acorn Woodpecker *Melanerpes formicivorus*	Cedar Waxwing *Bombycilla cedrorum*
Common Merganser *Mergus merganser*	Red-breasted Sapsucker *Sphyrapicus ruber*	Phainopepla *Phainopepla nitens*
Red-breasted Merganser *Mergus serrator*	Nuttall's Woodpecker *Picoides nuttallii*	Orange-crowned Warbler *Oreothlypis celata*
Chukar *Alectoris chukar*	Downy Woodpecker *Picoides pubescens*	Yellow-rumped Warbler *Dendroica coronata*
Ring-necked Pheasant *Phasianus colchicus*	Hairy Woodpecker *Picoides villosus*	Yellow-rumped (Audubon's) Warbler *Dendroica coronata*
California Quail *Callipepla californica*	Northern Flicker *Colaptes auratus*	Yellow-rumped (Myrtle) Warbler *Dendroica coronata*
Pied-billed Grebe *Podilymbus podiceps*	Northern (Red-shafted) Flicker *Colaptes auratus*	Townsend's Warbler *Dendroica townsendi*
Great Blue Heron (Blue form) *Ardea herodias*	Black Phoebe *Sayornis nigricans*	Spotted Towhee *Pipilo maculatus*
Great Egret *Ardea alba*	Say's Phoebe *Sayornis saya*	California Towhee *Melozone crissalis*
Turkey Vulture *Cathartes aura*	Cassin's Kingbird *Tyrannus vociferans*	Rufous-crowned Sparrow *Aimophila ruficeps*
Bald Eagle *Haliaeetus leucocephalus*	Loggerhead Shrike *Lanius ludovicianus*	Chipping Sparrow *Spizella passerina*
Northern Harrier *Circus cyaneus*	Hutton's Vireo *Vireo huttoni*	Vesper Sparrow *Pooecetes gramineus*
Sharp-shinned Hawk *Accipiter striatus*	Western Scrub-Jay *Aphelocoma californica*	Lark Sparrow *Chondestes grammacus*
Cooper's Hawk *Accipiter cooperii*	Clark's Nutcracker *Nucifraga columbiana*	Sage Sparrow *Amphispiza belli*

Red-shouldered Hawk *Buteo lineatus*	Yellow-billed Magpie *Pica nuttalli*	Lark Bunting *Calamospiza melanocorys*
Red-tailed Hawk *Buteo jamaicensis*	American Crow *Corvus brachyrhynchos*	Savannah Sparrow *Passerculus sandwichensis*
Ferruginous Hawk *Buteo regalis*	Common Raven *Corvus corax*	Fox Sparrow *Passerella iliaca*
Golden Eagle *Aquila chrysaetos*	Horned Lark *Eremophila alpestris*	Song Sparrow *Melospiza melodia*
American Kestrel *Falco sparverius*	Tree Swallow *Tachycineta bicolor*	Lincoln's Sparrow *Melospiza lincolnii*
Merlin *Falco columbarius*	Violet-green Swallow *Tachycineta thalassina*	Harris's Sparrow *Zonotrichia querula*
Prairie Falcon *Falco mexicanus*	Chestnut-backed Chickadee *Poecile rufescens*	White-crowned Sparrow *Zonotrichia leucophrys*
Virginia Rail *Rallus limicola*	Oak Titmouse *Baeolophus inornatus*	Golden-crowned Sparrow *Zonotrichia atricapilla*
Sora *Porzana carolina*	Bushtit *Psaltriparus minimus*	Dark-eyed (Oregon) Junco *Junco hyemalis*
American Coot *Fulica americana*	Red-breasted Nuthatch *Sitta canadensis*	Red-winged Blackbird *Agelaius phoeniceus*
Killdeer *Charadrius vociferus*	White-breasted Nuthatch *Sitta carolinensis*	Tricolored Blackbird *Agelaius tricolor*
Mountain Plover *Charadrius montanus*	Brown Creeper *Certhia americana*	Western Meadowlark *Sturnella neglecta*
Greater Yellowlegs *Tringa melanoleuca*	Rock Wren *Salpinctes obsoletus*	Brewer's Blackbird *Euphagus cyanocephalus*
Long-billed Curlew *Numenius americanus*	Canyon Wren *Catherpes mexicanus*	Brown-headed Cowbird *Molothrus ater*
Wilson's Snipe *Gallinago delicata*	Bewick's Wren *Thryomanes bewickii*	small blackbird sp. *Icterinae*
Rock Pigeon *Columba livia*	House Wren *Troglodytes aedon*	Purple Finch *Carpodacus purpureus*
Eurasian Collared-Dove *Streptopelia decaocto*	Marsh Wren *Cistothorus palustris*	House Finch *Carpodacus mexicanus*
Mourning Dove *Zenaida macroura*	Ruby-crowned Kinglet *Regulus calendula*	Pine Siskin *Spinus pinus*
Greater Roadrunner *Geococcyx californianus*	Western Bluebird *Sialia mexicana*	Lesser Goldfinch *Spinus psaltria*
Barn Owl *Tyto alba*	Mountain Bluebird *Sialia currucoides*	Lawrence's Goldfinch *Spinus lawrencei*
Western Screech-Owl *Megascops kennicottii*	Hermit Thrush *Catharus guttatus*	American Goldfinch *Spinus tristis*

Great Horned Owl *Bubo virginianus*	American Robin *Turdus migratorius*	House Sparrow *Passer domesticus*
Northern Pygmy-Owl *Glaucidium gnoma*	Varied Thrush *Ixoreus naevius*	
Burrowing Owl *Athene cunicularia*	Wrentit *Chamaea fasciata*	

Appendix C

Panoche Valley Solar Point Count Survey Study Report

Panoche Valley Solar Point Count Survey Study Report

Panoche Valley Solar Project
San Benito County, California
April 2014

Image Courtesy of Michael Bumgardner

Prepared for:
Panoche Valley Solar, LLC
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Charlotte, NC 28202

Prepared by:
Energy Renewal Partners, LLC
305 Camp Craft Road, Suite 575
West Lake Hills, Texas 78746

Date:
April 2, 2014

Trisha Elizondo
Project Manager

James McRacken Jr.
Senior Biologist

TABLE OF CONTENTS

Abbreviations and Acronyms

°F	Degrees Fahrenheit
AMSL	Above Mean Sea Level
BBCS	Bird and Bat Conservation Strategy
CNPS	California Native Plant Species
Duke Energy	Duke Energy Renewables
ECP	Eagle Conservation Plan
FEIR	Final Environmental Impact Report
GOEA	Golden eagle
GPS	Global positioning system
km	kilometer
MW	Megawatt
Project Footprint	The portion of the Proposed Project that includes the solar arrays and associated roads and equipment, totaling 2,492 acres.
Proposed Project	Panoche Valley Solar Project
PVS	Panoche Valley Solar, LLC
SCRCL	Silver Creek Ranch Conservation Lands
UDA	Utilization Distribution Assessment
USFWS	United States Fish and Wildlife Service
UTM	Universal Transverse Mercator
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands

1.0 Project Introduction and Background

Panoche Valley Solar, LLC (PVS) is proposing to construct the proposed Panoche Valley Solar Project (Proposed Project). PVS is proposing to construct the Proposed Project to operate an up to 399-Megawatt (MW) solar photovoltaic energy generation facility in San Benito County, California (Figure 1). The Proposed Project would be located approximately three-quarters of a mile north of the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County (Figure 2). The Proposed Project site is comprised of approximately 2,492 acres in the Panoche Valley and would also include approximately 24,185 acres of high quality Conservation Lands that are contiguous with the Proposed Project area (Figure 3).

On June 13, 2013, PVS consulted with the United States Fish and Wildlife Service (USFWS)-Ventura office concerning the requirement to prepare an Eagle Conservation Plan (ECP) and a Bird and Bat Conservation Strategy (BBCS) for the Proposed Project. It was determined during this discussion, the data presented in the 2010 Final Environmental Impact Report (FEIR) was dated, insufficient in coverage, and was conducted too late in the season. USFWS recommended a Phase II site-specific golden eagle (GOEA; *Aquila chrysaetos*) study be conducted (USFWS 2013).

This report documents the survey results of GOEA occurrence, frequency, and behavior conducted during the migratory and wintering phase (September through January) within the Proposed Project area and associated conservation lands in the Panoche Valley (Figure 3). The conservation lands include three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels. These parcels are called the Valley Floor Conservation Lands, the Valadeao Ranch Conservation Lands, and the Silver Creek Ranch Conservation Lands (Figure 3).

Additionally, aerial surveys conducted in January and March were completed to determine the number and locations of occupied nests and the approximate centers of occupied nesting territories of GOEA within a 10-mile radius centered on the Project Footprint. The results of these studies will be summarized in a separate report. Results of the combined studies will be used to prepare the ECP and the BBCS.

2.0 Study Purpose and Need

The Point Count and Utilization Distribution Assessment (UDA) studies were completed to provide baseline data on GOEA occurrence, frequency, and behavior to present results of spatial and temporal site use and potential risk based on time spent within the Proposed Project area.

3.0 Study Area

The Study Area includes the Proposed Project which is generally located approximately three-quarters of a mile north of the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County. This location is approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley. The Project Footprint is located within Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 of the United States Geologic Survey's Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche 7.5-minute topographic quadrangle maps. In addition to the Project Footprint, the Study Area also includes the Conservation Lands associated with the Proposed Project, which are located in both San Benito and Fresno counties within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27, and 32-36; Township 14S, Range 11E, Sections 19, and 29-32; Township 15S, Range 10E, Sections 1-8, and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6, and 8-12 (Figure 3).

The Study Area is comprised almost entirely of annual, non-native grasslands used mainly to graze cattle and sheep. The Study Area experiences a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates into the site's soils and flows in creeks and drainages when soil capacity has been reached.

The Study Area for this GOEA survey includes the habitats within the following areas:

- Project Footprint
- Conservation Lands associated with the project including the Valley Floor (VFCL), Valadeao Ranch (VRCL), and Silver Creek Ranch (SCRCL)areas

Project Footprint

The Project Footprint consists of the area within the fence line of the proposed solar facility and is composed of approximately 2,492 acres of rangeland. Historically, the Project Footprint was used for crop production; however, in the past approximately 40 years, the site has been used for cattle grazing. The site is surrounded by rangeland and bordered by hills of the Gabilan Range to the west and the Panoche Hills to the east. The topography of the site dips gently down to the east-southeast. The site elevation ranges from approximately 1,200 feet above mean sea level (amsl) near the southeast end of the site to approximately 1,400 feet amsl near the west end.

Prominent grass species within the Project Footprint include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum var. nitidum*), and vinegarweed (*Tricostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Areas which have not been previously disturbed by grazing or historic cultivation also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitaum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

Valley Floor, Silver Creek Ranch and Valadeao Ranch Conservation Lands

Project Conservation Lands include 3 areas totaling 24,185 acres that would be preserved in perpetuity for the benefit of the GOEA, as well as many other species of wildlife. An additional 2,523 acres interspersed throughout and adjacent to the Project Footprint would be left undisturbed and designated as the VFCL. In addition to the designation of the VFCL, the Proposed Action will include two large ranches for conservation purposes. These ranches, the VRCL (10,772 acres) and the SCRCL (10,890 acres), are contiguous with the Project site and each other (Figure 3).

<u>Valley Floor Conservation Lands</u>

The VFCL (approximately 2,523 acres) are contiguous with the Project Footprint, and primarily consist of the non-native annual grassland habitat found within the Project Footprint with some seasonal ponds and vernal and ephemeral pools, as well as the seasonally dry Panoche and Los Aquilas Creeks. The VFCL also includes the entire 100-year floodplain within the Proposed Project boundary on the valley floor.

The dominant vegetation in the VFCL includes ripgut brome, soft chess, red brome, foxtail barley, rat-tail fescue, broad-leaved filaree, red-stemmed filaree, shining peppergrass, and vinegarweed. Fiddleneck, devils lettuce, shepherds purse, turkey mullein, and bur clover were also common, especially in disturbed areas. Areas which have not been previously disturbed include a variety of native wildflowers such as blow wives, blue dicks, California gold fields, yellow daisy tidy-tips, and California creamcups.

<u>Valadeao Ranch Conservation Lands</u>

The VRCL (approximately 10,772 acres) are contiguous with the Project Footprint directly to the west, east, and northeast of the site (Figure 3). These lands are also contiguous with the VFCL and Silver Creek Ranch Conservation Lands (SCRCL). The VRCL include several seasonal drainages. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent. Elevations on the VRCL range from approximately

1,400 feet to 2,100 feet above mean sea level (amsl). The property which is currently grazed is dominated by introduced annual grasslands (approximately 6,700 acres), which have a very similar species makeup to the Project Footprint and VFCL. This property also mostly consists of ephedra shrubland (approximately 2,700 acres), barrens, and saltbush shrubland.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to Introduced Annual Grasslands.

Plant associations that are noted to occur within the Ephedra shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub. Ephedra Shrublands occur in the VRCL portion of Las Aquilas Creek in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, ephemeral drainages, and steep, rocky, and thin-soiled south-facing slopes.

Barrens are ridgelines and south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia macrostachys*.

The saltbush shrubland habitat consists of nearly pure to mixed stands of saltbush (*Atriplex polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest *Atriplex polycarpa* cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two plant associations exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages 5 to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *Eriogonum fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens that are often present on adjacent slopes of similar aspect. Shrub canopies are confined to wash edges due to trampling by cattle, and average cover rarely exceeds 10 percent.

Silver Creek Ranch Conservation Lands

The SCRCL (approximately 10,890 acres), which is currently being with grazed with livestock, is located southeast of the Project Footprint (Figure 3). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well drained and moderately permeable. SCRCL contains approximately 5,765 acres with slopes between 0 and 11 percent.

SCRCL are dominated by non-native species (approximately 8,400 acres), with the same species found on the Project Footprint and on the other conservation lands, distributed sparsely over the landscape. The other major habitats on this conservation lands includes ephedra shrubland (approximately 2,260 acres) with similar species noted on the VRCL and riparian/wetland habitat.

The riparian habitats occur along the Panoche and Silver Creeks. The Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.). Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site, both upstream and downstream. In this area, saltgrass (*Distichlis spicata*) appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site for at least three miles was observed to be completely dry and largely devoid of plants. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (*Typha* Herbaceous Alliance) centrally, *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge and *Frankenia salina* and *Juncus mexicanus*. Trees are largely absent, as are species adapted to a floating or submerged habitat.

4.0 Methodology

Per the USFWS recommendations, the GOEA studies followed the Wind Energy Guidelines in Tier 3, Stage 2 of which includes site-specific surveys and assessments in anticipation of ECP preparation (USFWS 2013). These site specific surveys included:

- Point Count Surveys (i.e., fixed-radius circular plot surveys) within the project footprint and Conservation Lands (conducted summer, fall, and winter of 2013/2014);
- Utilization Distribution Assessment (UDA) within the project footprint and VFCL (conducted summer, fall, and winter of 2013/2014); and
- Aerial survey of Project-area nesting population, location, and number of occupied eagle nests within a 10 mile radius of the Proposed Project center (results provided in separate report).

4.1 Point Count Surveys

The surveys for GOEA resources were conducted through the use of point counts that were conducted at established point count stations (Cooperrider et al. 1986; Hamel et al. 1996; Ralph et al. 1993; Ralph et al. 1995). Six point count stations were located within Project Footprint and VFCL (Figure 4) to ensure a minimum spatial coverage of at least 30 percent of the Project Footprint (USFWS 2013). Six point count stations were also located within the VRCL and the SCRCL (Figures 5 and 6). Three point count stations were located in the VRCL (Figure 5) and three point count stations in the SCRCL (Figure 6). The coverage for the VRCL and SCRCL is less than 30 percent, but provides adequate observations of GOEA use in these areas.

The survey locations were established by creating point count stations within an 800 meter (2,625 feet) radius observation area. The center point of each plot was geo-referenced using a global positioning system (GPS). The boundary of each point count plot was identified via distinct natural or any anthropogenic features at several points for distance reference.

The point count surveys consisted of observers recording GOEA detections from the point count stations for two hours at each point count station (Figures 4, 5, and 6) and recorded on point count field forms (Appendix A) (Pagel et al. 2010; USFWS 2013). The GOEA surveys were conducted between daylight hours (sunrise to sunset) on a bi-weekly basis from September 3, 2013 to January 24, 2014. During the fall migration, when possible, surveys were completed during midday to increase sampling efficiency by temporally stratifying surveys to cover the midday period during migration (CA Energy Commission 2007; USFWS 2013).

During the point count surveys, the observers, which were trained and their skills tested for GOEA observations (e.g. species, age class, activity), stayed with their vehicle to remain inconspicuous, which decreased the possibility that an individual eagle would avoid observers, which could reduce the likelihood of detection. The observers performed systematic scans of the point count plot using binoculars alternated with unaided eye scans to detect GOEA.

The data collected during each point count station survey beyond the typical conditions information (e.g. date, time, temperature, wind speed and direction, and etc.) included the number of GOEA seen, age class, GOEA activity/behavior, flight paths, estimated flight height and location in plot, and general description of observations.

The age class of the GOEA were broken down into juvenile eagles (first year), immature or subadult eagles (second to fourth year), adult eagles (fifth year or greater), or unknown (eagles where age class could not be determined due to distance, etc.). The activity/behavior data collected noted the prevalent behavior during each one-minute interval as soaring flight (circling broadly with wings outstretched); unidirectional flapping gliding; kiting-hovering; stooping or diving at prey; stooping or diving in an agonistic context with other eagles or other bird species; undulating/territorial flight; perched; or other. The flight path data included GOEA inside, as well as outside the plot. The flights were recorded on the point count data forms for each point count station (Appendix B).

In addition to the GOEA point count surveys and the UDA data, any miscellaneous observations information gathered during the 2013 PVS giant kangaroo rat and blunt- nosed leopard lizard surveys, conducted in March through September, 2013, was also used to supplement the point count/UDA data (Appendix C).

4.2 Utilization Distribution Assessment (UDA)

In addition to the point count surveys, a UDA for GOEA was completed during the survey season. The UDA was completed to document the GOEA spatial distribution of use on the Proposed Project Footprint. The observation data was noted on field maps (Appendix B) and then convert the data into GIS formats for analyses. The field maps were created by placing a grid of square cells, each 0.5 x 0.5 kilometer (km), which was framed by a Universal Transverse Mercator (UTM) system across a map of the PVS Project Footprint to record eagle observations in each 0.25 km^2 cell (Figure 7).

The Project Footprint/VFCL was divided into non-overlapping observation sectors centered on a designated Observation Point, each with a vantage point. The point count stations were utilized for the UDA Observation Points (Figure 7). These locations afforded an unobstructed viewing of the grid cells to more than one km in all directions. The UDA observation periods were conducted for two hours and were added to each point count survey period for the Project Footprint/VFCL. The UDA was not conducted on the VRCL and the SCRCL since they are outside of the Project Footprint.

During the UDA, when necessary, the observers worked together with the use of hand-held radios from separate vantage points to pinpoint the location(s) of GOEA through triangulation. This communication between observers also eliminated the duplication of GOEA sightings. The data recorded by the observers during the UDA included GOEA activity/behavior and flight path and location. The prevalent activity/behavior of each GOEA was recorded in one-minute interval as soaring flight (circling broadly with wings outstretched); unidirectional flapping gliding; kiting-hovering; stooping or diving at prey; stooping or diving in an agonistic context with other eagles or other bird species; undulating/territorial flight; perched; or other. The flight paths and location data was recorded on the gridded field maps (Appendix B), using topographic features or distance indicators as location references.

The data was analyzed by simply counting the number of flights intersecting each cell. If the data set had been larger, a specific GOEAs distribution of use would have been estimated by using standard kernel analyses (USFWS 2013).

5.0 Discussion, Analysis and Results

This discussion, analysis, and results section presents a compilation of the data that was gathered during the surveys point count and UDA surveys for GOEA. As stated previously, the surveys for GOEA resources were conducted through use of point counts and UDA surveys at 12 established stations within the PVS Project Footprint; Conservation lands associated with the Project include the Valley Floor, Valadeao Ranch, and Silver Creek Ranch areas.

Survey events occurred every other week between the weeks of September 3, 2013 until January 24, 2014, for a total of 11 survey events. Each survey event was made up of 12 point counts surveys that lasted 2 hours each and 6 UDA surveys which were also 2 hours each. The total hours surveying for GOEA during each survey event was 36 hours. This gives an overall total of 396 hours of survey time within the Project area. The overall sightings of GOEA during the surveys, excluding the aerial surveys, was 94. Weather was generally conducive to GOEA surveys; temperatures ranged between 20-97˚F, and winds ranged between 0 and 19.5 miles per hour (mph), though were typically less than 8 mph, nothing but a trace of rain throughout the surveys, and visibility that ranged from 80% to 100% (Appendix D).

5.1 Point Count Surveys

As stated previously, six point count stations (P-01 to P-06) were located within Project Footprint and VFCL (Figure 4), and six point count stations were located within Valadeao Ranch and Silver Creek Ranch Conservation Lands (Figures 5 and 6). Three point count stations were located in the VRCL (Figure 5) and three point count stations in the SCRCL (Figure 6).

The results of the point count surveys included a total of 61 observations of GOEA. This total includes 23 individual observations of GOEA seen within the point count plot boundaries and 38 observations outside the plot boundaries (Tables 1 and 2).

Table 1. Total GOEA by Survey Event

Survey Event	Total GOEA Observed (inside and out of boundaries)	Observation Location (Inside Point Count/Outside)	Juvenile GOEA (Inside Point Count/Outside)	Subadult GOEA (Inside Point Count/Outside)	Adult (Inside Point Count/Outside)	Unknown Age (Inside Point Count/Outside)
1st (September 3 -5, 2013)	10	2/8	0/0	0/0	2/0	0/8
2nd (September 17-19, 2013)	21[1]	9/12	2/0	1/0	3/2	2/10
3rd October 2-4, 2013	1	1/0	0/0	0/0	1/0	0/0
4th October 15-17, 2013	5	3/2	0/0	0/0	3/2	0/0
5th October 28-30, 2013	4	1/3	0/1	0/0	1/1	0/1
6th November 11-13, 2013	7	0/7	0/0	0/0	0/1	0/6
7th November 25-27, 2013	3	0/3	0/0	0/0	0/0	0/3
8th December 9-11, 2013	2	1/1	0/0	0/0	0/0	1/1
9th December 21-23, 2013	2	0/2	0/0	0/0	0/2	0/0
10th January 7-9, 2014	5	5/0	2/0	1/0	1/0	1/0
11th January 22-24, 2014	1	1/0	0/0	0/0	1/0	0/0

[1] - Data includes several GOEA (approx. 7 GOEA) that were feeding on a carcass of a dead cow inside the project boundary and GOEA stayed at carcass during point count and UDA.

Table 2. GOEA by Point Count Station

	Project Footprint/Valley Floor CL						Valadeao Ranch CL			Silver Creek Ranch CL			Age Class Total
Age Class	**P-01**	**P-02**	**P-03**	**P-04**	**P-05**	**P-06**	**V-01**	**V-02**	**V-03**	**S-01**	**S-02**	**S-03**	
Juvenile	2/1[1]	0/0	0/0	1/0	0/0	0/0	0/0	2/0	0/0	0/0	0/0	0/0	6
Sub-Adult	1/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	2
Adult	5/2	2/2	0/2	0/0	0/1	0/0	2/0	0/0	0/0	0/0	1/0	2/1	20
Unknown	2/10	0/3	1/0	0/0	0/7	0/0	0/0	0/5	0/2	0/0	1/1	0/1	33
Total – Inside/Out	10/13[2]	2/5	2/2	1/0	0/8	0/0	2/0	2/5	0/2	0/0	2/1	2/2	
Total	23	7	4	1	8	0	2	7	2	0	3	4	61

[1] - Numbers of GOEA observed inside point count plot/outside point count plot
[2] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead animal inside the P-01 boundaries.

Project Footprint/Valley Floor Conservation Lands

The GOEA observations in the Project Footprint/VFCL totaled 43 GOEA, with 15 observations within the point count plot boundaries and 28 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class (Table 2). The GOEA observation on the Project Footprint/Valley Floor Conservation Lands were made up of four juveniles, three inside the point count plot boundaries and one observation outside the plot boundaries. There were two subadult GOEA observed within the point count plot boundaries and none outside. The surveys also found 14 adult GOEA observations within the Project Footprint/Valley Floor Conservation Lands areas, with 7 adults being seen inside the plot boundaries, and 7 adult GOEA observed outside the plot boundaries. Furthermore, there were 23 GOEA observations where the age class could not be determined and were categorized as unknown (Table 2). A majority of the unknown age class observations were due to the distance between the observer and the GOEA.

The point count station with the highest number of observations of GOEA, both inside and outside the plot boundaries, was P-01 (Figure 4) with a total of 23 GOEA observations (10 inside/13 outside) (Table 2). Note that the reasons for the high number of GOEA observations at this point count station was due to numerous GOEA observed utilizing the hills of the VRCL and the hills to the west of the VRCL for perching, foraging, etc. An additional event elevated the number of GOEA observed at this point. During the second survey event (September 17-19, 2013), 7 GOEA were observed feeding on a carcass of a dead animal (i.e. cattle) during the entire point count survey period (Table 1). The point count station with the lowest number of GOEA observations during the survey season was P-06 (Figure 4) with no GOEA observed during all of the point count surveys (Table 2).

Of the 15 GOEA observations within the Project Footprint/Valley Floor Conservation Lands observed within the point count plots, over half of the observations (8 GOEA) were seen within the month of September (Table 3). As previously stated, during the second survey event (September 17-19, 2013), 7 GOEA were observed feeding on a carcass of a dead animal during the entire point count survey period. The next highest number of observations during a month was the events in October with four GOEA (Table 3). The observation numbers for the other months included two observations in January, one GOEA observation in December, and no observations of GOEA in November within the Project Footprint/Valley Floor Conservation Lands during the point count surveys (Table 3).

Table 3.Survey Event Results for Project Footprint/Valley Floor Conservation Lands

Survey Event	P-01	P-02	P-03	P-04	P-05	P-06	Total
1st (September 3 -5, 2013)	0	0	0	0	0	0	**0**
2nd (September 17-19, 2013)	7[1]	0	1	0	0	0	**8**
3rd (October 2-4, 2013)	1	0	0	0	0	0	**1**
4th (October 15-17, 2013)	1	2	0	0	0	0	**3**
5th (October 28-30, 2013)	0	0	0	0	0	0	**0**
6th (November 11-13, 2013)	0	0	0	0	0	0	**0**
7th (November 25-27, 2013)	0	0	0	0	0	0	**0**
8th (December 9-11, 2013)	0	0	1	0	0	0	**1**
9th (December 21-23, 2013)	0	0	0	0	0	0	**0**
10th (January 7-9, 2014)	1	0	0	1	0	0	**2**
11th (January 22-24, 2014)	0	0	0	0	0	0	**0**
Total	**10**	**2**	**2**	**1**	**0**	**0**	**15**

[1] - Data includes several GOEA that were feeding on a carcass of a dead animal inside the plot boundary.

Valadeao Ranch Conservation Lands

The GOEA observations in the VRCL totaled 11 GOEA with 4 observations within the point count plot boundaries and 7 observations outside the plot boundaries for the entire survey season (Table 2). These observations were also categorized by their age class. The GOEA observations on the Valadeao Ranch Conservation Lands were made up of 2 juveniles, all inside the point count plot boundaries. There were no subadult GOEA observed within the point count plot boundaries or outside the plot boundaries. The surveys also found 2 adult GOEA observations within the Valadeao Ranch Conservation Lands areas with all being seen inside the plot boundaries. Furthermore, there were 7 unknown age class observations that were observed outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the GOEA.

The point count station with the highest number of observations of GOEA, both inside and outside the plot boundaries was V-02 (Figure 5) with a total of 7 GOEA observations (2 inside/5 outside) (Table 2). The point count stations with the lowest number of GOEA observations during the survey season was V-01 and V-03 (Figure 5) with 2 GOEA observations each (Table 2). V-01 had 2 GOEA observations inside the plot boundaries, and V-03 had 2 observed outside the plot boundaries (Table 2).

Of the 4 GOEA observations within the VRCL observed within the point count plots, 75% of the observations (3 GOEA) were seen within the month of September (Table 4). The next highest number of observations during a month was the events in January with 1 GOEA observation. For the months of October, November, and December, no observations of GOEA were made within the VRCL during the point count surveys (Table 4).

Table 4. Survey Event Results for Valadeao Ranch/Silver Creek Ranch Conservation Lands

Survey Event	V-01	V-02	V-03	S-01	S-02	S-03	Total
1st (September 3 -5, 2013)	2	0	0	0	0	0	2
2nd (September 17-19, 2013)	0	1	0	0	0	0	1
3rd (October 2-4, 2013)	0	0	0	0	0	0	0
4th (October 15-17, 2013)	0	0	0	0	0	0	0
5th (October 28-30, 2013)	0	0	0	0	0	1	1
6th (November 11-13, 2013)	0	0	0	0	0	0	0
7th (November 25-27, 2013)	0	0	0	0	0	0	0
8th (December 9-11, 2013)	0	0	0	0	0	0	0
9th (December 21-23, 2013)	0	0	0	0	0	0	0
10th (January 7-9, 2014)	0	1	0	0	2	0	3
11th (January 22-24, 2014)	0	0	0	0	0	1	1
Total	**2**	**2**	**0**	**0**	**2**	**2**	**8**

Silver Creek Ranch Conservation Lands

The GOEA observations in the SCRCL totaled 7 GOEA with four observations within the point count plot boundaries (Figure 6) and 3 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class (Table 2). The GOEA observations on the SCRCL had no juvenile or subadult eagles inside or outside the point count plot boundaries. The surveys found 4 adult GOEA observations within the SCRCL areas with 3 observations inside the plot boundaries and one observation outside the plot boundaries. Furthermore, there were 3 unknown age class observations with 1 observation inside the plot boundaries and 2 observations outside the plot boundaries (Table 2). The unknown age class observations were due to the distance between the observer and the GOEA.

The point count station in the SCRCL with the highest number of observations of GOEA, both inside and outside the plot boundaries was S-03 (Figure 6) with a total of 4 GOEA observations (2 inside/2 outside) (Table 2). The point count stations with the lowest number of GOEA observations during the survey season was V-01 and V-03 (Figure 6) with 2 GOEA observations each. V-01 had 2 GOEA observations inside the plot boundaries and V-03 had 2 observed outside the plot boundaries (Table 2). The point count station with the lowest number of GOEA observations during the survey season was S-01 (Figure 2) with no GOEA observed during all of the point count surveys.

Of the 4 GOEA observations within the SCRCL observed within the point count plots, 75% of the observations (three GOEA) were seen within the month of January (Table 4). The next highest number of observations during a month was the events in October with 1 GOEA observation. For the months of September, November, and December, no observations of GOEA were made within the SCRCL during the point count surveys (Table 4).

5.2 Utilization Distribution Assessment (UDA)

Like the Point Count Survey events, the UDA Survey events occurred every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. Each survey event was made up of 6 UDA surveys from designated Observation Points (Figure 7) for 2 hours each. The total hours surveying for GOEA during the UDA study was 132 hours of survey time within the Project Footprint/VFCL.

The results of the UDA surveys included a total of 33 observations of GOEA (Table 5) which includes observations inside the Project Footprint/ VFCL (the UDA Study Area) and outside the UDA Study Area. Of those 33 observations, 16 GOEA observations were recorded within the UDA Study Area (Table 5) with 5 identified as adult GOEA, 3 as subadult GOEA, 4 as juvenile GOEA, and 4 birds were not able to be identified by age class (Table 6).

Table 5. Total UDA Observations

Date of Observation	UDA Observation Point	Observation Location - In or Out of UDA Study Area	Age Class	Flight Height (feet)	Observation Minutes
9/4/2013	P-06	In	SA	150	5
9/17/2013[1]	P-01	In	UK	0[2]	10
9/17/2013	P-01	In	UK	0	120
9/17/2013	P-01	In	AD	0	80
9/17/2013	P-01	Out	UKN	200-300	16
9/17/2013	P-01	Out	UKN	200-300	16
9/17/2013	P-01	Out	UKN	200-300	16
9/17/2013	P-01	In	JUV	0	52
9/17/2013	P-01	Out	UKN	350	11
9/17/2013	P-01	In	UKN	0	15
9/17/2013	P-01	In	UKN	0	8
9/17/2013	P-02	In	JUV	NR	6
9/18/2013	P-05	In	AD	120	4
9/18/2013	P-06	Out	UKN	100	13
10/3/2013	P-03	In	AD	150-300	2
10/3/2013	P-03	Out	JUV	150-300	2
10/3/2013	P-03	Out	AD	150-300	2
10/3/2013	P-05	Out	JUV	800	2
10/16/2013	P-03	Out	AD	50-200	6
10/16/2013	P-03	Out	AD	50-200	6
10/16/2013	P-03	Out	UKN	150-200	3
10/16/2013	P-03	Out	UKN	150-200	3
10/16/2013	P-04	In	JUV	400 - 800	7
10/28/2013	P-01	Out	UKN	250	1
10/30/2013	P-02	In	SA	200 - 1,000	13
11/12/2013	P-06	In	AD	150	3
11/12/2013	P-06	In	AD	100	3
12/9/2013	P-02	Out	UK	1100	6
12/21/2013	P-04	Out	JUV	NR	19
12/21/2013	P-04	Out	JUV	NR	30
12/21/2013	P-04	Out	AD	NR	5
1/8/2014	P-01	In	SA	0	120
1/22/2014	P-02	In	JUV	200	4

AD – Adult, SA – Subadult, JUV – Juvenile, UKN – Unknown age, NG – Not Recorded

[1] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead animal inside the P-01 boundaries on September 17, 2013.

[2] – 0 feet flight height indicates perched on ground or rock.

Table 6. UDA Survey Overview by Age Class/Survey Point within Study Area

Age Class	P-01	P-02	P-03	P-04	P-05	P-06	Totals by Age Class
Juvenile	1	2	0	1	0	0	4
Sub-Adult	1	1	0	0	0	1	3
Adult	1	0	1	0	1	2	5
Unknown	4	0	0	0	0	0	4
Total per Observation Station	7[1]	3	1	1	1	3	

[1] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead cow inside the P-01 boundaries.

Table 5 indicates the majority of the GOEA observations came from outside the UDA Study Area near Observation Points P-01 and P-03 (Figure 7). This is due to numerous sightings of GOEA observed utilizing the hills of the western portion of the VRCL and the hills beyond the western portion of the VRCL for perching, foraging, etc.

During the UDA surveys there were 452 observation minutes of GOEA inside the UDA Study Area and 157 observation minutes of GOEA outside the UDA Study Area for a total of 609 observation minutes for the entire study period. Note that totals for the UDA study included several GOEA that were observed feeding on a carcass of a dead animal (cattle) inside the UDA Study Area near P-01 within Grid Cell 79 (Figure 7) and remained on the carcass a majority of the UDA survey event on September 17, 2013. These observations made up 63% (285 observation minutes) of the observation time for GOEA for the UDA Study. In addition, the observation time (120 observation minutes) for a subadult eagle noted on January 8, 2014, that perched on the hillside for the entire UDA survey period near P-01, make up 90% of the observation minutes made during the entire study within the UDA Study Area.

The average observed flight height noted during the study, excluding perched GOEA, for all observations of GOEA made during the UDA surveys, was approximately 300 feet above ground level. The average flight height for the GOEA observations noted inside the UDA Study Area was similar with an average flight above ground level of approximately 270 feet (Table 5).

Lastly, due to the small size of the data set, only 16 GOEA flight observations that utilized 57 grid cells within the UDA Study Area (Figure 8), a standard kernel analyses was unable to be utilized. The data was analyzed by calculating the number of flights intersecting an individual grid cell (Figure 8). With exception of the several GOEA observed feeding on a carcass in Grid Cell 79, the cells noted to be utilized by GOEA within the Study Area indicates that the GOEA are not using the southwest and south central areas of the Project Footprint and VFCL. They did not frequent the northern portion of the Project Footprint/VFCL, as well. However, Figure 8 does show that the GOEA are utilizing the hills in the VRCL on both the eastern and western sides of the Study Area for perching, foraging, etc. This area's usage was also noted during the point count surveys.

6.0 Conclusion

This report provides the findings of the 2013/2014 Phase II site-specific surveys (USFWS 2013) for GOEA for the Panoche Valley Solar Project. Point Count and UDA studies were completed to provide baseline data on GOEA occurrence, frequency, and behavior to present results of spatial and temporal site use and potential risk based on time spent within the Proposed Project area, which will assist in the preparation of the BBCS and the ECP.

The results of the point count surveys indicated that 93% of the GOEA observations made within the Project Footprint and VFCL point count station boundaries were from the western point count stations, which are in close proximity to the hills located within the western portion of the VRCL (Figure 4). Of the total 15 GOEA observations made during the entire study within point count plots, approximately 47% of those observations were seen during a single survey event (September 17-19, 2013), where 7 GOEA were observed feeding on a carcass of a dead animal within the proposed Project Footprint. This indicates that unless there is an attractant (i.e. food) found within the Project Footprint and the VFCL, that GOEA usage is nominal.

With exception of the several GOEA observed feeding on a carcass in the northeast corner of the UDA Study area, the cells noted to be utilized by GOEA within the UDA Study Area indicates that the GOEA are not using the northern, southwest, and south central areas of the Project Footprint and VFCL. The UDA Study does show, as seen in the point count surveys, that the GOEA are utilizing the hills in the VRCL on both the eastern and western sides of the Study Area for perching, foraging, etc. In addition, the study indicated that flight heights noted inside the UDA Study Area averaged approximately 270 feet with exception of the GOEA noted feeding on the carcass during a September survey event. This shows that the eagles mostly are flying across or through the Panoche Valley (i.e. Project Footprint and VFCL) to other habitat to forage or perch.

7.0 References

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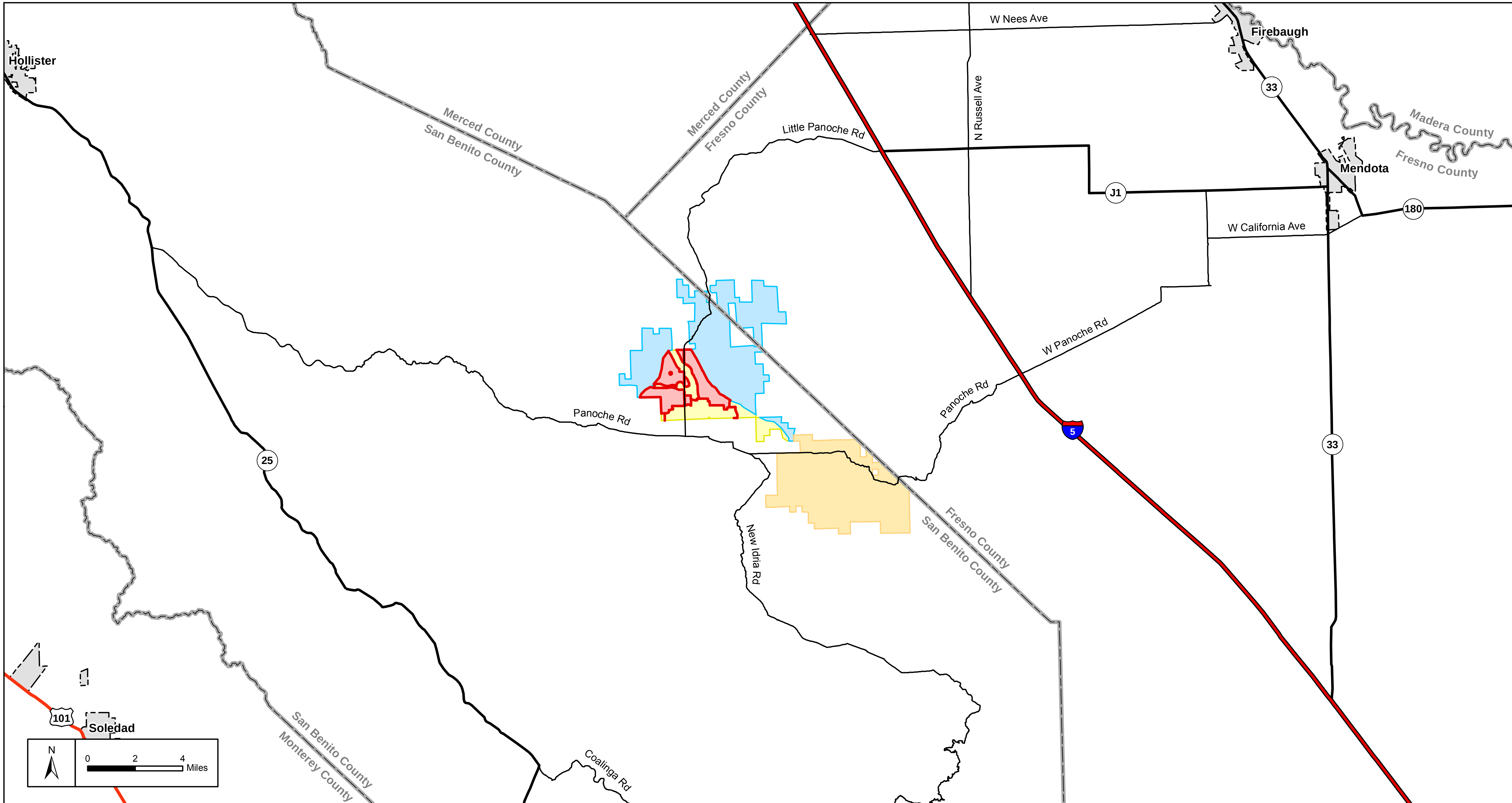
FIGURES



305 Camp Craft Road, Suite 575
West Lake Hills, Texas 78746
512-222-1125
www.energyrenewalpartners.com

Energy Renewal PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

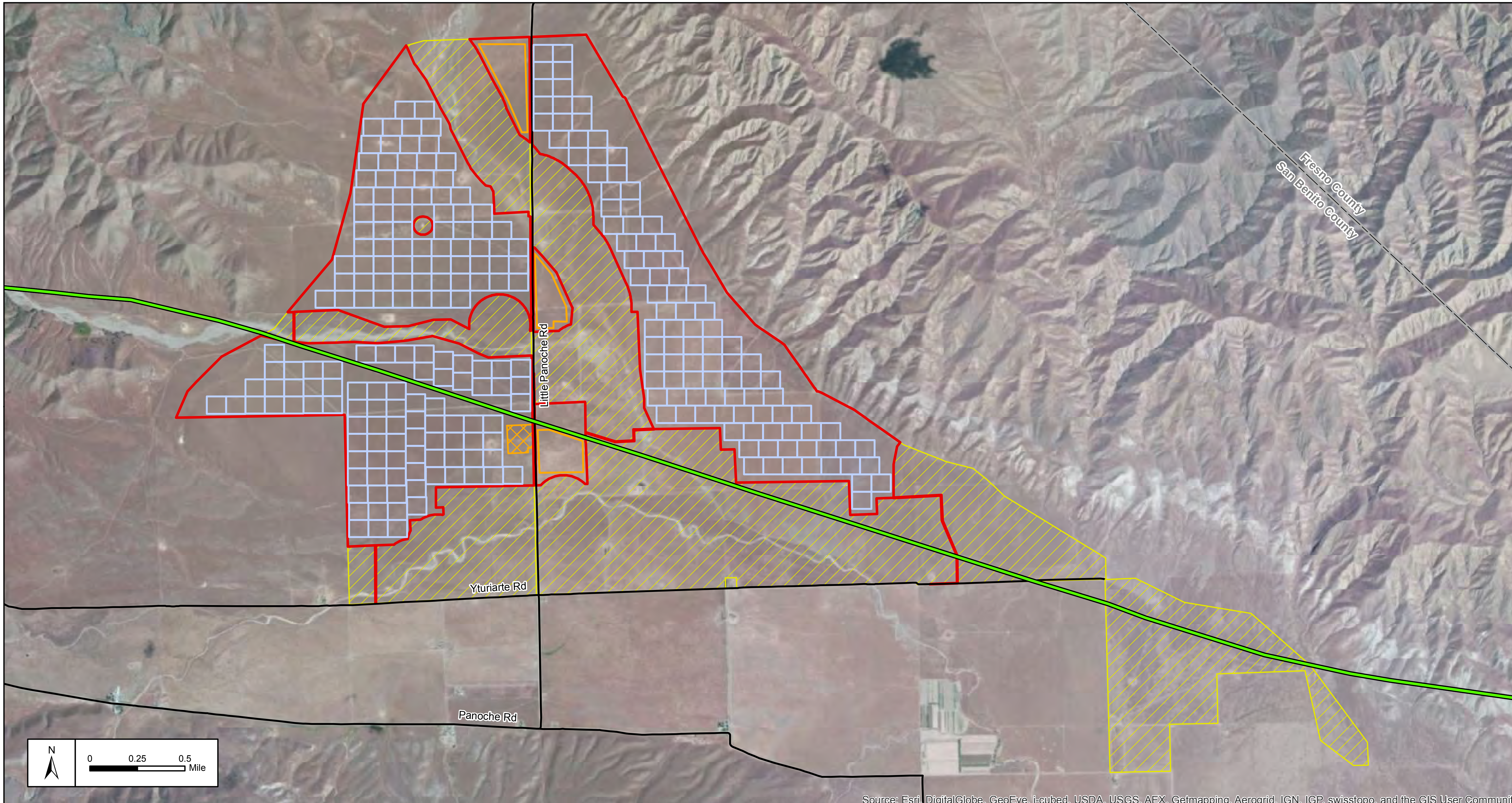
Panoche Valley Solar Project

Project Location

FIGURE

1

JH 2014-03-18



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Proposed Panel Block
- Existing Transmission Line
- Project Substation
- Laydown Yard

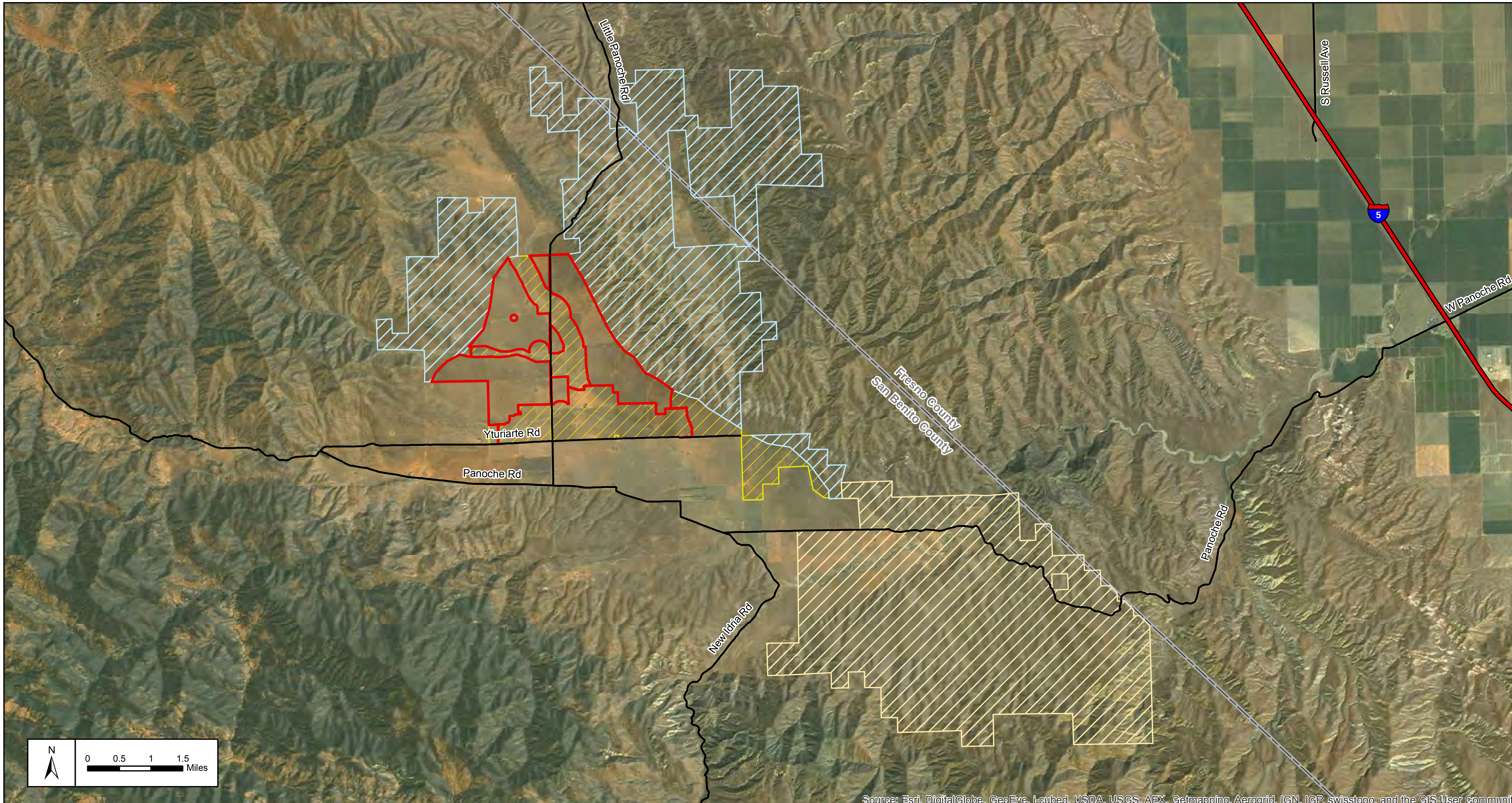
Panoche Valley Solar Project

Proposed Layout

FIGURE

2

JH 2014-03-17



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

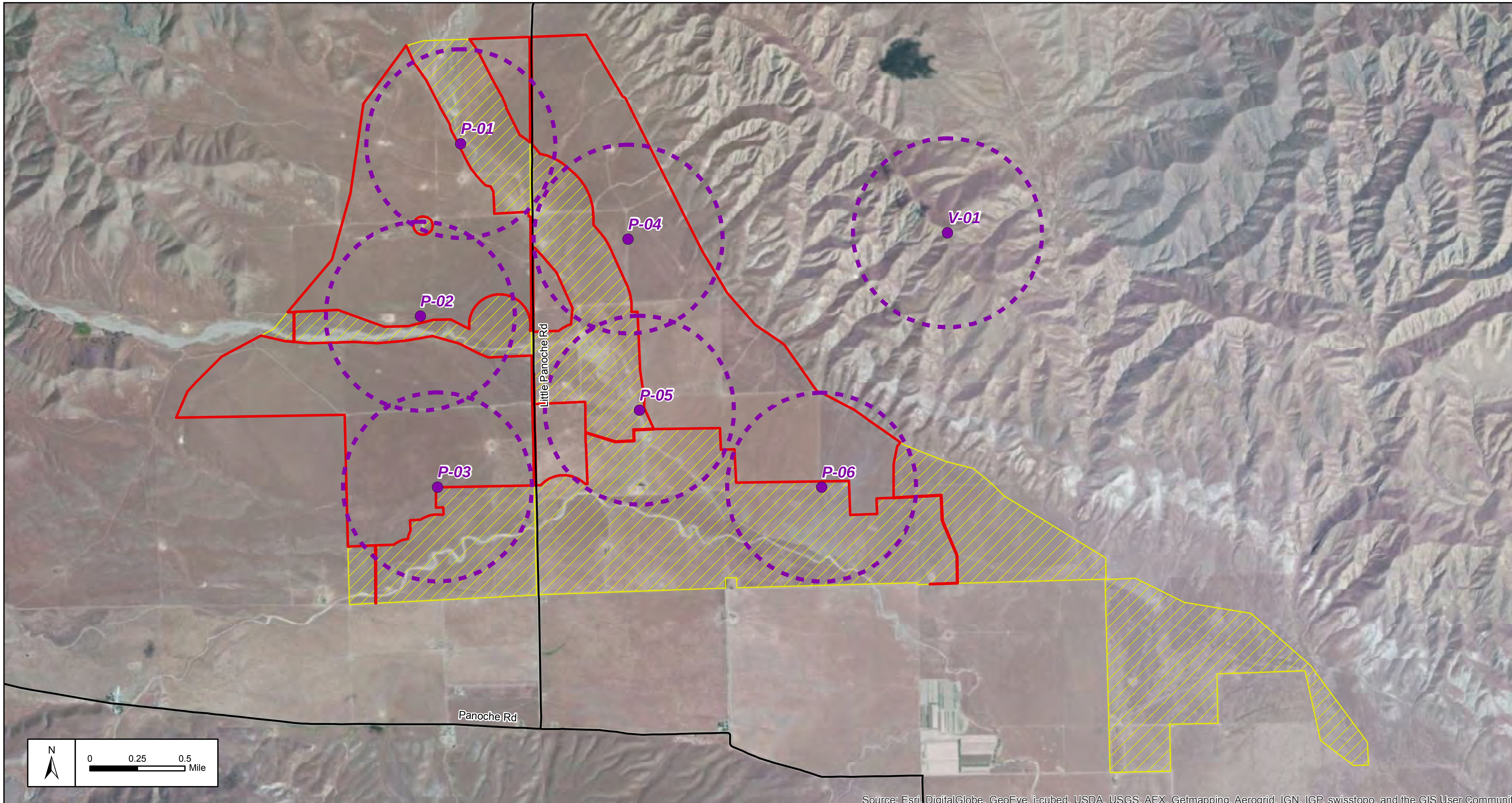
Panoche Valley Solar Project

Project Footprint and Conservation Lands

FIGURE

3

JH 2014-03-18



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Legend

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valley Floor Conservation Lands

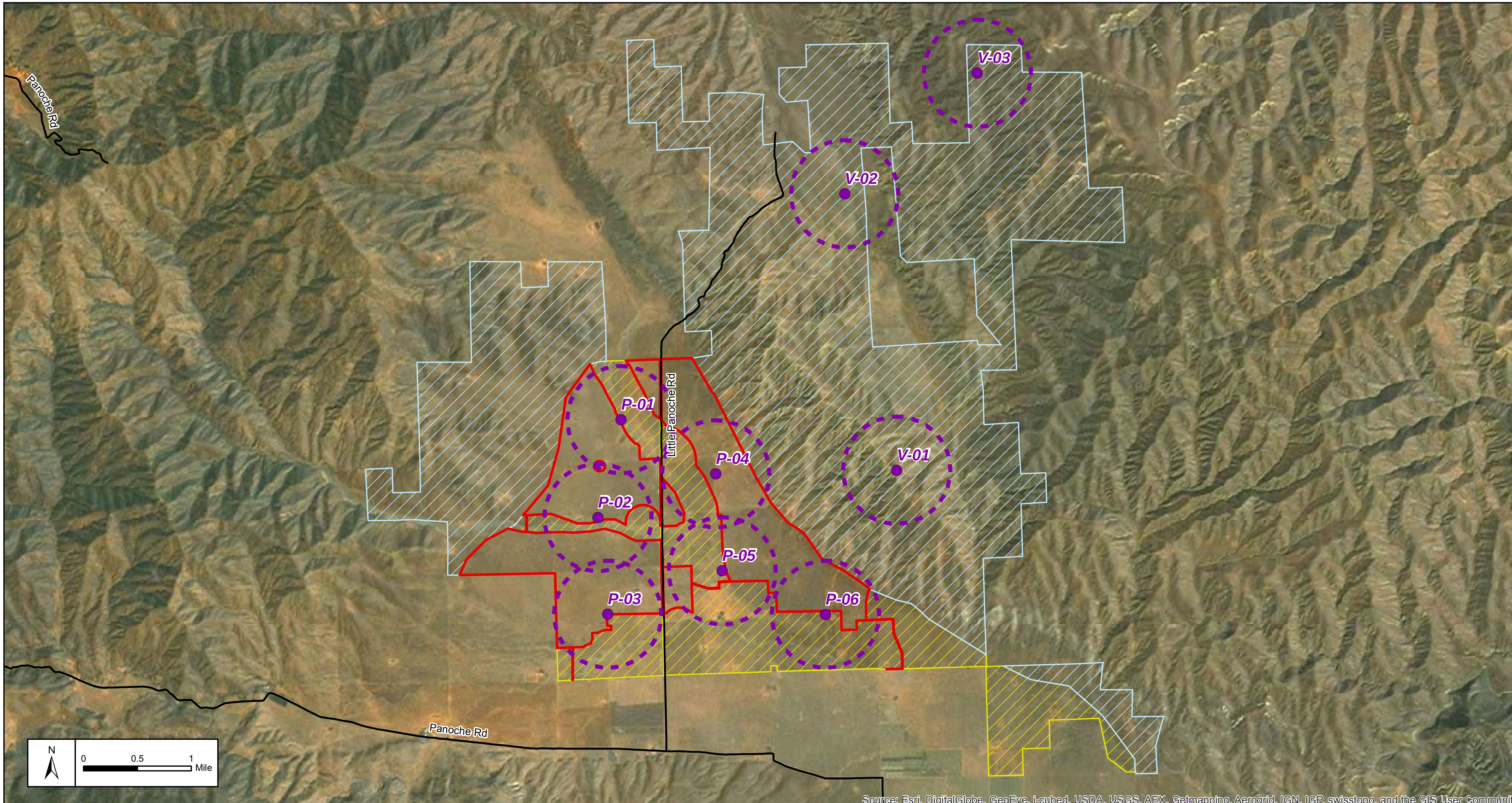
Panoche Valley Solar Project

Point Count Stations

Project Footprint and Valley Floor Conservation Lands

FIGURE 4

JH 2014-03-17



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PARTNERS, LLC

Legend

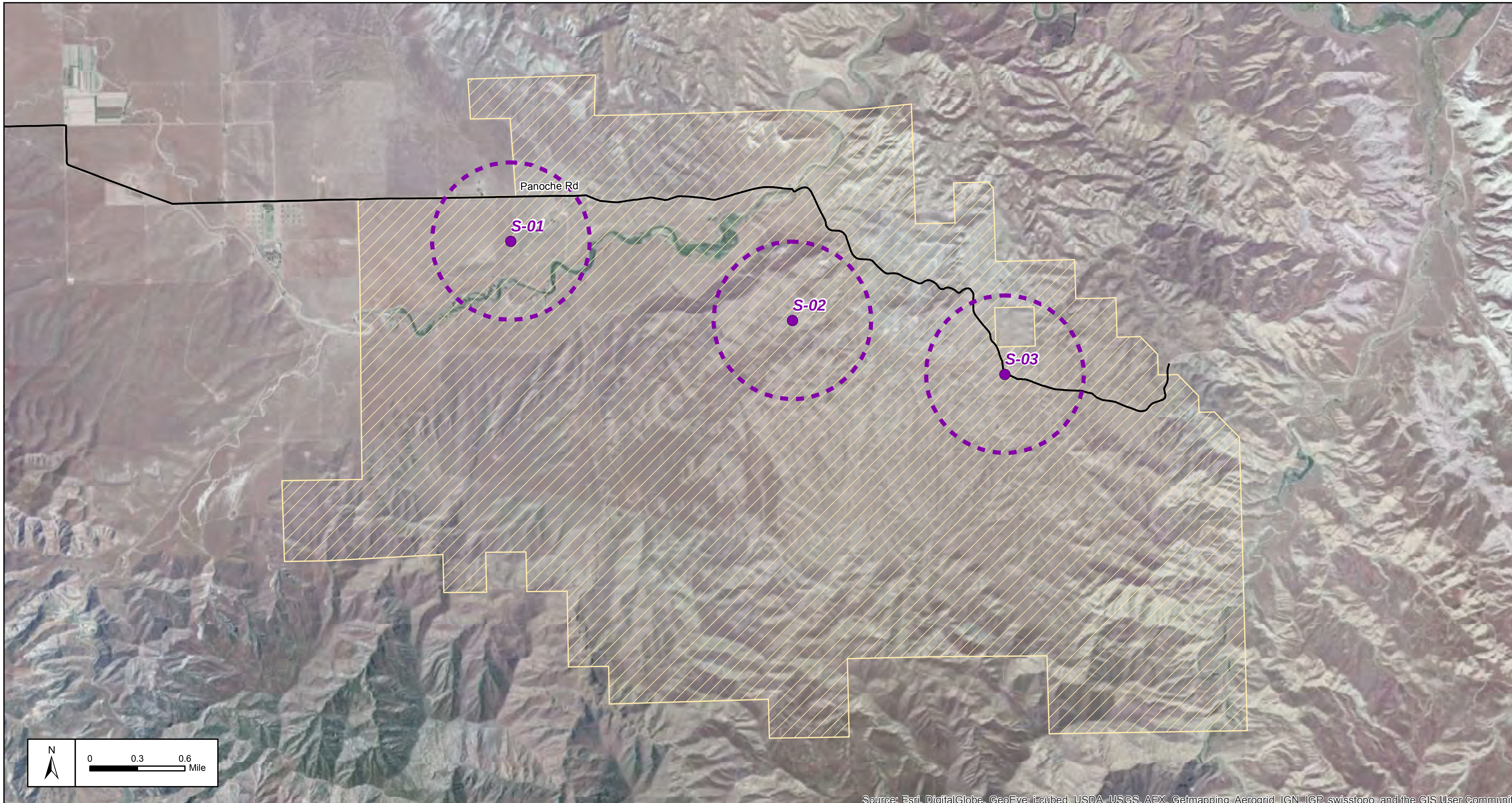
- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

Panoche Valley Solar Project

Point Count Stations
Valadeao Ranch Conservation Lands

FIGURE
5

JH 2014-03-17



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Legend

- Point Count Station
- 800-meter Observation Area
- Silver Creek Ranch Conservation Lands

Panoche Valley Solar Project

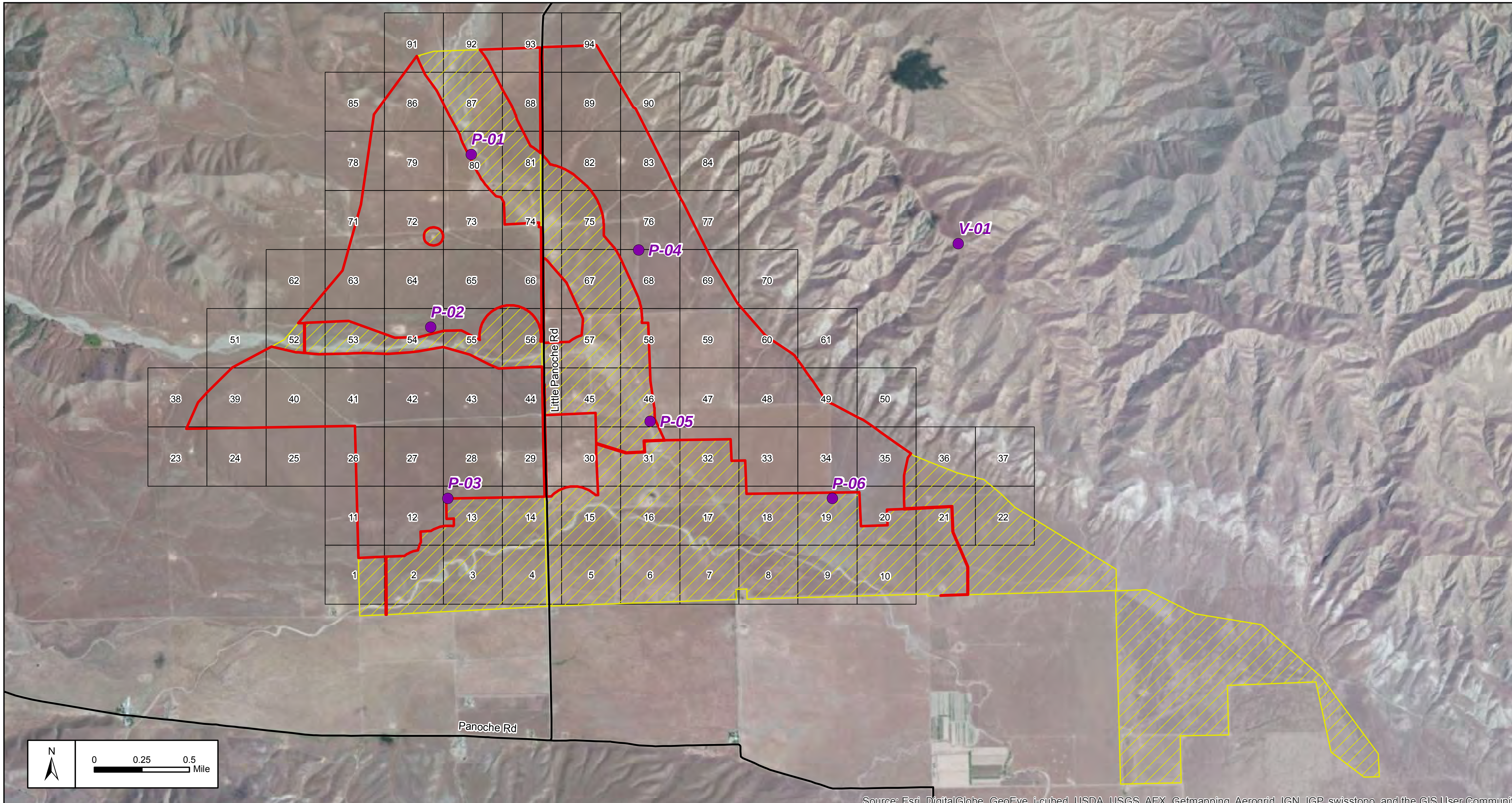
Point Count Stations

Silver Creek Ranch Conservation Lands

FIGURE

6

JH 2014-03-17



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Legend

- UDA Observation Point
- Project Footprint
- Valley Floor Conservation Lands
- 0.5 x 0.5 Kilometer Grid Cell

Panoche Valley Solar Project

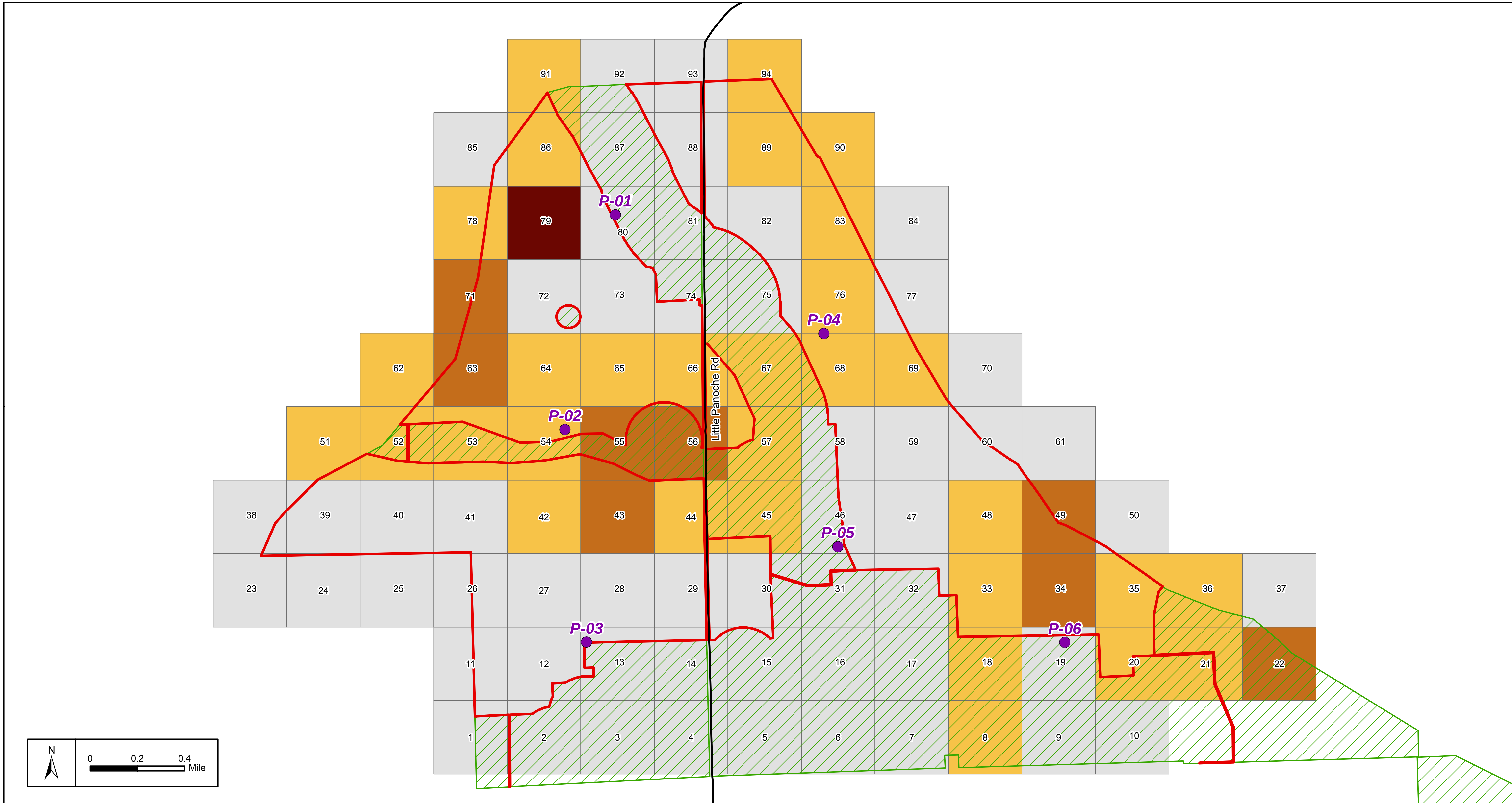
UDA Observation Points

Project Footprint and Valley Floor Conservation Lands

FIGURE

7

JH 2014-03-17



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Legend

- UDA Observation Point
- Project Footprint
- Valley Floor Conservation Lands

Number of Times a Grid Cell was Utilized by GOEA

- 0
- 1
- 2 - 3
- 4 - 7

Panoche Valley Solar Project

UDA Study Results

FIGURE

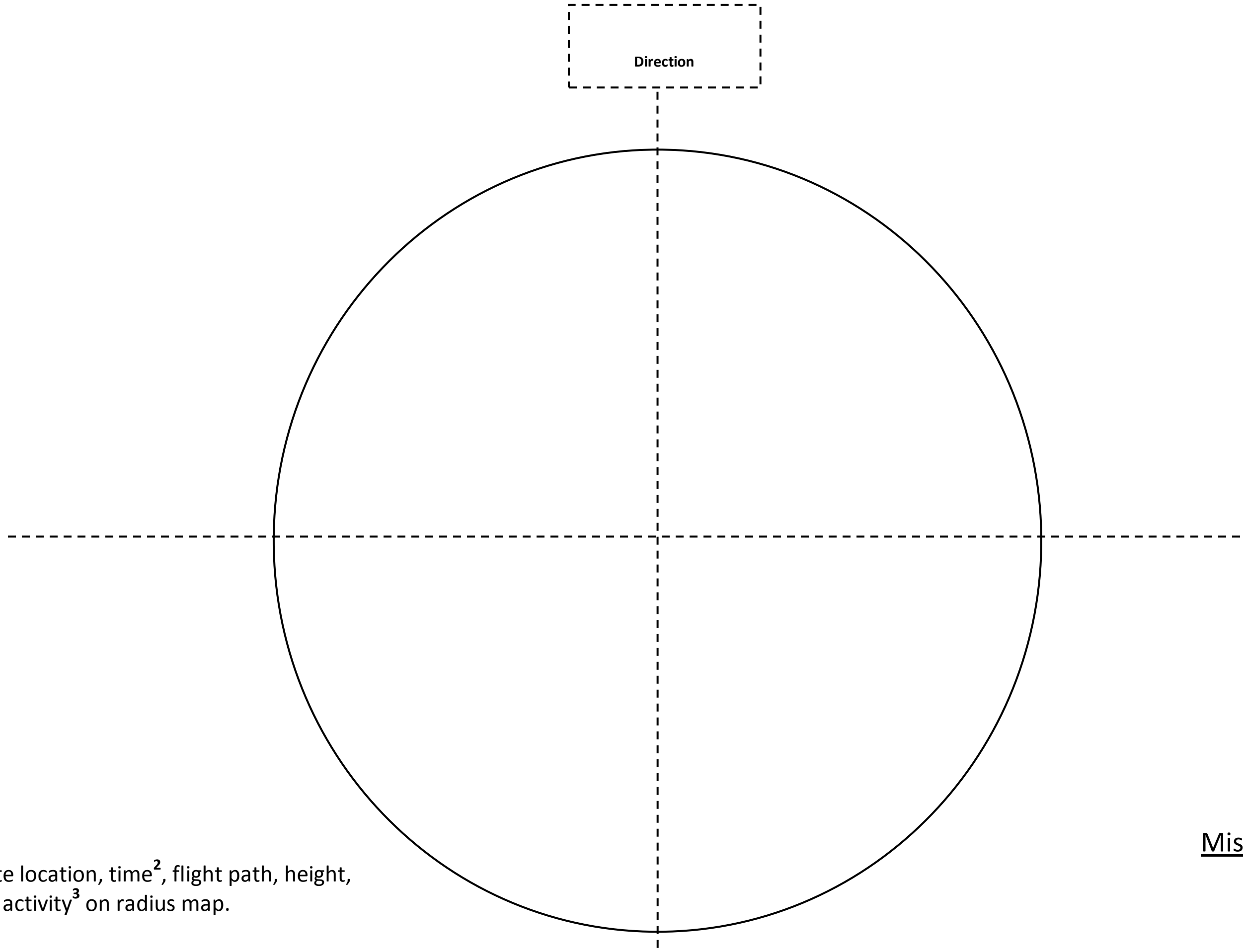
8

JH 2014-03-17

APPENDICES

APPENDIX A
FIELD FORMS

Panoche Valley Solar Golden Eagle 800 Meter Point Count Survey		
Point Count Station Number	Start Time	Temp Start °F
Date (mm/dd/yy)	End Time	Temp End °F
Observer(s)	Precip. (amt. last 24hr)	Visibility (% clear)[1]
Wind (mph/direction)	Cloud Cover (% cloudy)	



Misc. Obs

Indicate location, time[2], flight path, height, and activity[3] on radius map.

GOLDEN EAGLE OBSERVATIONS

GOEA #	Age Class[4]	Obs Time Start/End	Eagle Minutes	Description of Observation/Comments

[1]Percent clear within 800 meter and 200 meter vertical
[2]Prevalent behavior noted at one minute intervals
[3]Activity - PE (Perched), SO (Linear Soaring/Gliding), CS (Circle soaring), FL (Flapping), HU (Hunting), HO (Hovering/Kiting), and OT (Other).
[4]Age Class – JUV (Juvenile), SA (Sub-adult), and AD (Adult)

Energy Renewal
PARTNERS, LLC

BR
9/11/2013

Legend

- Approximate Project Boundary
- Valley Floor Conservation Lands
- Survey Point Location
- 800 meter Observation Area

Duke Energy Renewables
Panoche Valley Solar Project

Golden Eagle Utilization
Distribution Assessment (UDA) Grid Map

N

0 1,000 2,000
Feet

Panoche Valley Solar Golden Eagle Utilization Distribution Assessment (UDA)			
UDA Point Number	**Start Time:**	**Temp Start: °F**	**Wind (mph/direction)**
Date (mm/dd/yy)	**End Time:**	**Temp End: °F**	**Observer(s)**

GOLDEN EAGLE OBSERVATIONS

GOEA #	Age Class[1]	Obs Time Start/End	Eagle Minutes	Description of Observation[2]/Comments[3]

Indicate location, time, flight path, estimated height, and activity[2] on grid map (opposite side).

KEY

[1]Age Class – JUV (Juvenile), SA (Sub-adult), and AD (Adult)

[2]Includes prevalent behavior/activity noted at one minute intervals. Activity description includes - PE (Perched), SO (Linear Soaring/Gliding), CS (Circle Soaring), FL (Flapping), HU (Hunting), HO (Hovering/Kiting), and OT (Other).

[3]Include grid numbers utilized from attached grid map

APPENDIX B
COMPLETED FIELD FORMS
ELECTRONIC FORMAT

APPENDIX C
MISCELLANEOUS GOLDEN EAGLE OBSERVATIONS

Miscellaneous Golden Eagle Observations during other Surveys

Date	GOEA Observations
5/13/2013	1
5/25/2013	1
5/26/2013	2
5/28/2013	1
5/29/2013	1
6/17/2013	1
6/22/2013	1
7/6/2013	1
7/8/2013	1
8/4/2013	1
8/9/2013	2
8/29/2013	1
9/5/2013	3
9/7/2013	2

APPENDIX D
WEATHER DATA

Survey Date	Weather Conditions
September 3, 2013	Temp 83-95° Fahrenheit (F) Wind 6.5-10.4 miles per hour (mph) N Cloud Cover 25% Precipitation 0 inches (in) Visibility 100%
September 4, 2013	Temp 66-97°F Wind 1.5-6.6 mph N Cloud Cover 0% Precipitation 0 in. Visibility 100%
September 5, 2013	Temp 70-96°F Wind 6.1 – 7.4 mph E Cloud Cover 100% Precipitation 0 in. Visibility 95%
September 17, 2013	Temp 61-72.3°F Wind 15.4 mph W Cloud Cover 0% Precipitation 0 in. Visibility 100%
September 18, 2013	Temp 64-79°F Wind 7.9-13.2 mph NNW Cloud Cover 0% Precipitation 0 in. Visibility 100%
September 19, 2013	Temp 64-93.5°F Wind 0.6 mph N Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 2, 2013	Temp 59-70°F Wind 3.2 mph SW Cloud Cover 10% Precipitation 0 in. Visibility 100%
October 3, 2013	Temp 52-66°F Wind 1-12.7 mph S Cloud Cover 0% Precipitation 0 in.

Survey Date	Weather Conditions
	Visibility 100%
October 4, 2013	Temp 53-68°F Wind 1.4 mph E Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 15, 2013	Temp 52-84°F Wind 1.1 – 5.9 mph S Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 16, 2013	Temp 51.5-85°F Wind 0-5 mph S Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 17, 1913	Temp 77-90°F Wind 1.1-5 mph S Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 28, 2013	Temp 48-62°F Wind 8.9-19.5 mph W Cloud Cover 35% Precipitation Trace Visibility 100%
October 29, 2013	Temp 53.4-75°F Wind 3.6-6 mph NW Cloud Cover 98% Precipitation 0 in. Visibility 90%
October 30, 2013	Temp 42-67°F Wind 0.9 -7 mph S Cloud Cover 10% Precipitation 0 in. Visibility 100%
November 12, 2013	Temp 58-64.4°F

Survey Date	Weather Conditions
	Wind 1-6 mph N Cloud Cover 80% Precipitation Trace Visibility 100%
November 13, 2013	Temp 49-74.6°F Wind 2-8.1 mph N Cloud Cover 5% Precipitation Trace Visibility 100%
November 14, 2013	Temp 52-76°F Wind 1 -5 mph NW Cloud Cover 15% Precipitation 0 in. Visibility 100%
November 25, 2013	Temp 32-73°F Wind 0.8-3.6 mph SE Cloud Cover 0% Precipitation 0 in. Visibility 80%
November 26, 2013	Temp 46-66°F Wind 1-4 E Cloud Cover 90% Precipitation 0 in. Visibility 100%
November 27, 2013	Temp 41-64°F Wind 1 mph W Cloud Cover 35% Precipitation 0 in. Visibility 100%
December 9, 2013	Temp 20-50.3°F Wind 1-1.7 mph SE Cloud Cover 0% Precipitation 0 in Visibility 100%
December 10, 2013	Temp 27-51.6°F Wind 1-5 mph NE Cloud Cover 0%

Survey Date	Weather Conditions
	Precipitation 0 in Visibility 100%
December 11, 2013	Temp 31.4-53°F Wind 0.9-2.7 mph W Cloud Cover 0% Precipitation 0 in Visibility 100%
December 21, 2013	Temp 33-40°F Wind 2.5- 7.5 mph W Cloud Cover 0% Precipitation 0 in Visibility 100%
December 22, 2013	Temp 30-49°F Wind 0.6-8.2 mph N Cloud Cover 0% Precipitation 0 in Visibility 100%
December 23, 2013	Temp 43-60°F Wind 0.6-2 mph W Cloud Cover 0% Precipitation 0 in Visibility 100%
January 7, 2014	Temp 39-69°F Wind 1-5 mph E Cloud Cover 75% Precipitation 0 in. Visibility 100%
January 8, 2014	Temp 36-71°F Wind 0-5 mph S Cloud Cover 50% Precipitation 0 in. Visibility 100%
January 9, 2014	Temp 41-47°F Wind 0-5 mph N Cloud Cover 50% Precipitation 0 in. Visibility 100%

Survey Date	Weather Conditions
January 22, 2014	Temp 38-66°F Wind 1-4 mph N Cloud Cover 40% Precipitation 0 in. Visibility 100%
January 23, 2014	Temp 47-68°F Wind 3-6 mph NW Cloud Cover 5% Precipitation 0 in. Visibility 100%
January 24, 2014	Temp 48-65°F Wind 0-10 mph S Cloud Cover 90% Precipitation 0 in. Visibility 100%

APPENDIX E
PHOTOGRAPHS

Photo 1. General habitat view of Valley Floor Conservation Lands (VFCL) and Project Site near P-01 looking southwest.

Photo 2. General habitat view of Project Footprint in vicinity of P-03 looking northeast toward P-04 and P-05.

Photo 3. General habitat view of Project Footprint in vicinity of P-03 looking southwest.

Photo 4. General view from Little Panoche Road toward P-05 with the Valadeao Ranch in background looking east/northeast.

Photo 5. General view of Project Footprint and VFCL looking west toward P-02 and the western Valadeao Ranch property.

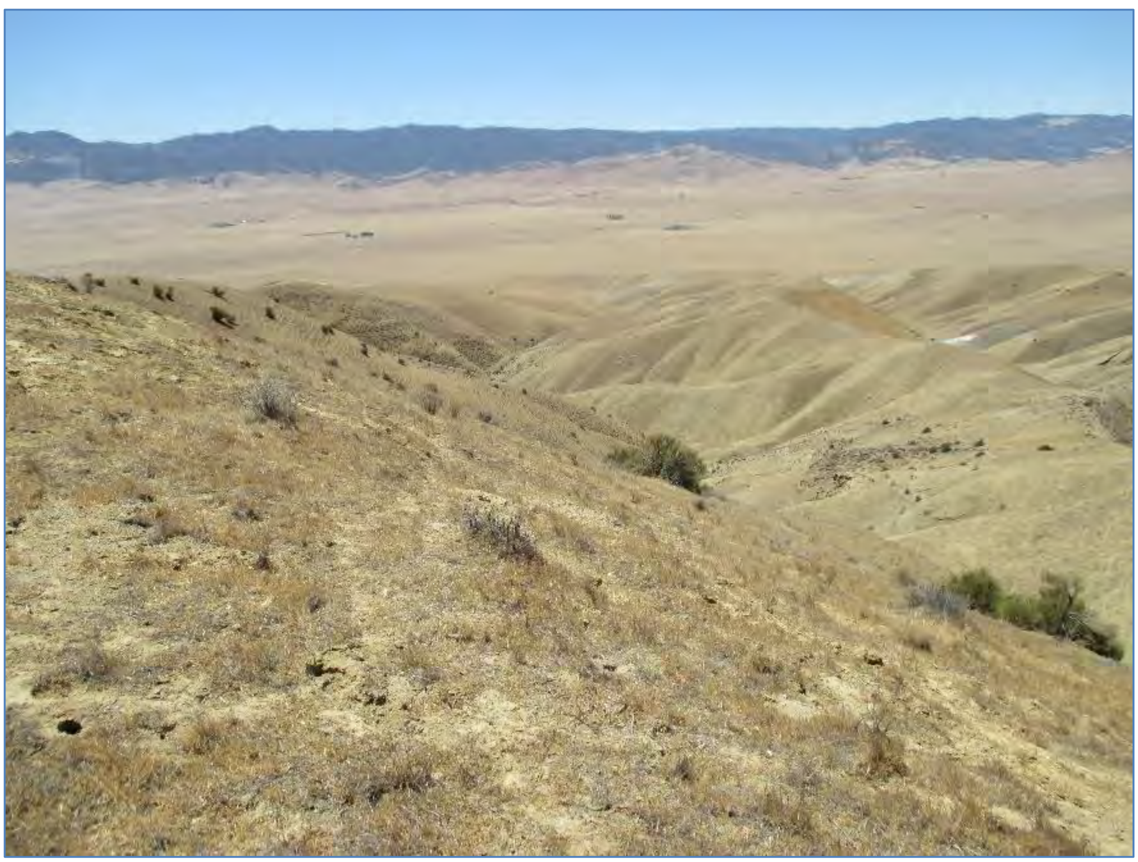


Photo 6. General view of Project Footprint and VFCL looking southwest from V-01 on the eastern Valadeao Ranch property.

Photo 7. General habitat view of eastern Valadeao Ranch property looking northeast from V-01.

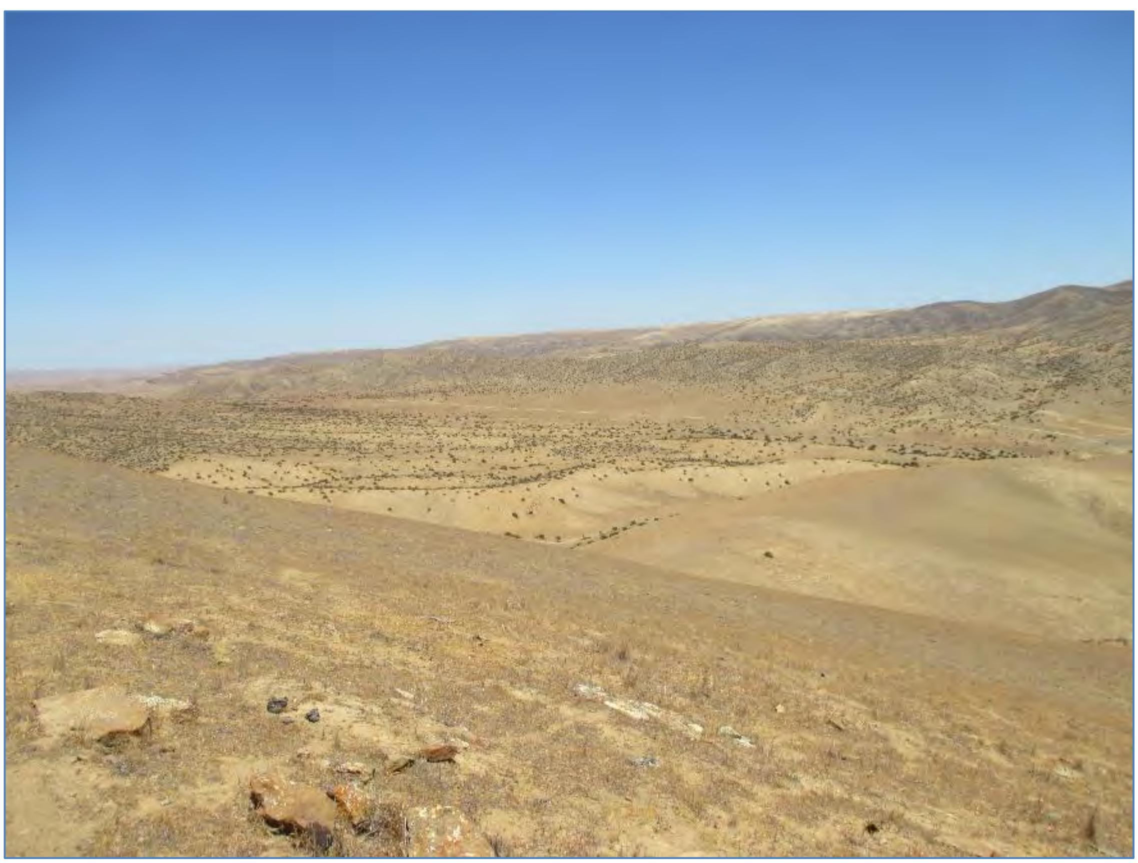


Photo 8. General habitat view of eastern Valadeao Ranch property looking north/northeast from V-01.

Photo 9. General habitat view of eastern Valadeao Ranch property looking east near V-02.

Photo 10. General habitat view of eastern Valadeao Ranch property near V-02.

Photo 11. General habitat view of the Silver Creek Ranch property looking northwest back towards S-01.

Photo 12. General habitat view of the Silver Creek Ranch property near S-02.

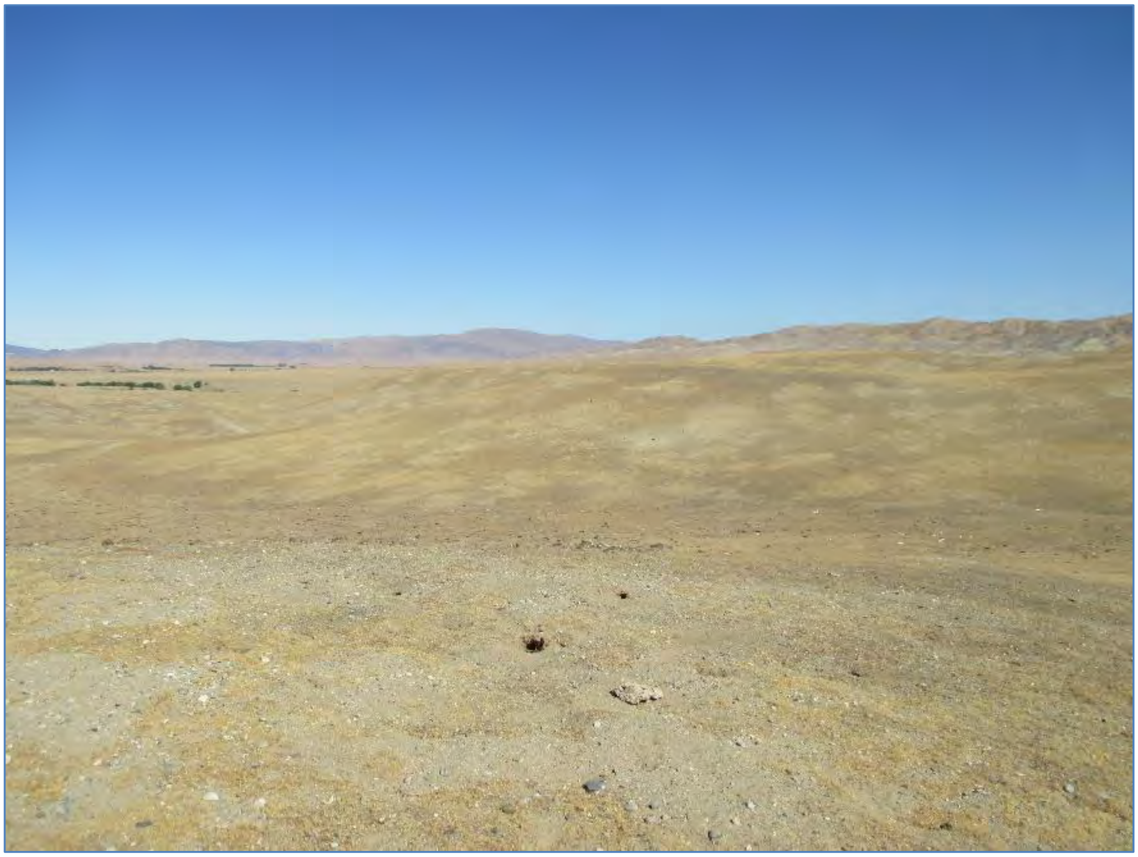


Photo 13. Additional habitat view of the Silver Creek Ranch property near S-02.

Appendix D
Resume of Plan Preparer

James A. McRacken

Senior Scientist

Mr. McRacken has over 26 years of experience in wildlife studies including avian, mammal, and reptile and amphibian surveys, jurisdictional streams and wetlands delineations, as well as federal, state, and local permitting activities. During his career, he has conducted wildlife surveys, including rare, threatened, and endangered (RTE) plant and wildlife species, wetland evaluations, habitat and substrate assessments, and various National Environmental Policy Act (NEPA) related assessments for multiple branches of the federal government. He has also conducted wetland compensation design and monitoring to support development and hydropower and transportation projects.

In the area of protected species and wildlife studies, he has conducted and managed protected species assessments on projects throughout the eastern U.S. In addition, he has conducted U.S. Fish and Wildlife Service formal and informal consultations for protected species and provided client representation during the Endangered Species Act permitting. Mr. McRacken's major studies include wildlife habitat studies associated with avian studies – including waterfowl, raptor, breeding, and migratory bird surveys, as well as bat acoustic and trapping studies.

Mr. McRacken's wetland experience includes assessing, surveying, and managing wetland projects at over 270 sites throughout the eastern and southeastern United States. He has permitted impacts to jurisdictional waters of the U.S., including wetlands, impacts under the Nationwide Permit, and Individual Permit programs throughout the southeastern U.S. Mr. McRacken has provided client representation in court as an expert witness and at regulatory meetings for wetland permitting issues.

Selected project experience is summarized below.

Panoche Valley Solar Facility Project (247 MW) - Ongoing

California, Duke Energy Renewables, LLC

Served as a Senior Scientist by conducting biological surveys such as protected species surveys for golden eagle, burrowing owls, San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel, and various other terrestrial animal on the project footprint and conservation lands. Also responsible for the preparation of the Clean Water Act Section 404 Individual Permit and the Section 404(b)(1) Alternative Analysis for submittal to the USACE, and the preparation of the Biological Assessment report for submittal to the USFWS as part of the Section 7 Endangered Species Act consultation. Additional support included preparation of the California Department of Fish and Wildlife Endangered Species Act Incidental Take Permit Application (2081) for state protected species as well as the Lake or Streambed Alteration Agreement permit application, Weed Control Plan, Avian Conservation

Education
B.S. Biology/Naturalist,
Appalachian State University, 1989

Specialized Training and Certifications

Anabat Acoustic Monitoring Techniques - Bat Sense/Bats R Us

Bat Acoustic Monitoring Training - Bat Conservation International

Bat Conservation and Management Training – BCI

Bat Study Techniques - Indiana Bat - Bat Conservation and Management, Inc.

Basic Wetlands Training Program - The National Wetland Science Training Cooperative

Federal Highway Administration NEPA Training Program - FHWA and GDOT

Endangered Species Act Section 7 Consultation Training - Duncan & Duncan WEST

USACE Nationwide Permit Training - The Wetland Training Institute

Stream Restoration Trainings – NC State University

Florida Department of Environmental Protection Jurisdictional Wetland Identification Training

Florida Department of Environmental Protection Controlled Prescribed Burning Interagency Training – Florida Division of Forestry

Strategy, Eagle Conservation Plan, and the Wetland Mitigation and Monitoring Plan for the Project.

Avian Survey of the Los Vientos III, IV, V and Rio Bravo Wind Farms - Ongoing

Texas, Duke Energy Renewables, LLC

Served as Senior Scientist responsible for the Breeding, Migratory and Wintering Bird Study for the proposed wind farm in south Texas. The purpose of the avian study was to characterize the existing breeding, migratory, and wintering avian communities of the project area and to estimate the temporal and spatial use of the project area by birds, especially raptors, and also to create risk indices for bird assemblages (large and small birds).

Avian/Eagle Surveys of the Frontier City Wind Farm - Ongoing

Oklahoma, Amshore, LLC

Served as Senior Scientist responsible for the Breeding, Migratory and Wintering Bird Study for the proposed wind farm in northern Oklahoma. The purpose of the avian study was to characterize the existing breeding, migratory, and wintering avian communities of the project area and to estimate the temporal and spatial use of the project area by birds, especially raptors, and also to create risk indices for bird assemblages (large and small birds).

Bat Acoustic Surveys Associated With W.S. Lee Nuclear Station and Make-Up Pond C

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Project Manager and Senior Scientist responsible for the acoustic bat surveys on the proposed nuclear station and the adjacent Make-Up Pond C parcel. The purpose of this study was to characterize the existing bat communities of the Project areas and assess the potential project-related impacts on the federally protected Northern Long-eared Bat (*Myotis septentrionalis*). The study focused on representative and high-value roosting and foraging habitat areas located within Project areas.

Bat Acoustic Surveys Associated With the Oconee and Catawba Nuclear Stations and the W. S. Lee Combined Cycle Power Plant

Oconee, York, and Anderson Counties, South Carolina, Duke Energy Carolinas, LLC

Served as Project Manager and Senior Scientist responsible for the acoustic bat surveys on the Oconee and Catawba Nuclear Stations and the W. S. Lee Combined Cycle Power Plant. The purpose of this study was to assess the potential project-related impacts on the federally protected Northern Long-eared Bat (*Myotis septentrionalis*) within areas of the power plants where development was planned.

James A. McRacken

Senior Scientist

The study focused on representative and high-value roosting and foraging habitat areas located within Project areas.

Keowee-Toxaway Hydroelectric Relicensing Project (FERC No. 2503), Avian Study

Oconee, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager responsible for the development of the comprehensive study plan and the field studies that characterize the avian resources within the Federal Energy Regulatory Commission (FERC) Project Boundary. Study objectives were to survey and evaluate existing breeding, resident, and migratory avian populations; survey and identify the presence of any avian state or federal rare, threatened or endangered species; assess any effects of current and any proposed Project-related hydropower operations on the breeding and migratory species and communities; and provide information to assist in developing any potential mitigation measures. Results of the avian study will be filed as part of Exhibit E in the overall FERC hydroelectric relicensing application.

Toledo Bend Relicensing Project, Red-cockaded Woodpecker Foraging Habitat Assessment

Texas and Louisiana, Sabine River Authority

Served as Task Manager responsible for the assessment of potential foraging habitat within the 0.5 mile foraging buffer around the red-cockaded woodpecker (*Picoides borealis*) nesting cluster found adjacent to the Toledo Bend Reservoir. Results of the study will be used in the FERC hydroelectric relicensing process.

Toledo Bend Relicensing Project, Terrestrial Special-Status and Species Assessment Studies

Texas and Louisiana, Sabine River Authority

Served as Task Manager responsible for surveys, planning, coordinating, and managing the Terrestrial Special-Status and Species Assessment studies for inclusion into the Integrated Licensing Process (ILP) application to FERC. These studies focused on federally and state protected species such as the Louisiana pine snake (*Pituophis ruthveni*) and the red-cockaded woodpecker that could be found adjacent to the Toledo Bend Reservoir. Results of the studies will be filed as part of Exhibit E in the overall FERC hydroelectric relicensing application.

Avian Survey of the William States Lee III Nuclear Station

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the Breeding and Migratory Bird Study. The purpose of the avian study was to characterize the existing breeding and migratory avian communities of the approximately 2,068 acres project area and assess the potential project-related impacts on the breeding and migratory species and communities. The study focused on representative and high-value habitat areas located within the project area. The study also provided information that assisted in development of potential mitigation measures and any occurrences of state or federally protected avian species.

Avian Survey of the Railroad Corridor between Gaffney and the William States Lee III Nuclear Station

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the Breeding and Migratory Bird Study. The purpose of the avian study was to characterize the existing breeding and migratory avian communities of the project area and assess the potential project-related impacts on the breeding and migratory species and communities. The study focused on representative and high-value habitat areas located within approximately 6.8 miles (10.9 km) within a 100-foot (30.5 m)-wide corridor that would connect to the existing railroad line in Gaffney, South Carolina, to the proposed William States Lee III Nuclear Station. In addition, a survey to determine the presence/absence of breeding raptors (hawks, owls, and eagles) along the proposed railway was performed. The study also provided information that assisted in development of potential mitigation measures and any occurrences of state or federally protected avian species.

Breeding and Migratory Avian Species Associated With London Creek

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the Breeding and Migratory Bird Study. The purpose of this study was to characterize the existing breeding and migratory avian communities of the Project area and assess the potential project-related impacts on the breeding and migratory species and communities. The study focused on representative and high-value habitat areas located within Project area. The study also provided information that assisted in development of potential mitigation measures and any occurrences of state or federally protected avian species.

Sutton Hydroelectric Project

Braxton County, West Virginia, Brookfield Renewable Power Corporation

Served as Task Manager responsible for planning, conducting, and managing the terrestrial surveys for the project. Surveys included avian, bat mist netting and acoustic inventories, small and large mammal trapping and sampling, and reptile and amphibian assessments. Results of the studies were to be filed as part of Exhibit E in the overall FERC hydroelectric licensing application.

James A. McRacken

Senior Scientist

Catawba-Wateree Relicensing Project, Breeding and Migratory Bird Study

North and South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager responsible for the Breeding and Migratory Bird Study. The work included the characterization of the existing breeding, resident, and migratory bird communities of the relicensing project area; assessing any effects of current and any proposed relicensing project-related hydropower operations on the breeding and migratory species and communities; and providing information to assist in developing any potential protection, mitigation, and enhancement (PM&E) measures.

Tillery and Blewett Falls Lake Relicensing Project, Avian Assessment

Anson and Richmond Counties, North Carolina, Progress Energy

Served as Project Scientist assisting in conducting the avian survey on existing impoundments to anticipate various relicensing scenarios. Work included field reconnaissance for transect locations and performing surveys of existing bird communities, which would be utilized to provide information to assist in developing any potential PM&E measures.

John Scott Highway Indiana Bat Roost Survey

Steubenville, Ohio, Ohio Department of Transportation

Served as a Senior Scientist responsible for conducting a survey at the John Scott Connector Safety Project in Steubenville, Ohio, for potential maternity roost and day roost trees for the Indiana Bat (*Myotis sodalis*). This survey was for an emergency Ohio Department of Transportation Project, which involved surveying of the proposed spoil laydown and access road for the Project.

Linville Dam Embankment Seismic Stabilization Improvements (ESSI) Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys, stream surveys, stream and wetland mitigation, cultural resources oversight with Historic American Engineering Record (HAER) assessment. Responsible for the CWA Section 404 Individual Permit for submittal to the USACE and North Carolina Department of Environment and Natural Resources (NCDENR). Prepared Biological Assessment report for the Section 7 Endangered Species Act formal consultation regarding the dwarf-flowered heartleaf (*Hexastylis naniflora*). In addition, performed the erosion and control permitting as well as regulatory consultation.

James A. McRacken

Senior Scientist

Catawba Dam ESSI Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys, stream surveys, stream and wetland mitigation, cultural resources oversight with abandoned cemetery relocation, county watershed and shoreline protection permits, and sediment and erosion control permitting and regulatory inspections. Responsible for the Section 404 CWA Individual Permit for submittal to the USACE and several North Carolina agencies. Prepared Biological Assessment report for USFWS Section 7 Endangered Species Act informal consultation.

Paddy Creek ESSI Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys, stream surveys, county watershed and shoreline protection permits, and nursery stock inventory evaluations. Also responsible for the CWA Section 404 Individual Permit for submittal to the USACE and several North Carolina agencies and Biological Assessment report preparation (Section 7 Endangered Species Act) USFWS formal consultation. In addition, performed the erosion and control permitting and compliance inspections as well as regulatory consultation.

Catawba-Wateree Relicensing Project, Schweinitz's Sunflower Monitoring Study

North Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the yearly monitoring surveys and reports to document population size and health of the Schweinitz's sunflower (*Helianthus schweinitzii*), which is a federally endangered species. This monitoring is in association with Duke Energy's Catawba-Wateree Comprehensive Relicensing Agreement to prepare and institute a species protection plans for the sunflower, which was documented within the FERC Project Boundary.

Lake Keowee/Little River Bypassed Reach Beaver Pond Leveler Installation

Oconee County, South Carolina, Duke Energy Carolinas, LLC

Served as the Project Manager and Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys for the installation of a pond leveling device for American beaver impacts to ensure dam safety. Also responsible for the Clean Water Act (CWA) Section 404 Nationwide Permit application for submittal to the U.S. Army Corps of Engineers (USACE) with Project concurrence letters to the U.S. Fish and Wildlife Service (USFWS) and South Carolina State Historic Preservation Office (SHPO).

James A. McRacken

Senior Scientist

Make-up Pond B Spillway Channel Repair on the William States Lee III Nuclear Station

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for conducting biological surveys including wetland delineation, protected species surveys, and submittal of the Nationwide Permit application for impacts due to the necessary channel repair. The purpose of the project was to stabilize approximately 798 linear feet of the jurisdictional channel with engineered gabion mats to limit future erosion, protect against the planned flood event, and to ensure the adjacent meteorological tower is protected from slope subsidence.

Paddy Creek Spillway Improvement Project (FERC No. 2232)

Burke County, North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation, protected species surveys, and management of cultural resources evaluations. Also responsible for the submittal of the Shoreline Protection Act permit submittal to Burke County Planning and Development Department.

Caesars Head Mountain Transmission Line Environmental Review Project

Greenville County, South Carolina, and Henderson County, North Carolina, Duke Energy Carolinas, LLC

Conducted field surveys along the existing 22-mile transmission line. Duties included delineating and mapping wetlands and streams, managing field staff, and managing project financials. Work also involved the senior review and signoff of all submitted materials to client.

Bridgewater Powerhouse Penstock Tie-In Temporary Fish Relocation and Water Quality and Quantity Monitoring

North Carolina, Duke Energy Carolinas, LLC

Served as Project Manager and Senior Scientist responsible for conducting a field effort to relocate stranded fish following penstock closure of the existing Bridgewater Powerhouse penstock. Duties involved project management, deployment of temperature loggers throughout a one-mile reach of the Linville River immediately downstream of the Linville Dam, oversight of Hydrolab (dissolved oxygen, etc.) measurements at each temperature monitoring location, and field collection of the fish utilizing backpack electrofishing and seining. Duties also included obtaining a Scientific Fish Collecting License/Permit through the North Carolina Wildlife Resource Council (NCWRC) prior to the field effort.

James A. McRacken

Senior Scientist

Cedar Cliff Hydroelectric Station Proposed Minimum Flow Powerhouse Permitting, East Fork Tuckasegee River Hydroelectric Project (FERC No. 2698)

Jackson County, North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as jurisdictional waters delineation and protected species surveys. Submitted and received a request for a finding of "no permit necessary" for the construction of the new Cedar Cliff Hydroelectric Station Proposed Minimum Flow Powerhouse. This work and request included an on-site field assessment to document the extent of the jurisdictional ordinary high water mark (OHWM) within the proposed construction area and submittal of the findings to the USACE.

Lee Steam Station Combined Cycle Combustion Turbine Natural Resource Survey Project

Anderson County, South Carolina, Duke Energy Carolinas, LLC

Performed field surveys for wetlands and protected species and provided senior report review on all information concerning the 325-acre site.

Dan River Combined Cycle Combustion Turbine Environmental Survey Project

Rockingham County, North Carolina, Duke Energy Carolinas, LLC

Consulted and provided senior-level review of all information concerning stream and wetland and natural resources on the 250-acre site. Provided permitting support between clients and agencies. Obtained all NEPA-related permits for project to proceed.

Hawks Nest Hydroelectric Project

West Virginia, Brookfield Renewable Power Corporation

Served as Terrestrial Lead responsible for the preparation of the wildlife and botanical resources, wetlands, riparian and littoral habitat, and terrestrial rare, threatened, and endangered species sections of the pre-application document.

Keowee-Toxaway Hydroelectric Relicensing Project (FERC No. 2503), Bat Acoustic Study

Oconee, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager responsible for the Bat Acoustic Study. The work included the characterization of the bat species that utilize the relicensing project area; assessment of any effects of current and any proposed relicensing project-related hydropower operations on the bat populations; and providing information to assist in developing any potential protection, mitigation, and enhancement (PM&E) measures.

James A. McRacken

Senior Scientist

Buck Steam Station Combined Cycle Combustion Turbine Environmental Survey Project

Rowan County, North Carolina, Duke Energy Carolinas, LLC

Consulted and provided senior-level review of all information concerning stream and wetland and natural resources on the 80-acre site. Consulted with client to re-position station footprint to minimize stream and wetland impacts. Provided permitting support between clients and agencies. Obtained all NEPA-related permits for project to proceed.

Opekiska and Hildebrand Hydroelectric Project

Monongalia County, West Virginia, Brookfield Renewable Power Corporation

Served as Terrestrial Lead responsible for the preparation of the wildlife and botanical resources, wetlands, riparian and littoral habitat, and terrestrial rare, threatened, and endangered species sections of the pre-application document.

Island Point Substation Project, Wetlands Delineation

Iredell County, North Carolina, Duke Energy Carolinas, LLC

Delineated 12 acres of proposed substation property for potentially jurisdictional waters of the U.S., including wetlands. Work also involved the senior review and signoff of all submitted materials to client and agencies.

Hydroelectric Relicensing Project, Relicensing Application Field Studies and Application Development

City of Spearfish, South Dakota

Served as Task Manager responsible for the Botanical and Wildlife Resources study for the relicensing application of the hydroelectric project on Spearfish Creek. Assisted other HDR scientists with the wildlife and protected species studies. In addition, assisted with the instream flow study.

Gaston Shoals Hydroelectric Station Dam Stabilization and Probable Maximum Flood (PMF) Remediation Project

South Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation, protected species surveys, and cultural resources evaluations. Responsible for the CWA Nationwide Permit for submittal to the USACE and South Carolina Department of Health and Environmental Control (SCDHEC).

James A. McRacken

Senior Scientist

Claytor Lake Hydroelectric Relicensing Project

Virginia, Appalachian Power Company/American Electric Power

Served as Terrestrial Lead responsible for the preparation of the wildlife and botanical resources, wetlands, riparian and littoral habitat study plans for the Pre-Application Document.

Myers-Pinch Gut 100kV Transmission Corridor and Substation Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys. Responsible for the CWA Nationwide Permit for submittal to the USACE and South Carolina Department of Health and Environmental Control. Prepared the Biological Assessment report (Section 7 Endangered Species Act) for the USFWS informal consultation regarding the dwarf-flowered heartleaf.

Beaverdam Creek Sanitary Sewer Project

Anderson County, South Carolina, Anderson County Utilities

Served as Senior Project Scientist responsible for performing wetland delineation and federal and state protected species surveys within the Project's corridor. Responsible for the appropriate state and federal permits and certifications from the USACE and the SCDHEC. In addition, developed alternative analyses, wetland mitigative actions, or monitoring requirements due to the impacts to waters of the U.S. including wetlands. In addition, provided expert witness services.

Low Level Radiation Disposal Facility Siting Project, Biological Assessment and Permitting

Richmond, Chatham, and Wake Counties, North Carolina, Chem-Nuclear

Served as Project Scientist and Task Manager. Conducted and assisted in several wildlife population studies for an Environmental Impact Statement needed for the proposed location of a low-level radioactive waste facility. The studies involved were small mammal trapping with capture-recapture of small rodents, flora plot surveys, large mammal spotlighting, scent station monitoring, transect study of the avian community, and reptile and amphibian study.

James A. McRacken

Senior Scientist

Yamaha Facility Siting Project, Environmental Assessment

Alabama, Yamaha Motor Corporation, USA

Served as Project Scientist responsible for conducting biological surveys such as wetland delineation and endangered species assessment for Anthony's Riversnail (*Athearnia anthonyi*), and Section 404 permitting and site monitoring activities associated with the proposed engine testing facility.

Phase III Natural Gas Pipeline Expansion Project

Florida Gas Transmission Company, Central and East Coast Florida

Served as Spread Environmental Inspector/Advisor responsible for the supervision of the construction of an entire spread of the Florida Gas Transmission Company Phase III natural gas pipeline expansion project. The tasks included advising and instructing the construction contractor on state and federal environmental permit compliance issues; supervising the construction through environmentally sensitive natural features, such as wetlands and Outstanding Florida Waters; coordinating all construction and environmental activities with the appropriate federal, state, and local regulatory agencies; monitoring all hydrological and turbidity problems in construction areas that crossed either wetland or open water habitats; analyzing the hydrological and turbidity data for permit compliance; and interpreting the data to ensure total compliance or corrective measures.

L&C Development Project, Environmental Studies

South Carolina, L&C Development Corporation

Served as Project Manager and Senior Scientist responsible for conducting wetland and protected species surveys, ASTM Phase I environmental site assessments, and coordinating geotechnical and archaeology studies for potential commercial development sites.

Sony Property, Environmental Assessment and Permitting

Blythewood, South Carolina, Sony Corporation of America

Served as Senior Project Scientist responsible for performing the wetland delineation, assisting in the regulatory verification, and conducting a federal and state protected species survey on the subject property. Responsible for obtaining the appropriate permits and certifications from the USACE and SCDHEC. Performed wetland mitigation planning, implementation, and monitoring. In addition, represented Sony during a wetland-related dispute with a site development contractor, and fulfilled all mitigation requirements and coordinated with a local land trust conservancy group to arrange deeding of the remaining wetlands and associated upland buffers.

James A. McRacken

Senior Scientist

Marine Mammal Studies and Surveys

Northeast Florida, Florida Department of Environmental Protection and University of Miami

Served as Biologist assisting in the research of pelagic and intracoastal Bottle-nosed Dolphin (*Tursiops truncatus*) populations in the waters of northeast Florida. This study consisted of dorsal fin photography for individual identification and data gathering to show migrant populations, movements, group interactions, and habitat usage. In addition, logged over 40 hours flying aerial surveys for manatees along the St. John's River for research on movements, habitat usage, and population studies. Additionally, flew surveys to locate the presence of the Northern Right Whale off the coast of North Florida. Mr. McRacken also created a manatee scar sketch catalogue for the northeastern field office of the Florida Department of Environmental Protection Florida Marine Research Institute and tracked tagged manatees using telemetry in northeastern Florida and southeastern Georgia.

California Tiger Salamander
Pre-construction Avoidance and Minimization Plan
for the Panoche Valley Solar Facility Project
San Benito County, California

Prepared for:

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Introduction

This Pre-construction Avoidance and Minimization Plan (Plan) has been prepared to establish the procedures for the potential salvage, handling, and relocation of California tiger salamander (*Ambystoma californiense*) (CTS) if encountered during pre-construction clearance surveys associated with the Panoche Valley Solar Farm Project (Project) in San Benito County, California (Figures 1 and 2). The Plan has been prepared pursuant to the mitigation measures in the *Final Environmental Impact Report for the Panoche Valley Solar Farm Project (CUP No. UP 1023-09; State Clearinghouse No. 2010031008)* (2010). It should be noted that this Plan precedes the U.S. Fish and Wildlife Service's (USFWS) issuance of the Biological Opinion for the Project and California Department of Fish and Wildlife's (CDFW) issuance of the California Fish and Game Code Section 2081 Incidental Take Permit (ITP) for the Project. As such, minor changes to this Plan may occur upon issuance of these documents.

Legal Status

The CTS population segment which occurs in the vicinity of the Project is currently listed as threatened under the California Endangered Species Act and federal Endangered Species Act. The Project does not contain USFWS designated critical habitat for CTS. In addition, no Recovery Plan has yet been prepared for the species.

Species Ecology

The CTS is a large, stocky, terrestrial salamander with a broad, rounded snout. Adults may reach a total length of 8.2 inches (Petranka 1998, Stebbins 2003). The CTS exhibits sexual dimorphism (e.g., males tend to be larger than females). As adults, CTS tend to have creamy yellow to white spotting on the sides that becomes much reduced on the dorsal surface of the animal, whereas other tiger salamander species have brighter yellow spotting that is heaviest on the dorsum.

The species occurs from near sea level up to approximately 3,900 feet in the Coast Ranges and up to approximately 1,600 feet in the Sierra Nevada foothills (Shaffer et al. 2004). Along the Coast Ranges, the species occurred from the vicinity of Santa Rosa in Sonoma County to near Buellton in Santa Barbara County. In the Central Valley and surrounding foothills, the species occurred from northern Yolo County southward to northeastern Kern County and northern Tulare County.

The CTS has an obligate biphasic life cycle (Shaffer et al. 2004). Although breeding, egg-laying, and development of the larval salamanders occur in vernal pools and other ponds, the species otherwise spends most of its post-metamorphic life in widely dispersed, underground retreats (Trenham et al. 2001, Shaffer et al. 2004). Subadult and adult CTS spend the dry summer and fall months of the year in the burrows of small mammals (e.g., California ground squirrel (*Otospermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925, Loredo and Van Vuren 1996, Petranka 1998, Trenham 1998a). These burrows provide protection from the sun and dry winds that are associated with the dry California climate. Given that CTS utilize burrows created by other species (rather than dig their own burrows) and these burrows typically collapse within 18 months if not maintained, an active population of burrowing mammals is necessary to sustain sufficient underground refugia for the species (Loredo et al. 1996).

The burrows inhabited by CTS are not estivation sites. Studies have demonstrated that individuals move, feed, and remain active in their burrows during the summer months (Trenham 2001, Van Hattem 2004). Individuals may even move between closely located burrows (Trenham 2001). In addition, researchers have long inferred that individuals are feeding while underground since they arrive at breeding ponds in good condition and are heavier when entering the pond than when leaving the pond (Trenham 2001).

Dispersal and migration movements made by adult CTS can be grouped into three categories: (1) postmetamorphosis dispersal; (2) breeding migration; and (3) interpond dispersal. After metamorphosis, juveniles move away from breeding ponds into the surrounding upland habitat, where they live continuously for several years. At a study in Monterey County, it was found that upon reaching sexual maturity, most individuals returned to their natal (i.e., birth) pond to breed. However, 20 percent of the individuals dispersed to other ponds where they breed (Trenham et al. 2001). Following breeding, adult CTS return to the upland habitat, where they may live for one or more years before breeding again (Trenham et al. 2000).

CTS are known to travel relatively long distances from the breeding ponds into the surrounding upland habitat (something that is surprising given the small size of the species). Maximum distances moved are difficult to establish for the species, but an individual in Santa Barbara County was found approximately 1.3 miles from the nearest known breeding pond (S. Sweet in litt. 1998), suggesting that the species may be able to move up to distances of this magnitude. As previously mentioned, CTS are known to travel between breeding ponds. One study found that 20 to 25 percent of the individuals captured at one pond were later captured at other ponds approximately 1,900 and 2,200 feet away (Trenham et al. 2001). In addition to traveling long distances during breeding migrations or interpond dispersals, CTS may reside in burrows that are far from known breeding ponds. At one site in Contra Costa County, hundreds of CTS were captured 3 years in a row in upland habitat approximately 0.75 mile from the nearest known breeding pond (Orloff 2007).

Although observations show that CTS may travel far from breeding ponds, individuals typically reside in upland habitat that is closer to the breeding ponds. Evidence suggests that juvenile CTS disperse further into upland habitats than adult CTS. A trapping study conducted in Solano County during winter of 2002–2003 found that juveniles used upland habitats farther from breeding ponds than adults did (Trenham and Shaffer 2005). More juvenile individuals were captured at distances of 328, 656, and 1,312 feet from a breeding pond than at 164 feet. Approximately 20 percent of total captures were found 1,312 feet from a breeding pond. Fitting the data to a distribution curve demonstrates that 95 percent of juvenile individuals could be found within 2,099 feet, with the remaining 5 percent being found at even greater distances.

Preliminary results from the 2003–2004 trapping effort detected juvenile CTS at even greater distances, with a large proportion of the total CTS caught at 2,297 feet from the breeding pond (Trenham and Shaffer 2005). Surprisingly, most juveniles captured, even those at 2,100 feet, were still moving away from the ponds. Such variability in movements (particularly by juvenile CTS) may reflect a "hardwired" genetic behavior that increases the likelihood that a metapopulation will persist (particularly given the short and long-term ephemeral nature of vernal pool systems) if individuals travel longer distances where they may encounter other breeding ponds. This latter behavior and the known interpond dispersal behavior that has been demonstrated at some sites would appear to support this concept. Furthermore, interpond movements may also reduce local in-breeding depression, genetic drift, and founder effects that could occur if individuals only returned to their natal pond.

Postbreeding movements away from breeding ponds by adults appear to be much smaller. During postbreeding emigration, radio-telemetered adult CTS were tracked to burrows 62 to 813 feet from their breeding ponds (Trenham 2001). These reduced movements may be due to adult CTS having depleted physical reserves after breeding or due to the drier weather conditions that often occur during the period when adults leave the ponds. The reduced movement may also reflect the effects of the internally-placed radio-telemeter on the physiology of the individual. However, the shorter movement distances of adult CTS may also reflect the selective advantages of only moving as far away from the breeding pond as necessary to find suitable refugia (such that more energy goes into reproduction and less into travel).

Once CTS have moved into the surrounding upland habitat, most individuals use several successive burrows at increasingly greater distances from the pond. Although the studies discussed above provide an approximation of the distances that CTS move from their breeding ponds, movement in the upland habitat is believed to be driven by the local habitat features. Trenham (2001) found that radio-telemetered adults favored grassland with scattered large oaks over more densely wooded areas. A drift fence survey at a pond in Santa Barbara County found that many emigrating juveniles moved towards an adjacent strawberry field. However, no adults were captured returning to the pond from this direction. Nor did many CTS return to the pond from the direction of adjacent sandhill or eucalyptus habitats found in other quadrants. Most of the CTS returning to the pond were captured coming from a nearby, extensive overgrazed grassy flat (S. Sykes pers. comm. 2011). Furthermore, based on studies of radio-telemetered individuals, CTS do not appear to favor specific corridors for movement in the upland habitat (Trenham 2001). At two ponds completely encircled by drift fence and pit fall traps, captures of arriving adults and dispersing juveniles were distributed randomly around the ponds. Therefore, it appears that dispersal into the surrounding upland habitat occurs randomly with respect to direction and habitat types.

Once the fall or winter rains begin, individuals emerge from their burrow (typically on rainy nights) to feed and migrate to the breeding ponds (Shaffer et al. 1993). Adult salamanders mate in the ponds, after which the females lay their eggs in the water (Twitty 1941, Shaffer et al. 1993, Petranka 1998). Historically, the CTS utilized vernal pools as breeding ponds. However, many current breeding sites also include stock ponds. Females attach their eggs singly, or in rare circumstances, in groups of two to four eggs to twigs, grass stems, other vegetation, or debris (Storer, 1925, Twitty 1941). In ponds with no or limited vegetation, they may be attached to objects such as rocks and boards that are located on the pond bottom (Jennings and Hayes, 1994). After breeding, adults leave the pond and enter small mammal burrows (Loredo et al. 1996, Trenham 1998a) where they may continue to exit and enter the burrows nightly for the next few weeks to feed (Shaffer et al. 1993). It should be noted that in drought years the seasonal ponds may not fill, and adults do not breed (Barry and Shaffer 1994).

CTS eggs hatch in 10 to 14 days, with newly hatched larvae ranging from 0.45 to 0.56 inch in total length (Petranka 1998). The larvae are entirely aquatic. They often rest on the bottom in shallow water, but may also be found at different depths in the water column in deeper water. The larvae are wary and when approached by potential predators, they dart into vegetation on the bottom of the pond (Storer 1925).

The larval stage of the CTS usually lasts 3 to 6 months as most seasonal ponds dry completely during the summer months (Petranka 1998). Amphibian larvae must develop to a critical minimum body size before they can metamorphose to the terrestrial stage (Wilbur and Collins 1973). Individuals collected near Stockton in the Central Valley during April varied from 1.88 to 2.32 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left the breeding ponds 60 to 94 days after the eggs had been laid. Furthermore, larvae developed faster in smaller, more rapidly drying ponds. Thus, larvae and metamorphosing juveniles are larger in ponds that are inundated longer and are more likely to survive and reproduce (Semlitsch et al. 1988, Pechmann et al. 1989, Morey 1998, Trenham 1998b). The larvae will perish if the pond dries before metamorphosis is complete (Anderson 1968a, Feaver 1971). Vollmar (2002) found that vernal pools occupied by CTS larvae in Merced County averaged 14.8 inches in depth, while vernal pools that were unoccupied averaged 6.0 inches in depth. Pechmann et al. (1989) found a strong positive correlation between ponding duration and total number of metamorphosing juveniles in five salamander species. In Madera County, Feaver (1971) found that only 11 of 30 ponds sampled supported larval CTS, and five of these ponds dried before metamorphosis could occur. Therefore, out of the original 30 ponds, only 6 (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch et al. 1988, Scott 1994, Morey 1998). In the late spring or early summer, before the ponds dry completely, metamorphosed juveniles leave the ponds and move into upland habitat. This emigration occurs in both wet and dry conditions (Loredo and Van Vuren 1996, Loredo et al. 1996). Unlike during their winter migrations, the wet conditions that CTS prefer do not generally occur during the months when their breeding ponds begin to dry. As a result, metamorphs may be forced to leave their ponds on rainless nights. Under these conditions, they may move only short distances to find suitable upland refugia (including leaf litter, desiccation cracks in the soil, and beneath boards or rocks in addition to small mammal burrows). These latter refugia are typically used temporarily and only until more suitable refugia can be found (i.e., small mammal burrows). Upon arrival of the next winter's rains, individuals may then move further within the upland habitat. Once juvenile CTS leave their breeding ponds, they may not return to breed for 4 to 5 years. However, they remain active in the upland habitat and come to the surface during rainfall events to disperse or forage.

Lifetime reproductive success for CTS is low. Trenham et al. (2000) found that the average female produced 814 eggs (range of 413 to 1,340) each time it bred, bred 1.4 times in its lifetime, and produced 8.5 young that survived to metamorphosis per reproductive effort. This resulted in approximately 11 metamorphic offspring over the lifetime of the female. Two reasons for the low reproductive success associated with these data are that most individuals require 2 years to become sexually mature, but some individuals may be slower to mature and do not breed until they are 4 to 6 years old (Shaffer et al. 1993). While individuals may survive for more than 10 years, many breed only once, and in some populations, less than 5 percent of marked juveniles survive to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events as well as from human caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated ponds can quickly extirpate a population.

Local Distribution

CTS larvae were observed in two nearby off-site water bodies during the 2009-2010 rainy season during protocol-level vernal pool branchiopod and CTS surveys (Ponds 3 and 12 on Figure 3). One of these water bodies is a large stock pond that still contained sufficient water on May 21, 2010 for ongoing development and metamorphosis of CTS larvae. Seven large CTS larvae were netted at this location. The second water body is a pool where small CTS larvae were first observed in February 2010 during the vernal pool branchiopod surveys. During the May 2010 CTS sampling event, there were several dozen larvae in the pool attempting to metamorphose (due to the drying of the pond). Some may have metamorphosed successfully, though 10 individuals were observed dead and desiccated in the shallow and muddy portions of the pool. CTS were not observed during protocol CTS larval surveys in two ponds located in the Valley Floor Conservation Lands (Ponds 8 and 9 on Figure 3) that historically were occupied by CTS (CDFW 2014). No CTS were observed within the boundaries of the Project Footprint during the 2009- 2010 rainy season. In addition, no CTS have been observed within the Project Footprint during any other onsite studies.

Qualified Project Biologists

Qualified Project Biologists (i.e., biologists with current state and federal permits/authorizations to handle CTS and prior experience monitoring CTS) will be assigned to serve as monitors during Project pre-construction CTS clearance activities. The resumes of these biologists will be submitted to the USFWS and CDFW for approval at least 30 days prior to scheduled pre-construction CTS clearance activities that could result in the “take” of CTS. The agency-approved biologists are the only individuals who will be allowed to handle and relocate CTS if it becomes necessary. All Project Biologists will be under the direction of one or more Designated Biologists (i.e., biologists with decision-making authority).

Pre-Construction Avoidance and Minimization Measures

To minimize the potential for "take" of CTS within the Project work area, the following measures will be implemented prior to the initiation of Project-related construction activities. Temporary wildlife exclusion fence (WEF) will be installed, as deemed necessary by the Project's Designated Biologist, around all Project work areas. The purpose of the WEF is to preclude special-status, small vertebrate species (e.g. California tiger salamander, giant kangaroo rat, blunt-nosed leopard lizard, etc.) from entering the Project work areas during pre-construction CTS clearance surveys where they could be killed, injured, or isolated. The WEF will also preclude CTS from entering the Project work area later during Project-related construction activities.

The Project Biologists will perform pre-construction clearance surveys in the CTS Pond Buffer areas that overlap with the Project Footprint areas planned for grading or excavation and identify suitable small mammal burrows or atypical refugia (e.g., concrete slabs, water tanks, man-made structures, etc.) that are present in the work area and provide potential upland refugia for CTS. These areas are illustrated on Figure 3 attached. Small mammal burrows that are suitable for CTS have generally been considered to be the burrows of California ground squirrel (*Otospermophilus beecheyi*) or Botta's pocket gopher (*Thomomys bottae*) (Barry and Shaffer 1994, Trenham 2001, Pittman 2005, Cook et al. 2006). Though less well documented, CTS have also been found heavily using kangaroo rat (*Dipodomys* spp.) burrows (S. Sweet, pers. comm.). Trenham (2001) found that even though rocks, logs, culverts and other potential refugia were available, radio-tracked CTS did not use them. It has been surmised that these other habitat features (including smaller mammal burrows) do not provide suitable temperature, humidity, or integrity for CTS. Trenham (2001) found radio-tracked CTS most often in burrows located in open grassland or underneath large oaks. Pittman (2005) found CTS in pocket gopher burrows located in short annual grassland, a boulder riprap mound with extensive pocket gopher activity, and in pocket gopher burrows under a large boulder. Bumgardner (personal observation) has observed CTS at the bottom of wooden debris piles and under concrete slabs, but always in association with larger small mammal burrows. As such, small mammal burrows that are considered suitable for CTS and appropriate to excavate within the Project Footprint will be limited to California ground squirrel, San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), kangaroo rat, and Botta's pocket gopher burrows.

Studies of CTS have documented individuals in upland habitat out to at least 2.2 kilometers (1.37 miles) from the nearest known breeding pond (USFWS 2004, Trenham and Shaffer 2005, Orloff 2011, Searcy et al. 2013). These same studies show an inverse relationship between number of individuals and distance from the breeding pond (i.e., there are fewer individuals in the landscape with increasing distance from the breeding pond). The mean distance that individuals travel from their breeding pond varies with associated environmental variables (density of suitable refugia, barriers to movement, density of vegetation, differences in annual weather conditions, etc.). As such, predicting the distance from the breeding pond at which a given percentage of the population occurs (e.g., 95% of the population within 620 meters of the pond) is not feasible for the Project site based on data collected for other sites (mostly due to the extremely dry conditions in the Panoche Valley). However, calculation of the Searcy and Shaffer (2011) ecophysiological maximum migration distance for CTS in the Panoche Valley, using rainfall data archived at the Western Regional Climate Center (http://www.wrcc.dri.edu/summary/Climsmcca.html), determined that all CTS associated with the identified breeding ponds in the valley should be found within 678 meters (2,223 feet) of the ponds (Figure 3) (see the March 30, 2015 Technical Memorandum prepared by Bumgardner Biological Consulting). Therefore, CTS burrow excavations for the Project will be conducted where ground-disturbing activities are proposed in the Project Footprint out to 700 meters (2,300 feet) from each identified breeding pond (Figure 3). Burrow excavations will be conducted in all areas to be graded (e.g., arrays, roads, buildings, mitigation pond creation, etc.). However, due to uncertainties in regards to the efficacy of the Searcy and Shaffer model as it relates to CTS in the Panoche Valley (mostly due to the lack of empirical data to validate the model), salvage and relocation of individuals will be extended an additional 300 meter beyond the 700 meter threshold predicted by the model (i.e., two contiguous 150 meter concentric rings) to 1,000 meters (3,281 feet). If no CTS are found within the additional 300 meters, no additional burrow excavations will be conducted for the associated breeding pond. However, if CTS are found within one or more of the 150 meter rings, additional burrow excavation will occur until there have been two contiguous 150 meter rings with no documented CTS occurrences. Under no circumstances will burrow excavations extend beyond 1,900 meters from any identified CTS breeding pond (i.e., the distance roughly correlated to the 1,866 meters found by Searcy and Shaffer (2011) to correspond to the 95% population threshold at the Jepsom Prairie Preserve in Solano County, California). Where burrow excavations for other special-status species (e.g., giant kangaroo rat) must be conducted outside of the above criteria, a Project Biologist will be in attendance to salvage and relocate CTS should it become necessary.

The pre-construction CTS clearance surveys will be conducted by two or more Project Biologists walking parallel, linear transects while watching for suitable burrows. Each suitable burrow that is found will be flagged with a pin flag and/or georeferenced with a GPS unit to facilitate return to and excavation of the burrow. Transect endpoints will be flagged (temporarily), transect segments will be no longer than 100 meters, and transect widths will be no wider than 10 meters to ensure that the surveys are conducted in a manner that provides 100 percent surface coverage. Field data sheets will be used to facilitate tracking of transects that have been surveyed or cleared.

Excavation of suitable small mammal burrows will be conducted as follows: All excavations will be conducted between April 1 and September 30 (during the CTS non-breeding season). At the discretion of the Designated Biologist, excavations may be allowed to proceed later into the year, but only if no substantial rain has fallen (rain event resulting in at least 2 millimeters of rainfall). Areas shown on grading plans that will be graded or excavated for arrays, roads, buildings, mitigation pond creation, and other project components will be staked to identify burrow excavation limits. The overlapping area of proposed grading and associated disturbance with upland habitat within will be marked in the field prior to beginning burrow excavations. If possible, each burrow excavation will be conducted by slowly removing the burrow (including any side tunnels) using hand tools (e.g., shovel, digging bar, garden trowel, masonry trowel, etc.). If hand tools cannot be used safely due to soil compaction and/or burrow depth extending greater than two feet from the surface, burrows may be excavated using mechanical methods. Mechanical methods will include either hand power tools or a backhoe and/or hand tools (e.g., shovel, garden trowel, masonry trowel, etc.). Cloth, cylinder, capped pipe, or similar material that would protect the integrity of the burrow will be pushed into the burrow approximately 12 to 16 inches to plug the burrow and prevent animals from exiting the burrow during excavation (i.e., to prevent injury or mortality). The excavation sequence will then continue as follows:

- 6-12 linear inches of burrow will be removed at a time (e.g., while excavating with hand tools or with each bucket of the backhoe) under the supervision of the Project Biologist;
- the plug will be removed;
- the burrow will be checked for evidence of CTS or other animals;
- small hand tools will be used to reestablish the burrow opening (if necessary);
- the burrow will again be checked for evidence of CTS or other animals (if necessary); and
- the plug will be reinserted to start the process again.

All burrows (including side burrows) will be excavated to their endpoints and the excavation will then be backfilled, brought back to grade, and compacted using the same equipment that was used for excavation. It should be noted that some small mammal burrows (particularly California ground squirrel burrows) can be up to 30 feet in length and have associated side tunnels that are also substantial in length. Hence, the use of other techniques such as fiber optic scopes are ineffective in clearing burrows that are more than approximately five feet in length or that have side tunnels. However, scopes may be used to examine burrows prior to excavation to identify wildlife that may be encountered during excavation procedures.

Atypical refugia will be addressed separately during scheduled demolition of the structure(s). However, it is recommended that such demolition occur when adjacent burrow excavations are scheduled. A Project Biologist will be in attendance during the demolition to monitor for CTS.

If a burrow or atypical refugium is found to be occupied by CTS, the individual(s) present will be captured and relocated in accordance with this Plan. Giant kangaroo rats and San Joaquin antelope squirrels found during burrow excavations will be relocated consistent with the *Panoche Valley Solar Giant Kangaroo Rat Relocation Plan* and *Panoche Valley Solar San Joaquin Antelope Squirrel Relocation Plan* respectively. Other special-status species found during burrow excavations (e.g., San Joaquin kit fox, American badger, burrowing owl, etc.) will be allowed to passively leave the burrow and relocate to other adjacent habitat.

Relocation Procedures

The relocation procedures in this Plan are based on the best available scientific information on CTS and other similar species. It should be noted that relocation plans for other projects often moved CTS to locations as much as 1,000 feet from the location of capture with no consideration for how individuals navigate to their breeding or natal pond. However, CTS, as well as other *Ambystoma* spp. that breed in seasonal ponds, tend to move unidirectionally when dispersing or migrating. As such, any relocation that moves the individual off of its bearing may preclude it from moving to and finding its breeding or natal pond. Individuals that are unable to move to and find a suitable breeding pond are then likely lost as part of the local breeding population. The following relocation procedures considers how CTS are known to move across (i.e., navigate) the landscape.

- Bare hands (only) will be used during capture and handling,
- The Project Biologist will not use soaps, oils, creams, lotions, repellents, or solvents of any sort on their hands within two hours before and during periods when they are capturing and relocating CTS,
- Individuals will not be handled by the tail, head, or limbs,
- The location of capture will be geo-referenced with a GPS unit and the latitude and longitude coordinates will be recorded on a standardized field data sheet,
- The bearing between the capture location and nearest known CTS breeding pond will be determined and recorded on the standardized field data sheet,
- Containers used for holding or transporting individuals (generally 2-gallon buckets with lids) will not contain any standing water,
- Individuals will not be placed in positions/containers where they may physically contact other individuals,
- Captured individuals will be kept moist and cool in a bucket containing a damp sponge that is shaded from direct sun exposure,
- Captured individuals will be relocated to a suitable small mammal burrow outside the work area on the same bearing with the nearest known CTS breeding pond,
- Multiple captured individuals will not be released to the same repository, and
- Upon release of an individual it will be monitored by the Project Biologist until it is determined that it is in no imminent danger.

Documentation and Reporting

All observations of federally-listed species within the work area will be recorded on California Natural Diversity Data Base (CNDDB) field data sheets and sent to the CDFW within 14 calendar days of the occurrence. Any harm, injury, or mortality (i.e., "take") of these species will be reported via phone and email to the USFWS and CDFW within 24 hours of the incident. The Designated Biologist will submit a pre-construction compliance report to the USFWS and CDFW documenting the excavation and backfill of all suitable burrows for CTS as well as relocation of individuals within 30 calendar days of completion of pre-construction CTS clearance activities. The report shall detail:

i. dates that pre-construction clearance activities occurred;

ii. pertinent information regarding the success of the Project in implementing the plan's avoidance and minimization measures;
iii. an explanation of failure to successfully implement such measures (if any);
iv. occurrences of incidental take of listed species (if any); and
v. other pertinent information.

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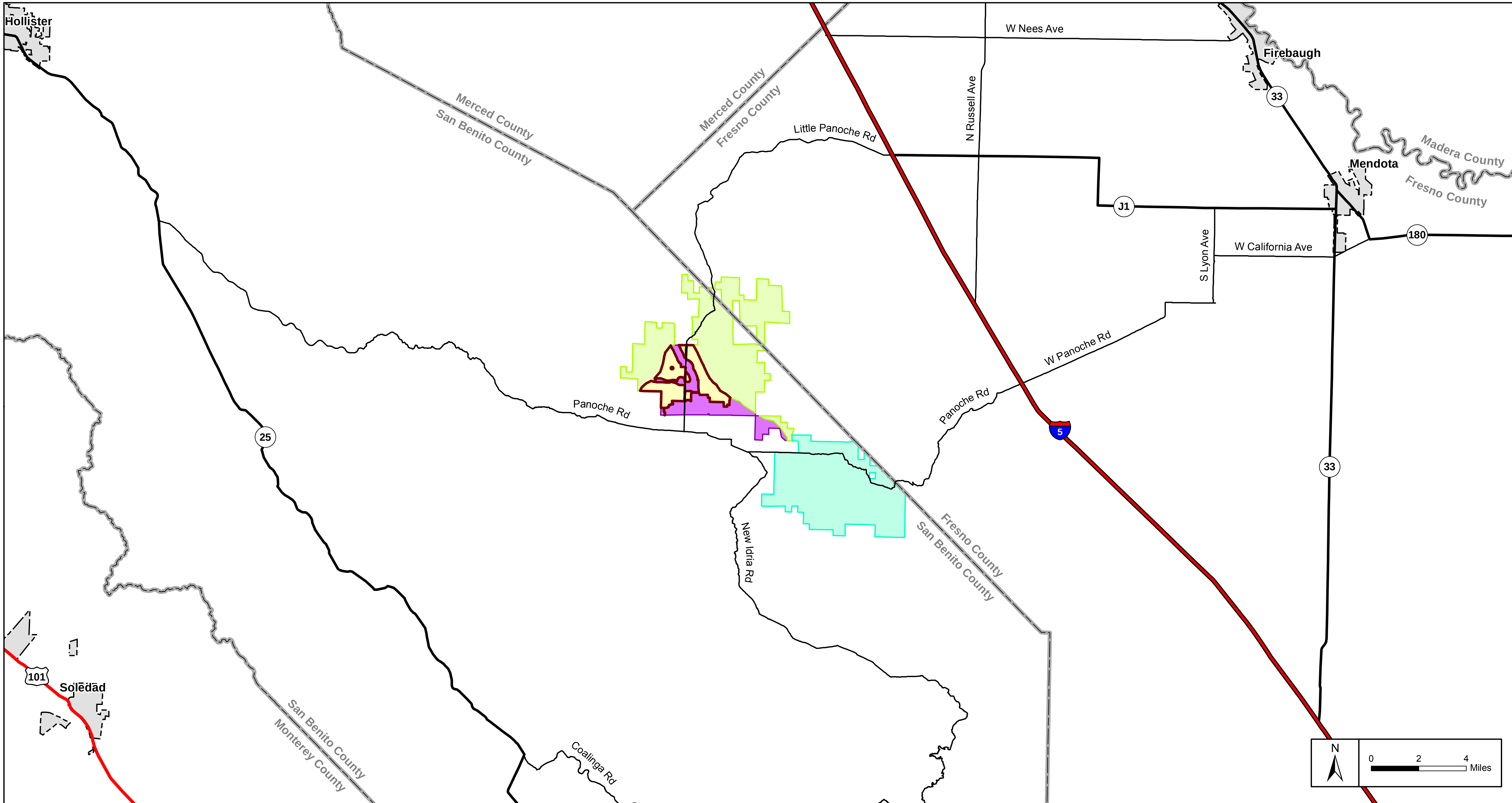

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Energy Renewal PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

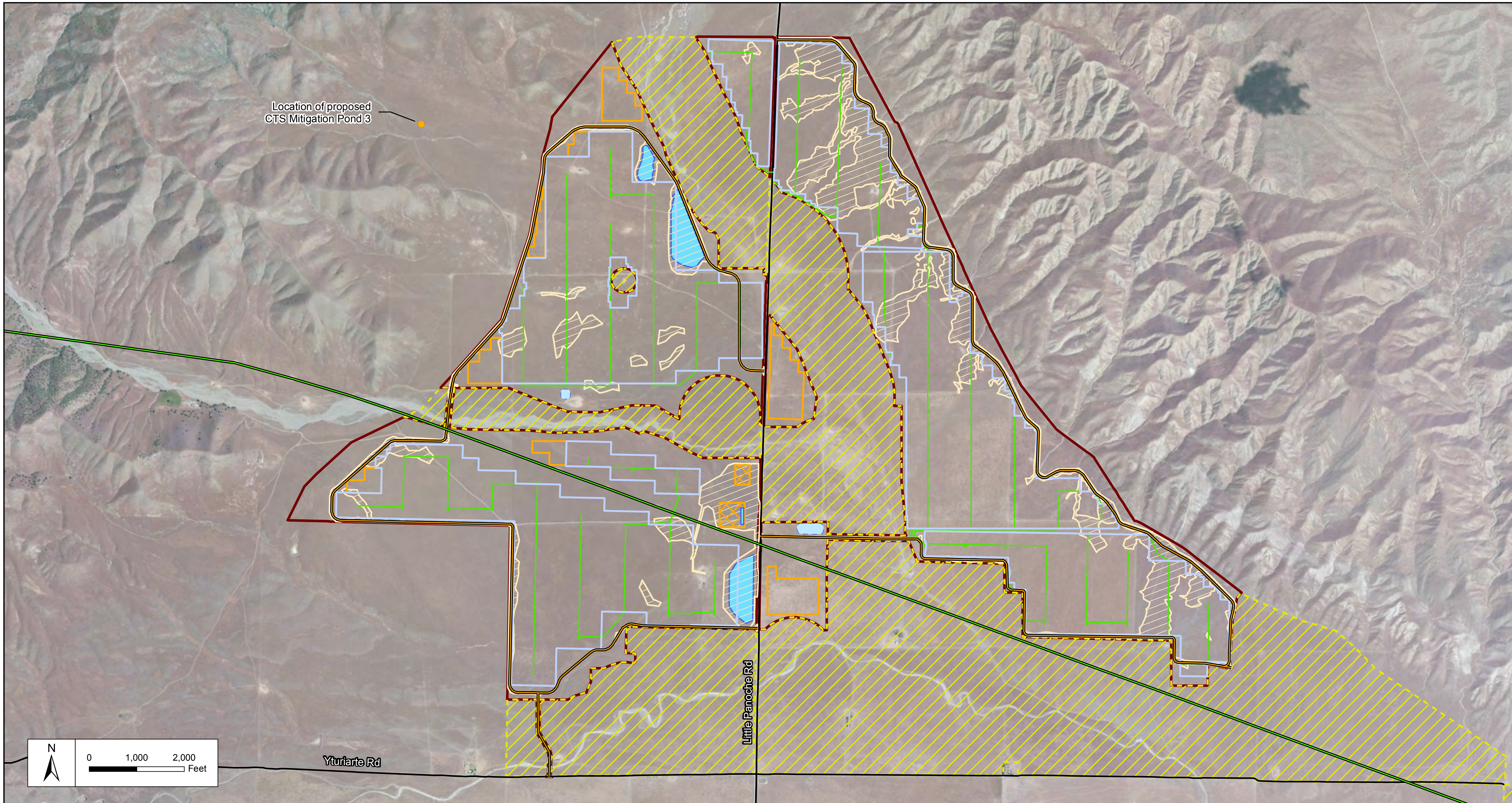
Panoche Valley Solar Project

Project Location

FIGURE

1

JH 2015-03-04



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PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Grading Area
- Proposed Panel Block
- Substation/Switchyard
- Laydown Yard
- Detention Pond
- Existing Transmission Line
- Perimeter Road
- AC Block Feeder
- Temporary Water Pond

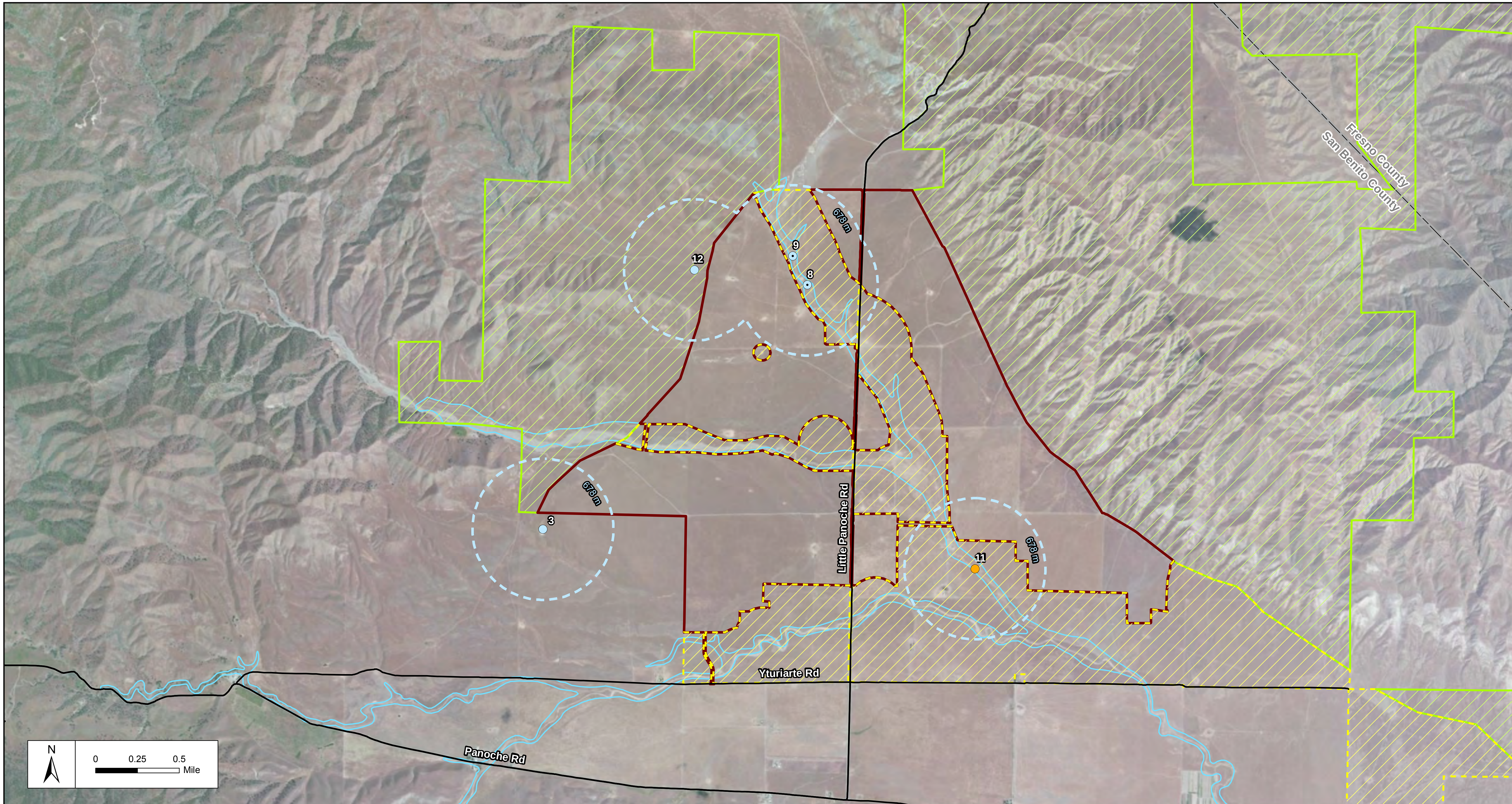
Panoche Valley Solar Project

Proposed Layout

FIGURE

2

JH 2015-03-11



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Historic CTS Breeding Pond
- Known CTS Breeding Pond
- Potential CTS Breeding Pond
- CTS Pond Buffer
- 100-Year Floodplain

Panoche Valley Solar Project

California Tiger Salamander Ponds with Buffers

FIGURE 3

JH 2015-03-16

TECHNICAL MEMORANDUM

TO: James McRacken, Senior Biologist, Energy Renewal Partners

FROM: Michael Bumgardner, Bumgardner Biological Consulting

SUBJECT: Response to California Department of Fish and Wildlife Comment Related to Cal. Code Regs., tit. 14, § 783.2, subd. (a)(5) and the Incidental Take Permit Application (2081-2014-035-04) for the Panoche Valley Solar Farm

DATE: March 30, 2015

In regards to the February 9, 2015 comment from the California Department of Fish and Wildlife (CDFW) related to Cal. Code Regs., tit. 14, § 783.2, subd. (a)(5) and the *Incidental Take Permit Application (2081-2014-035-04) for the Panoche Valley Solar Farm* please see the following response. The comment reads as follows: "This section requires an analysis of whether and to what extent the project or activity for which the permit is sought could result in the taking of species to be covered by the permit. This section is incomplete because the Application does not describe all of the impacts to California tiger salamander (CTS). The Application discusses a stormwater detention basin east of one of the ponds, but the location of that detention basin is not disclosed. In addition, the Application does not quantify the types and extent of ground disturbances proposed in uplands occupied by the CTS. Lastly, the Application maps only a 1,969-ft buffer around breeding ponds and discusses impacts within only 2,300 feet (ft.) of the ponds. The Application bases the analysis on outdated estimates of upland habitat use by CTS. In 2011, Searcy and Shaffer estimated that 95% of a CTS population's reproductive value is within 6,125 ft. of the breeding pool, 90% is within 4,925 ft., and 50% is within 1,844 ft. CDFW considers those to be the best available estimates and should be the basis for assessing impacts and developing mitigation measures. Please map, describe the sources of, and quantify all proposed ground disturbances within each of the three buffer distances described by Searcy and Shaffer."

Use of the Searcy and Shaffer calculated CTS migration distances within which 50%, 90%, and 95% of the reproductive value of a breeding pond should be found, would result in the percentages and total acreage of available upland habitat reflected in Table 1 being adversely affected for the four identified CTS breeding ponds (i.e., known and historic ponds) if all underlying assumptions related to the calculation of the distance thresholds (as determined for the Jepsom Prairie Preserve) are also applicable to the Panoche Valley.

TABLE 1. ACRES OF CTS ESTIVATION HABITAT AFFECTED BY THE PROJECT (BASED ON SEARCY & SHAFFER CALCULATED MIGRATION THRESHOLDS)

	Project Footprint		Conservation Lands		Private Land	
Buffer	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
0 - 562 meters	265.4	33.0%	352.6	43.9%	185.9	23.1%
562 - 1501 meters	914.2	25.6%	1391.3	39.0%	1266.1	35.4%
1501 - 1866 meters	312.5	17.3%	801.0	44.5%	688.3	38.2%
Cumulative Total	1492.1	24.2%	2544.9	41.2%	2140.3	34.6%

The Searcy and Shaffer (2011) model appears to be relatively robust when compared to the available data regarding CTS migration distances at other locations (e.g., Hastings Natural History Reservation in Monterey County, California). However, the Panoche Valley is drier (at the driest end of the spectrum for CTS) and has fewer potential movement nights during the CTS breeding season (based on the 2 millimeter (mm) rainfall threshold for CTS movement) than Jepsom Prairie Preserve and other sites addressed by Searcy and Shaffer (i.e., approximately 23% of the mean number of potential movement nights during immigration that were identified for Jepsom Prairie Preserve from 2005 to 2010) (see Table 2). As such, CTS in the Panoche Valley would be expected to move shorter total distances given fewer nights when there are suitable conditions for movement. Though there is no empirical data from the Panoche Valley to support this hypothesis, discussion with Christopher Searcy (personal communication, February 25 and 26, 2015) found no flaws in this logic.

Table 2 reflects rainfall data from the Panoche 2w weather station that is archived at the Western Regional Climate Center (http://www.wrcc.dri.edu/summary/Climsmcca.html). Specifically, Table 2 reflects the number of days per month for the months November through February from the years 1950-2014 in which cumulative rainfall for the day was 2 mm or greater (i.e., the threshold from the Searcy and Shaffer model for CTS movement). The Panoche 2w weather station is located at latitude/longitude 36.6066°/-120.8841° at the south end of the Panoche Valley (within a couple miles of the Project). Analysis of the data set for the years 1950-2014 and 2004-2014 resulted in the estimates of the mean number of potential movement days during immigration (inbound) and emigration (outbound) that are reflected in Table 3.

TABLE 2. NUMBER OF DAYS WITH MINIMUM 2 MM RAINFALL AT PANOCHE 2W WEATHER STATION

Breeding Season	November	December	January	February
1950-1951	4	4	3	2
1951-1952	2	9	9	2
1952-1953	3	10	3	0
1953-1954	0	1	5	2
1954-1955	2	4	5	3
1955-1956	3	8	8	2
1956-1957	0	1	5	5
1957-1958	2	4	4	7
1958-1959	1	1	3	7
1959-1960	0	1	3	7
1960-1961	5	1	2	1
1961-1962	4	3	6	10
1962-1963	0	1	2	4
1963-1964	3	1	2	0
1964-1965	6	7	5	1
1965-1966	4	4	1	2
1966-1967	6	5	4	0
1967-1968	4	5	3	4
1968-1969	5	5	10	9
1969-1970	1	3	10	3
1970-1971	6	7	2	1
1971-1972	1	4	1	1
1972-1973	5	4	7	11
1973-1974	4	5	4	0
1974-1975	1	3	0	9
1975-1976	0	0	0	6
1976-1977	3	2	5	1
1977-1978	2	6	8	8
1978-1979	2	1	10	7
1979-1980	2	4	9	10
1980-1981	0	1	5	4
1981-1982	6	3	6	2
1982-1983	7	4	8	8
1983-1984	6	6	2	2
1984-1985	6	6	3	2

Breeding Season	November	December	January	February
1985-1986	7	2	3	8
1986-1987	1	3	5	6
1987-1988	3	5	3	2
1988-1989	2	6	3	2
1989-1990	1	0	3	5
1990-1991	1	3	2	4
1991-1992	1	4	3	7
1992-1993	0	7	11	10
1993-1994	3	2	3	6
1994-1995	5	3	17	3
1995-1996	0	7	6	11
1996-1997	2	7	12	0
1997-1998	9	5	10	10
1998-1999	4	3	7	3
1999-2000	1	0	8	11
2000-2001	1	1	6	7
2001-2002	3	8	3	1
2002-2003	2	7	1	5
2003-2004	1	6	3	5
2004-2005	2	5	3	7
2005-2006	0	0	0	0
2006-2007	2	5	3	7
2007-2008	1	3	9	6
2008-2009	2	3	4	8
2009-2010	0	6	6	7
2010-2011	5	13	3	6
2011-2012	3	1	2	3
2012-2013	0	0	0	0
2013-2014	2	1	1	6
Totals (1950-2014)	170	250	303	299
Average per Month (1950-2014)	2.7	3.9	4.7	4.7
Totals (2004-2014)	17	37	31	50
Average per Month (2004-2014)	1.7	3.7	3.1	5

TABLE 3. MEAN DAYS WITH AT LEAST 2 MM RAINFALL FOR THE IDENTIFIED PERIODS IN THE PANOCHE VALLEY[1,2]

Data Period	Mean Potential CTS Movement Days
1950 - 2014	
Immigration (Nov 1 – Dec 15)	4.7
Emigration (Jan 16 – Feb 28)	7.1
2004 - 2014	
Immigration (Nov 1 – Dec 15)	3.6
Emigration (Jan 16 – Feb 28)	6.6

Notes:

1 Similar to the Searcy and Shaffer (2011) model, it is assumed that most if not all CTS in the Panoche Valley are at the breeding ponds and not moving during approximately Dec 16 – Jan 15).

2 The calculation of mean number of potential movement nights for immigration (for each period of record) is calculated as the sum of the mean number of potential movement nights for November and 50% of the mean number of potential movement nights for December. The calculation of mean number of potential movement nights for emigration (for each period of record) is calculated as the sum of the mean number of potential movement nights for February and 50% of the mean number of potential movement nights for January.

Unless the CTS within the Panoche Valley are behaving in a manner that is different from the CTS populations that have been studied elsewhere in California, the available data suggests that individuals in the Panoche Valley are moving away from their breeding ponds no more than 678 m (2,223 ft.). This latter maximum migration distance corresponds to Searcy and Shaffer's ecophysiological maximum migration distance (calculated as the maximum sustainable migration rate [188.2 m/night] x maximum number of suitable movement nights [a mean of 3.6 nights during the CTS breeding seasons of the most recent 10-year period of record] where the number of available suitable movement nights during either immigration or emigration (whichever was smaller) was chosen as the maximum number of suitable movement nights for both immigration and emigration). This calculation suggests that virtually all CTS in the Panoche Valley should be located within 678 m (2,223 ft.) of the identified breeding ponds. If CTS in the Panoche Valley are behaving differently (i.e., in a way that allows them to migrate further than the above calculated ecophysiological maximum migration distance), the model and its assumptions should be considered insufficiently robust to apply to this location. As such, it is my opinion that the most applicable distance threshold for CTS in the Panoche Valley is 678 m (2,223 ft.) from the identified breeding ponds (i.e., the distance in which virtually all CTS in the Panoche Valley should be found). This distance is consistent with the Searcy and Shaffer (2011) model and its assumptions, while the calculated migration distances associated with the 50%, 90%, and 95% population thresholds that were determined for the Jepsom Prairie Preserve are likely not (given the substantially fewer number of suitable movement nights in the Panoche Valley).

Use of the ecophysiological maximum migration distance, as determined for CTS in the Panoche Valley, results in a more defensible estimate of the CTS estivation habitat that is associated with the Project Footprint, dedicated conservation lands, and adjacent private land. For ease of use when implementing in-field avoidance and minimization measures related to CTS, the buffer within which the entire CTS population of the ponds should be found has been extended from 678 m to 700 m (see Table 4).

TABLE 4. ACRES OF CTS ESTIVATION HABITAT AFFECTED BY THE PROJECT (BASED ON ECOPHYSIOLOGICAL MAXIMUM MIGRATION THRESHOLD FOR PANOCHE VALLEY)

	Project Footprint		Conservation Lands		Private Land	
Buffer	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
0 - 700 meters	389.3	33.3%	485.7	41.6%	292.4	25.0%
0 - 1000 meters	659.7	30.7%	844.0	39.3%	642.2	29.9%
0 - 1900 meters	1524.2	24.0%	2616.9	41.2%	2210.8	34.8%

However, due to uncertainties in regards to the efficacy of the Searcy and Shaffer (2011) model as it relates to CTS in the Panoche Valley (mostly due to the lack of empirical data to validate the model), a conservative approach to CTS avoidance and minimization has been taken in regards to the Panoche Valley Solar Facility Project (see *March 2015 California Tiger Salamander Pre-Construction Avoidance and Minimization Plan for the Panoche Valley Solar Facility Project San Benito County, California*). This approach involves conducting burrow excavations where ground-disturbing activities are proposed within the Project Footprint to salvage and relocate CTS individuals within an additional 300 m beyond the 700 m threshold predicted by the model (Searcy and Shaffer 2011) (i.e., two contiguous 150 m concentric rings). If no CTS are found within the additional 300 m (1,000 m from the known breeding pond), no additional burrow excavations will be conducted. However, if CTS are found within one or more of the 150 m rings within the Project Footprint, additional burrow excavation will occur until there have been two contiguous 150 m rings with no documented CTS occurrences. Under no circumstances will burrow excavations extend beyond 1,900 m from an identified CTS breeding pond (i.e. the distance roughly correlated to the 1,866 m found by Searcy and Shaffer to correspond to the 95% population threshold at the Jepsom Prairie Preserve in Solano County, California). Using the 1,000 m and 1,900 m thresholds, the amount of CTS estivation habitat associated with the Project Footprint, the dedicated conservation lands, and adjacent private land has been provided in Table 4. It should be noted that the 1,900 m threshold is considered a "worst case" for CTS mitigation implementation, while the 1,000 m threshold is considered the "best case" for CTS mitigation implementation.

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Energy Renewal
PARTNERS, LLC

Eagle Conservation Plan

Panoche Valley Solar Energy Project

San Benito County, California

August 2015

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APPENDICES

ACRONYMS AND ABBREVIATIONS

ACP	Advanced Conservation Practice
amsl	Above mean sea level
APLIC	Avian Power Line Interaction Committee
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
County	San Benito County
Guidance	Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2 Guidance
ECP	Eagle Conservation Plan
EIS	Environmental Impact Statement
˚F	Fahrenheit
FR	Federal Regulation
GPS	global positioning system
km	kilometer
km^2	square kilometer
MBTA	Migratory Bird Treaty Act
MW	megawatts
PG&E	Pacific Gas and Electric Company
Project Footprint	The portion of the Proposed Project that includes the solar arrays and associated roads and equipment, totaling 2,506 acres.
Proposed Project	Panoche Valley Solar Project
PVS	Panoche Valley Solar, LLC
SCRCL	Silver Creek Ranch Conservation Lands
UDA	Utilization Distribution Assessment
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish Wildlife Service
UTM	Universal Transverse Mercator
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands

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1.0 INTRODUCTION

1.1 Corporate Policy

Panoche Valley Solar, LLC (PVS) is committed to implementing feasible measures to avoid and minimize eagle mortality associated with construction, operation, and maintenance of the Panoche Valley Solar Facility (the Project) on Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*). These measures include but are not limited to siting considerations, panel design, best management practices, avoidance and minimization measures, potential incorporation of safety features into appurtenant facilities (e.g., transmission lines), compensatory mitigation, and adaptive management measures.

1.2 Regulatory Setting

1.2.1 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) is the primary law protecting eagles. The BGEPA (16 USC 668-668c) protects Bald and Golden Eagles by prohibiting the taking, possession, and commerce of such birds and establishes civil penalties for violation of this Act. BGEPA defines the action of "take" to include "pursue, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb," and prohibits take of individuals and their parts, nests, or eggs. The United States Fish and Wildlife Service (USFWS) expanded this definition by regulation to include the term "destroy" to ensure that "take" includes destruction of eagle nests. The term "disturb" is further defined by regulation as "to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, injury to an eagle, a decrease in productivity, or nest abandonment" (50 Federal Regulation [FR] 22.3).

The BGEPA is the primary federal authority charged with the management of Bald and Golden Eagles in the United States (U.S.). USFWS guidance on the applicability of current Eagle Act statutes and mitigation is currently under review. On November 10, 2009 the USFWS implemented new rules (74 FR 46835) governing the "take" of Golden and Bald Eagles. The new rules were released under the existing BGEPA which has been the primary regulation protection for eagle populations since 1940. All activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this act. The definition of "disturb" (72 FR 31132) includes "interfering with normal breeding, feeding, or sheltering behavior to the degree that it causes or is likely to cause decreased productivity or nest abandonment."

1.2.2 Migratory Bird Treaty Act

The Federal Migratory Bird Treaty Act (MBTA) (Title 16 USC 703) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary. This Act encompasses migratory birds which includes eagles, hawks, and owls, their occupied nests, and their eggs (16 USC 703; 50 Code of Federal Regulations [CFR] 21, 50 CFR 10). Most actions that result in taking of or the permanent or temporary possession of a protected species constitute violations of the MBTA. The MBTA also prohibits destruction of occupied or active (presences of eggs or young) nests. The Migratory Bird Permit Memorandum dated April 15, 2003, clarifies that destruction of most unoccupied bird nests is permissible under the MBTA; exceptions include nests of federally listed threatened or endangered migratory birds, colonial nesting species, Bald Eagles, and Golden Eagles. The USFWS is responsible for overseeing compliance with the MBTA.

1.2.3 National Environmental Policy Act

NEPA is an act of Congress established to ensure that the environmental impacts of any federal action are fully considered and that appropriate steps are taken to mitigate potential environmental impacts. An Environmental Impact Statement (EIS) is being prepared for the Project in compliance with NEPA in order to analyze and disclose the potential impacts of the Project. The U.S. Army Corps of Engineers (USACE) is the lead agency responsible for preparing the EIS.

1.2.4 California Endangered Species Act

The California Endangered Species Act (CESA) of 1970 states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved. The CESA prohibits the take (hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill) of species listed under CESA. In addition, California Fish and Game Code Subsections 3503, 3503.5, and 3800 prohibit the possession, incidental take, or needless destruction of eagles and other birds, as well as their nests and eggs. California Fish and Wildlife Code Section 3511 lists birds including the Golden Eagle, that are “fully protected” as those that may not be taken or possessed except under specific permit.

1.3 Purpose of the Eagle Conservation Plan

PVS has prepared this Eagle Conservation Plan (ECP) to ensure that feasible avoidance and minimization measures are implemented into Project design, operation, and maintenance and that the Project remains in compliance with BGEPA requirements. This plan focuses primarily on Golden Eagles since there have been no historical or present sighting of Bald Eagles in the vicinity of the Project and no foraging or nesting habitat for the Bald Eagle exists within the Project Footprint.

Measures particularly relevant to Golden Eagles include avoiding artificial increases of the mammalian prey base, selecting a project site that does not support high-density eagle populations, and establishing standard setbacks from nest sites.

This ECP has been prepared to establish measures to be implemented by the Project that are “compatible with the preservation of the Bald Eagle and the Golden Eagle” as set forth in the Guidance (U.S. Fish and Wildlife Service 2013). The emphasis of the current guidance from the USFWS (e.g. *Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2*) is directed toward the establishment of new wind power projects[1], addressing the importance of siting these wind power projects at certain minimum distances from Golden Eagle use areas. There is currently no guidance modules directed toward the establishment of new solar power project; therefore this plan follows the guidance provided under wind power projects; however, not all guidelines apply to solar project. Although the Project does not include wind energy generation, PVS has agreed to establish an ECP for the Project to demonstrate compliance with the BGEPA and reduce any risk of potential injury or take. This compliance with the BGEPA comes in the form of:

[1]Important to note that guidelines are established for land based wind development and not designed for solar projects; however, wind guidelines are being applied which, in some cases, may not be applicable when calculating avian risks for solar projects.

- Conducting early pre-construction assessments to identify important eagle use areas potentially within the Project Footprint and surrounding Conservation Lands;
- Analyzing the pre-construction studies to estimate potential impacts on eagles;
- Avoiding and minimizing potential adverse effects to eagles due to the construction and operation of the Project; and
- Monitoring for impacts to eagles during the construction and operation of the solar facility.

1.4 Contents of this Eagle Conservation Plan

As stated above, this ECP has been developed in accordance with requirements set forth in the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2 Guidance (the Guidance) (USFWS 2013) as no guidance model currently exists for solar power projects. The Guidance focuses on the development of ECPs in five stages, with each stage building on the prior stage. These stages include:

- Stage 1 – Site Assessment
- Stage 2 – Site-Specific Surveys and Assessment
- Stage 3 – Predicting Eagle Fatalities
- Stage 4 – Avoidance and Minimization of Risk Using Advanced Conservation Practices and Other Conservation Measures, and Compensatory Mitigation, and
- Stage 5 – Updating of the Fatality Prediction and Continued Risk-Assessment

A Stage 1 assessment will assist in the determination of whether the Project demonstrates any risk for Golden Eagles and will provide important information that will be used to determine what studies need to be completed during the Stage 2 assessment.

A Stage 2 study will assist in the identification of eagle use areas or migration concentration sites that could be affected by the Project and also assess the likelihood of disturbance or "take" of eagles. Out of the four types of surveys recommended for assessing risk to eagles at proposed projects, three were utilized for the Project.

As part of the Stage 2 assessment, on June 13, 2013, PVS initiated a conference call with the USFWS-Ventura office concerning the requirement to prepare an Eagle Conservation Plan (ECP) for the Project. PVS also asked if it could proceed with the ECP using the Golden Eagle survey data provided in the FEIR in 2010 (i.e., 15 nests within 10 miles of the project and project site use). During the conversation, the USFWS stated that while the 2010 nesting survey data helps elucidate the regional Golden Eagle nesting and use information, the study would be considered out dated, insufficient in the coverage area, and the study was conducted too late in the season (i.e., after the nesting season). The USFWS recommended that PVS conduct the following "Stage 2" (USFWS 2013) site-specific surveys in anticipation of ECP preparation:

- Point Count Surveys (i.e., fixed-radius circular plot surveys) within the Project Footprint and Conservation Lands. These Point Count Surveys were conducted during the summer, fall, and winter of 2013/2014 (Appendix A, Figures 4-6);

- Utilization Distribution Assessment within the Project Footprint and the Valley Floor Conservation Lands (VFCL). This study was conducted during the summer, fall, and winter of 2013/2014 (Appendix B); and

- Updated aerial survey of project-area nesting population including the location and number of occupied eagle nests. This survey was completed in January-March 2014, before leaf-on of the trees to assist in the identification of eagle nests. This updated survey would augment the Project's nest survey work conducted in 2010.

Therefore following the recommendations of the USFWS, the three surveys of eagles used within the Project Footprint included: (1) point count surveys; (2) utilization distribution assessment (UDA), which provided use intensity within the Project Footprint; and (3) surveys of nesting territory occupancy in the Project vicinity.

Stage 3 utilizes the data from Stage 2 to predict any risk associated with eagles by the Project. The assessment of risk can compare construction type (solar or wind energy), alternative siting, construction, and operational scenarios. Also included in this stage is the evaluation of whether a "disturbance take" is likely, and if so, how much disturbance is anticipated.

Stage 4 of this ECP will describe how the information gathered in the previous stages will be used to determine potential conservation measures and advanced conservation practices (ACPs) if necessary, to avoid or minimize any risk of impacts on eagles within the Project Footprint.

Stage 5 of this ECP will discuss, if deemed necessary, the need for conducting post-construction surveys that could be compared to the pre-construction surveys. Additionally, if necessary, this plan will also discuss the need for the Project to conduct post-construction monitoring to collect data that could be compared with the pre-construction findings for any potential disturbances or any related eagle fatalities.

In addition, if any monitoring is necessary in Stage 5, PVS will use this data to assess whether compensatory mitigation is necessary and adequate, and explore any operational changes that might be warranted at the solar project.

2.0 PROJECT INFORMATION

2.1 Project Location

The Project is located near the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County and western Fresno County. The Project Footprint is located approximately two miles north of the intersection of Panoche Road and Little Panoche Road. This location is approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley. The Project Footprint would be located within Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 of the United States Geologic Survey's Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche 7.5-minute topographic quadrangle maps.

In addition to the Project Footprint, the Conservation Lands associated with the Proposed Project are located within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27, and 32-36; Township 14S, Range 11E, Sections 19, and 29-32; Township 15S, Range 10E, Sections 1-8, and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6, and 8-12.

The Project Footprint is bordered by rangeland to the north and south, by the Gabilan Range to the west, and by the Panoche Hills to the east. The Project Footprint elevation ranges from approximately 1,200 feet above mean sea level (amsl) near the southeastern end of the project site to approximately 1,400 feet amsl near the western end of the project site. The Project Footprint was historically used for crop production, but during the past forty years the Project Footprint has been used for cattle grazing.

The Project area experiences a Mediterranean type climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates into the site's soils and flows in creeks and drainages when soil capacity has been reached.

Panoche Creek and Las Aquilas Creek run between portions of the Project Footprint but are contained entirely within the Valley Floor Conservation Lands (Figure 2, Appendix A). They are ephemeral creeks that are dry in the summer. Smaller washes and drainages feed these larger creeks. The Project site supports several seasonally flooded pools and stock ponds, predominantly in the northern portion of the Project Footprint along unnamed washes. Habitat for aquatic species and breeding habitat for amphibians within the Project Footprint is limited to the stock ponds and ephemeral pools.

There is no urban development on the Project site or surrounding area. Two ranching communities are located within the Panoche Valley, Panoche and Llanada. Both communities are within two miles of the Project Footprint creating human disturbances that could also be a factor in no identified nest sites within two miles of the Proposed Project site. The nearest rural community is Firebaugh, approximately 15 miles from the perimeter of the Project Footprint.

Prominent grass species within the Project Footprint include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Areas which have not been previously disturbed by grazing or historic cultivation also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitatum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

2.2 Project Description

PVS proposes to construct and operate a 247 MW solar photovoltaic (PV) energy generating facility located in San Benito County, California (Figure 1, Appendix A). The Project Footprint consists of approximately 2,506 acres in the Panoche Valley of eastern San Benito County, California. The Project includes construction and operation of the PV solar array complexes, an operations and maintenance (O&M) building, perimeter roads including emergency access and egress, electricity collection lines, DC-AC inverters, an electrical substation and switching station, Pacific Gas & Electric (PG&E) telecommunication upgrades, and decommissioning of the Project. The Project also includes the permanent preservation and management of high quality Conservation Lands that are contiguous with the Project Footprint which will be protected in perpetuity (Figure 3, Appendix A). Additional information and Project Description can be found in the Project's 2015 Final Supplemental Environmental Impact Report (FSEIR).

2.3 Conservation Lands

Project Conservation Lands include three areas totaling 24,176 acres that would be preserved in perpetuity for the benefit of the Golden Eagles, as well as many other species of wildlife. The Conservation Lands are described below. The Conservation Lands will be managed under an approved Habitat Management Plan.

Valley Floor Conservation Lands

Approximately 2,514 acres of land that is interspersed throughout and adjacent to the Project Footprint would be left undisturbed and designated as the Valley Floor Conservation Land (VFCL). The VFCL are contiguous with the Project Footprint, and primarily consist of the non-native annual grassland habitat found within the Project Footprint with some seasonal ponds and vernal and ephemeral pools, as well as the seasonally dry Panoche and Los Aquilas Creeks (Figure 3, Appendix A). The VFCL also includes the entire 100-year floodplain within the valley floor.

The dominant vegetation in the VFCL includes ripgut brome, soft chess, red brome, foxtail barley, rat-tail fescue, broad-leaved filaree, red-stemmed filaree, shining peppergrass, and vinegarweed. Fiddleneck, devils lettuce, shepherds purse, turkey mullein, and bur clover were also common, especially in disturbed areas. Areas which have not been previously disturbed include a variety of native wildflowers such as blow wives, blue dicks, California gold fields, yellow daisy tidy-tips, and California creamcups.

Valadeao Ranch Conservation Lands

The Valadeao Ranch Conservation Lands (VRCL, approximately 10,772 acres) are contiguous with the Project Footprint directly to the west, east, and northeast of the site (Figure 3, Appendix A). These lands are also contiguous with the VFCL and Silver Creek Ranch Conservation Lands (SCRCL). The VRCL include several seasonal drainages. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent. Elevations on the VRCL range from approximately 1,400 feet to 2,100 feet amsl. The property which is currently grazed is dominated by introduced annual grasslands (approximately 6,700 acres), which have a very similar species makeup to the Project Footprint and VFCL. This property also includes ephedra shrubland (approximately 2,700 acres), barrens, and saltbush shrubland. The VRCL will continue to be grazed under an adaptive management plan in line with the Applicant's Habitat Management Plan.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to introduced annual grasslands.

Plant associations that are noted to occur within the Ephedra shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub. Ephedra shrublands occur in the VRCL portion of Las Aquilas Creek in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, ephemeral drainages, and steep, rocky, and thin-soiled south-facing slopes.

Barrens are ridgelines located in the VRCL that have south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity at barrens is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia microstachys*.

The saltbush shrubland habitat consists of nearly pure to mixed stands of saltbush (*Atriplex polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest saltbush cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two plant associations exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa - Eriogonum fasciculatum* var.

polifolium occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages 5 to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *Eriogonum fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens that are often present on adjacent slopes of similar aspect. Shrub canopies are confined to wash edges due to trampling by cattle, and average cover rarely exceeds 10 percent.

Silver Creek Ranch Conservation Lands

The Silver Creek Ranch Conservation Lands (SCRCL, approximately 10,890 acres), which is currently being grazed with livestock, is located southeast of the Project Footprint (Figure 3 Appendix A). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well drained and moderately permeable. SCRCL contains approximately 5,765 acres with slopes between 0 and 11 percent.

SCRCL are dominated by non-native species (approximately 8,400 acres), with the same species found on the Project Footprint and on the other Conservation Lands distributed sparsely over the landscape. The other major habitats on these Conservation Lands include ephedra shrubland (approximately 2,260 acres) with similar species noted on the VRCL and riparian/wetland habitat.

The riparian habitats occur along the Panoche and Silver Creeks. The Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.). Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site, both upstream and downstream. In this area, saltgrass (*Distichlis spicata*) appears to be the native species most tolerant of the soil salinity and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site was observed to be completely dry and largely devoid of plants for at least three miles. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (*Typha* Herbaceous Alliance) centrally, *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge and *Frankenia salina* and *Juncus mexicanus*. Trees are largely absent, as are species adapted to a floating or submerged habitats.

3.0 LANDSCAPE AND SITE-SPECIFIC ASSESSMENT (STAGES 1 AND 2)

3.1 Overview of Eagle Biology

This section gives an overview of the biology of both the Golden Eagle and the Bald Eagle.

3.1.1 Golden Eagle

The Golden Eagle is a large raptor with a wingspan between 73–87 inches and an average weight between 6.6–13.5 pounds. The eagle ranges throughout most of the northern Temperate Zone which includes arctic Canada and Alaska south through the western United States to central Mexico. The northern populations of Golden Eagles are short to medium distance diurnal migrants.

Golden Eagles can be found in a broad range of elevations in various habitats which include open and semi-open grasslands, shrub-steppes, forests, tundra, and desert habitats (Kochert et al. 2002). The eagles tend to avoid densely populated and agricultural areas for relatively open rangelands and undisturbed areas. Golden Eagles usually build their nests on cliff faces but will also build in trees, on the ground, or human-made structures such as observation towers, nesting platforms, and electrical transmission towers. Furthermore, Golden Eagle nests are most likely to occur in the vicinity of dense populations of ground squirrels, hares or other favored prey species. Besides hares and ground squirrels, Golden Eagles may take a wide variety of other prey, including larger birds, reptiles, mammals, and carrion. They have been observed hunting by diving from a high soar, but typically hunt by flying low to the ground while following the contours of the land. Golden Eagles have been noted to construct and maintain several alternative nests within their established breeding territories and rotating their use from year to year depending on breeding densities in the vicinity. Mated pairs will maintain or refurbish more than one nest each year, but reuse intervals may be several years or more (ICF 2014, Kochert et al. 2002).

Courtship and nest building in central California generally takes place from December through February. Golden Eagles normally lay only one brood a year that is made up of one to three eggs. The eggs are incubated for a period of between 41 to 45 days. Once hatched, the young stay in the nest for approximately 45 to 81 days between late May and early July (ICF 2014, Kochert et al. 2002).

3.1.2 Bald Eagle

The Bald Eagle is a large raptor with a wingspan between 72-96 inches and an average weight of approximately 14 pounds. The female Bald Eagles are larger than males, and birds of northern states and provinces tend to be larger than those from the southern portions of the breeding range. The characteristic adult plumage consists of a white head and tail with a dark brown body. Juvenile eagles are completely dark brown and do not fully develop the majestic white head and tail until the fifth or sixth year (Buehler 2000, CDFW 2014). This eagle is found throughout North America in riparian areas associated with coasts, rivers, and lakes where it primarily feeds on fish. The Bald Eagle will also take a variety of birds, mammals, and turtles (both live and as carrion) when fish are not readily available.

Bald Eagles in winter may be found throughout most of California at lakes, reservoirs, rivers, and some rangelands and coastal wetlands. The breeding habitats found in California are mainly in mountain and foothill forests and woodlands near reservoirs, lakes, and rivers. Most of the Bald Eagle breeding territories in California are found in the northern section of the state, but the eagles also nest in scattered locations in the central and southern Sierra Nevada Mountains and foothills, in several locations from the central coast range to inland southern California (CDFW 2014).

Breeding habitat usually consists of nests in tall trees or on cliffs near water. Nest trees include pines (*Pinus* spp.), spruce (*Picea* spp.), firs (*Abies* spp.), cottonwoods (*Populus* spp.), oaks (*Quercus* spp.), poplars (*Liriodendron* spp.), and beech (*Fagus* spp.). The same nest may be used year after year, or the birds may alternate between two nest sites in successive years (Terres 1995, Buehler 2000).

California's breeding populations display high fidelity to both breeding and wintering sites. Resident breeding pairs overwinter in California and do not disperse far from their nest sites, unless harsh weather drives them to lower elevations. Unlike northern breeding populations of Golden Eagles, Bald Eagles that breed in northwestern Canada and the United States migrate southward in large numbers to California to overwinter; these populations are most prevalent between September and March (ICF 2014). The breeding season for Bald Eagles lasts from January through August in California. Most Bald Eagles are sensitive to human disturbances and typically do not nest if there is evidence of human activity (ICF 2014). Bald Eagles normally lay only one brood a year that is made up of one to three eggs. The eggs are incubated for a period of between 34 to 36 days. Once hatched the young stay in the nest for approximately 56 to 98 days (Buehler 2000, Terres 1995).

3.2 History and Summary of Eagle Monitoring in the Panoche Valley

The only species of eagle observed in the Panoche Valley during surveys conducted as part of this solar project is the Golden Eagle. There have been no in-depth studies on Bald Eagles in the Panoche Valley due to the lack of habitat, no sightings during any of the over 25,000 hours of site surveys, and only anecdotal observations of the Bald Eagle in the Panoche Valley.

3.2.1 Historical Surveys

Previous surveys within the Project region that noted Golden Eagles within the vicinity of the Project Footprint were from historical data from the National Audubon Society's Annual Christmas Bird Counts. There have been 45 Golden Eagles detected during the past 13 Christmas bird counts (1999-2012) in the Panoche Valley (National Audubon Society, 2014). That averages out to be approximately 3.46 per year observed within the count circle which includes all of the Project Footprint and the VFCL and a majority of the VRCL and the SCRCL.

3.2.2 Point Counts

Point count surveys for Golden Eagles were conducted at established point count stations (Cooperrider et al. 1986; Hamel et al. 1996; Ralph et al. 1993; Ralph et al. 1995) every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. Six point count stations were located within Project Footprint/VFCL (Figure 4 Appendix A) to ensure a minimum spatial coverage of at least 30 percent of the Project Footprint (USFWS 2013). Six point count stations were also located within the VRCL and the SCRCL. Three point count stations were located in the VRCL (Figure 5 Appendix A) and three point count stations in the SCRCL (Figure 6 Appendix A). The coverage for the VRCL and SCRCL was less than 30 percent, but provided adequate observations of Golden Eagle use in these areas for general comparison purposes. Additional information can be found in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

The survey locations were established by creating point count stations within an 800 meter (2,625 feet) radius observation area. The center point of each plot was geo-referenced using a global positioning system (GPS) unit. The point count surveys consisted of observers recording detections of Golden Eagles from the point count stations for two hours at each point count station (Figures 4, 5, and 6 in Appendix A). Observations were recorded on point count field forms (Pagel et al. 2010; USFWS 2013). The Golden Eagle surveys were conducted between daylight hours (sunrise to sunset) on a bi-weekly basis from September 3, 2013 to January 24, 2014. During the fall migration, when possible, surveys were completed during midday to increase sampling efficiency by temporally stratifying surveys to cover the midday period during migration (CA Energy Commission 2007; USFWS 2013).

The data collected during each point count station survey beyond the typical conditions information (e.g. date, time, temperature, wind speed and direction, and etc.) included the number of Golden Eagles seen, age class, Golden Eagles' activity/behavior, flight paths, estimated flight height and location in plot, and general description of observations.

With the data from the point count surveys, the age classes of the Golden Eagles were broken down into juvenile eagles, immature or sub-adult eagles, adult eagles, or unknown (eagles where age class could not be determined due to distance, visibility, etc.). The activity/behavior data collected noted the prevalent behavior during each one-minute interval as soaring flight (circling broadly with wings outstretched), unidirectional flapping gliding, kiting-hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or other bird species, undulating/territorial flight, perched, or other. The flight path data included Golden Eagles observed inside, as well as outside the point count plot. The flights were recorded on the point count data forms for each point count station.

Project Footprint/Valley Floor Conservation Lands

The Golden Eagle observations in the Project Footprint/VFCL totaled 43 Golden Eagles, with 15 observations within the point count plot boundaries and 28 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class. The Golden Eagles observation on the Project Footprint/VFCL were made up of four juveniles, three inside the point count plot boundaries and one observation outside the plot boundaries. There were two sub-adult Golden Eagles observed within the point count plot boundaries and none outside. The surveys also found 14 adult Golden Eagles observations within the Project Footprint/VFCL areas, with seven adults being seen inside the plot boundaries, and seven adult Golden Eagles observed outside the plot boundaries. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

The point count station with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries, was the station located in the northwestern portion of the Project Footprint/VFCL (Figure 4 in Appendix A) with a total of 23 Golden Eagles observations (10 inside/13 outside). Note that the high number of Golden Eagle observations at this point count station was due to numerous Golden Eagles observed utilizing the hills of the VRCL and the hills to the west of the VRCL for perching, foraging, etc. During the second survey event (September 17-19, 2013), seven Golden Eagles were observed feeding on a carcass of a dead animal (i.e. cattle) during the entire point count survey period. The point count station with the lowest number of Golden Eagle observations during the survey season was the point count station located in the southeastern portion of the Project Footprint/VFCL (Figure 4 Appendix A) with no Golden Eagles observed during any of the point count surveys.

Of the 15 Golden Eagles observations within the Project Footprint/VFCL observed within the point count plots, over half of the observations (eight Golden Eagles) were seen within the month of September. As previously stated, during the second survey event (September 17-19, 2013), seven Golden Eagles were observed feeding on a carcass of a dead animal during the entire point count survey period. There were four Golden Eagle observations during October, one in December, and two observations in January. No observations of Golden Eagles were documented in November within the Project Footprint/VFCL.

Valadeao Ranch Conservation Lands

The Golden Eagle observations in the VRCL totaled 11 Golden Eagles with four observations within the point count plot boundaries and seven observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class. The Golden Eagle observations on the VRCL were made up of two juveniles, all inside the point count plot boundaries. There were no sub-adult Golden Eagles observed within the point count plot boundaries or outside the plot boundaries. The surveys also found two adult Golden Eagle observations within the VRCL areas within the plot boundaries. Furthermore, there were seven unknown age class observations that were observed outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the Golden Eagles.

The point count station with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries was located in the central portion of the VRCL (V-02) (Figure 5 Appendix A) with a total of seven Golden Eagles observations (two inside/five outside). The point count stations within the VRCL with the lowest number of Golden Eagles observations during the survey season was the point count station located in the southern and northern portions of the VRCL (V-01 and V-03) (Figure 5 Appendix A) with two Golden Eagle observations each during the entire study. Additional information is located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

Of the four Golden Eagle observations within the VRCL observed within the point count plots, 75 percent of the observations (three Golden Eagles) were seen within the month of September. There was one observation during January. No observations were made within the VRCL during the point count surveys in October, November, and December. Additional information is located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

Silver Creek Ranch Conservation Lands

The Golden Eagles observations in the SCRCL totaled seven Golden Eagles with four observations within the point count plot boundaries and three observations outside the plot boundaries for the entire survey season (Figure 6 Appendix A). The Golden Eagle observations on the SCRCL had no juvenile or sub-adult eagles inside or outside the point count plot boundaries. The surveys found four adult Golden Eagle observations within the SCRCL areas with three observations inside the plot boundaries and one observation outside the plot boundaries. There were three unknown age class observations with one observation inside the plot boundaries and two observations outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the Golden Eagles.

The point count station in the SCRCL with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries was S-03 (Figure 6 in Appendix A) SCRCL with a total of four Golden Eagle observations (2 inside/2 outside). The point count station with the lowest number of Golden Eagle observations during the survey season was located in the western portion of the SCRCL (Figure 6 in Appendix A) with no Golden Eagles observed during all of the point count surveys.

Of the four Golden Eagle observations within the SCRCL point count plots, 75 percent of the observations (three Golden Eagles) were seen within the month of January. There was only one Golden Eagle observation in October and no observations of Golden Eagles during the point count in September, November, and December.

Summary and Conclusion

Overall, the results of the point count surveys included a total of 61 observations of Golden Eagles. This total includes 23 individual observations of Golden Eagles seen within the point count plot boundaries and 38 observations outside the plot boundaries. Additional information is located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

The results of the point count surveys indicated that 93 percent of the Golden Eagles observations made within the Project Footprint and VFCL point count station boundaries were from the western point count stations, which are in close proximity to the hills located within the western portion of the VRCL. Of the 15 total Golden Eagle observations made within the Project Footprint and VFCL during the entire study within point count plots, approximately 47 percent of those observations were seen during a single survey event (September 17-19, 2013), where Golden Eagles were observed feeding on a carcass of a dead animal within the proposed Project Footprint. The data gathered during this fall migration/winter survey period indicates that unless there is an attractant (i.e. food) found within the Project Footprint and the VFCL, that Golden Eagles usage of the Project Footprint is minimal. Additional information is located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

3.2.3 Utilization Distribution Assessment

The Utilization Distribution Assessment (UDA) for Golden Eagles occurred every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. The UDA was completed to document the Golden Eagles' spatial distribution of use on the proposed Project Footprint. The observation data was noted on field maps and then the data was converted into GIS formats for analyses. The field maps were created by placing a grid of square cells, each 0.5 x 0.5 kilometer (km), which was framed by a Universal Transverse Mercator (UTM) system across a map of the Project Footprint to record eagle observations in each 0.25 km^2 cell.

The Project Footprint/VFCL was divided into non-overlapping observation sectors centered on a designated Observation Point, each with a vantage point. The previously mentioned point count stations were utilized for the UDA Observation Points (Figure 4 Appendix A). These locations afforded an unobstructed viewing of the grid cells to more than one km in all directions. The UDA was not conducted on the VRCL and the SCRCL since they are outside of the Project Footprint.

During the UDA, the data recorded by the observers included Golden Eagle activity/behavior and flight path and location. The prevalent activity/behavior of each Golden Eagle was recorded in one-minute intervals as soaring flight (circling broadly with wings outstretched), unidirectional flapping gliding, kiting-hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or other bird species, undulating/territorial flight, perched, or other. The flight paths and location data was recorded on the gridded field maps, using topographic features or distance indicators as location references.

The data was analyzed by simply counting the number of flights intersecting each cell. If the data set had been larger, a specific Golden Eagles' distribution of use would have been estimated by using standard kernel analyses (USFWS 2013).

Each survey event was made up of six UDA surveys from designated Observation Points for two hours each. The total hours surveying for Golden Eagles during the UDA study was 132 hours of survey time within the Project Footprint/VFCL (the UDA Study Area).

The results of the UDA surveys included a total of 33 observations of Golden Eagles which includes observations inside the UDA Study Area and outside the UDA Study Area. Of those 33 observations, 16 Golden Eagles observations were recorded within the UDA Study Area with five identified as adult Golden Eagles, three as sub-adult Golden Eagles, four as juvenile Golden Eagles, and four birds were not able to be identified by age class.

The majority of the Golden Eagle observations came from outside the UDA Study Area near the Observation Points P-01 and P-03 (Figure 4 in Appendix A) located in the northwestern and southwestern portions of the UDA Study Area. This is due to numerous sightings of Golden Eagles observed utilizing the hills of the western portion of the VRCL and the hills beyond the western portion of the VRCL for perching, foraging, etc.

During the UDA surveys there were 452 observation minutes of Golden Eagles inside the UDA Study Area and 157 observation minutes of Golden Eagles outside the UDA Study Area for a total of 609 observation minutes for the entire study period. Note that totals for the UDA study included seven Golden Eagles that were observed feeding on a carcass of a dead animal (cattle) inside the UDA Study Area in the northwestern portion of the UDA Study Area and remained on the carcass for the entire duration of the UDA survey event on September 17, 2013. These observations made up 63% (285 observation minutes) of the observation time for Golden Eagles for the UDA Study. In addition, the observation time (120 observation minutes) for a sub-adult eagle that perched on the hillside for the entire UDA survey period in the northwestern portion of the UDA Study Area, noted on January 8, 2014, makes up 90 percent of the observation minutes made during the entire study within the UDA Study Area. These two events – seven birds foraging on a carcass and one perched on the hillside were 405 out of the 609 total minutes of observations and most other observations were outside the UDA Study Area.

The average observed flight height noted during the study for observations made during UDA surveys, excluding perched Golden Eagles, was approximately 300 feet above ground level. The average flight height for the Golden Eagles observations noted inside the UDA Study Area was similar with an average flight above ground level of approximately 270 feet.

Lastly, due to the small size of the data set (only 16 Golden Eagle flight observations that utilized 57 grid cells within the UDA Study Area) a standard kernel analyses could not be performed. The data was analyzed by calculating the number of flights intersecting an individual grid cell. The study indicated that flight heights noted inside the UDA Study Area averaged approximately 270 feet with exception of the Golden Eagles noted feeding on the carcass during the noted September survey event.

Summary and Conclusion

With exception of the seven Golden Eagles observed feeding on a carcass in the northeast corner of the UDA Study area, the cells utilized by Golden Eagles within the UDA Study Area indicates that the Golden Eagles are not using the northern, southwest, and south central areas of the Project Footprint/VFCL. They also did not frequent the northern portion of the Project Footprint/VFCL. The UDA Study does show, as seen in the point count surveys, that the Golden Eagles are utilizing the hills in the VRCL on both the eastern and western sides of the UDA Study Area for perching, foraging, etc.

Information gathered from the UDA surveys indicate Golden Eagles mostly fly across or through the Panoche Valley (i.e. Project Footprint/VFCL) to other habitat to forage or perch.

3.2.4 Nesting Survey

Helicopter-based Golden Eagle surveys were conducted in August 2010 during a non-breeding summer period. The surveys were specifically targeted for Golden Eagle occupancy using individual and nest sightings according to the USFWS Interim Guidelines for Golden Eagle Surveys (Pagel et al. 2010). The survey was performed by two qualified biologists who flew surveys over the Project Footprint and Conservation Lands. Additionally surveys were performed within a 10-mile radius of the Project Footprint. During the flight, one biologist observed at all times while the other recorded and marked data when appropriate. During the surveys, 15 Golden Eagle nests were observed within the 10-mile radius of the Project Footprint. Four of those nests showed evidence of having young fledged in 2010. No Golden Eagle nests occurred within two miles of the Project Footprint.

To augment the previously noted 2010 nest survey effort, the USFWS recommended that the PVS conduct “Stage 2” aerial surveys of the Project area nesting population during a January-February (winter) time frame before leaf-on. The aerial surveys were conducted for Golden Eagles within ten miles of the Project Footprint in January and April 2014 (winter to spring), resulting in the documentation of 46 Golden Eagle nests and an estimated 30 Golden Eagle territories, with nine of them active, though none were located within three miles of the Project Footprint.

As per guidance provided by the USFWS, an initial round of helicopter surveys was performed over a 10-day period during the early breeding season, from January 15 to 24, 2014 (winter). The second round of aerial surveys were conducted over a 7-day period from April 2 to 8, 2014 (spring), when active nests were expected to contain eggs or young nestlings.

All surveys were conducted by qualified observers in a helicopter operated by a pilot experienced in conducting aerial Golden Eagle nesting surveys. Survey methodology described in USFWS *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Eagle Management and Permit Issuance* (Pagel et al. 2010) was followed to the extent possible. The biologists conducted an aerial examination of all appropriate nesting habitats with ten miles of the Project Footprint. During aerial surveys, the observers searched for large stick nests of Golden Eagles and other raptors on cliff faces, rocky outcrops, trees, transmission towers, and other suitable nesting substrates.

A total of 492 nests were documented by Bloom Biological, Inc. (BBI) during the aerial survey, including 46 Golden Eagle nests. Nests classified as belonging to species other than Golden Eagles included nests of 226 Common Ravens (*Corvus corax*), 146 Red-tailed Hawks (*Buteo jamaicensis*), 62 Prairie Falcons (*Falco mexicanus*), eight Barn Owls (*Tyto alba*), three Great Horned Owls (*Bubo virginianus*), and one Turkey Vulture (*Cathartes aura*). Additional information can be located in the Panoche Valley Solar Facility - 2014 Final Golden Eagle Nesting Survey Report located in Appendix C of this Plan.

It was estimated that the 46 Golden Eagle nests discovered during this survey effort comprise approximately 30 breeding territories, some of which contain one or more alternate nests. The actual number of territories could be slightly higher or lower than 30, and the exact number of territories depends, in part, on how alternate nests of a single territory are defined. Golden Eagle nesting density (and territory size) is driven primarily by habitat quality, with higher nesting density in better quality habitat. Given that habitat quality in the Nesting Study Area varies from quite high (in the northwestern quadrant, where most nests were located), to quite low, in extreme eastern portions, it would not be surprising for nests in some areas to be located as close together as one mile, or even rarely 0.5 miles, particularly in the areas of better quality habitat.

In total, nine Golden Eagle nests were classified as active in the 2014 season, each representing a separate territory. Thus, active nesting occurred in almost one-third (9 of about 30) of the territories identified in this survey. Of these nine nests, eggs are presumed to have been laid in at least four. Adults were observed on nests in incubating posture and two un-incubated eggs were observed in (presumed failed) nests in April. Finally, two chicks were observed being tended to by a female Golden Eagle in early April. Of the remaining five Golden Eagle nests that were identified as active in 2014, none were known to contain eggs or nestlings as of the April 8th survey date. A nest was considered active if any of the following three conditions was met: (1) fresh (live or dead) sticks had been added during the current nesting season, (2) the nest was found to contain eggs or young (dead or alive), or (3) an adult was observed on the nest in an incubating (or brooding) posture. Given that Golden Eagles in this region normally lay eggs on or before this date, it is very unlikely that any of these five nests went on to successfully fledge young during the 2014 nesting season.

No Golden Eagle nests were identified within three miles of the Project Footprint, though four nests were located within four miles of the Project Footprint. Two of these four nests were considered attended in 2014, though neither nest was ever found to contain eggs or nestlings. The next closest active Golden Eagle nest to the Project in 2014 was located approximately 5.79 miles north-northwest of the Project Footprint. Additional information is located in the Panoche Valley Solar Facility - 2014 Final Golden Eagle Nesting Survey Report located in Appendix C of this Plan.

3.2.5 Summary and Conclusions

Golden Eagle

With exception of the studies performed for the Panoche Valley Solar Project, Golden Eagle presence in the Panoche Valley has not been well studied, and the effects of other solar projects (e.g. Topaz solar facility) near the project have not been reported. Based on the point count, UDA, aerial nesting survey information and incidental observations, it is apparent that Golden Eagles forage in and around Panoche Valley throughout the year. However, studies conducted for the Project indicate most Golden Eagles are flying across or through the Panoche Valley (i.e. Project Footprint/VFCL) to other habitat to forage or perch with a majority of the activity taking place on adjacent Conservation Lands which have elevations ranging from approximately 1,400 feet to 2,100 feet amsl. The UDA Study does show, as seen in the point count surveys, that the Golden Eagles are utilizing the hills in the VRCL on both the eastern and western sides of the UDA Study Area for perching, foraging, etc, rather than the Project Footprint.

Because the Project Footprint does not support significant populations of ground squirrels and other diurnal prey species (James McRacken, observation, June 25, 2013 through July 16, 2013); the present land management practices; the slopes within the valley; the lack of potential nesting structures (e.g.

mature trees); and the distance from existing nesting location makes the Project and VFCL less attractive to foraging Golden Eagles. Additionally, as found during the point count and the UDA studies, unless there is an attractant (i.e. food, carcass) found within the Project Footprint and the VFCL, the Golden Eagles usage of the site is minimal. Therefore, the Project Footprint does not appear to be an "important eagle-use area" because the studies show that the site does not have eagle nests, significant foraging areas, and no landscape features that eagles rely on for breeding, sheltering, or feeding.

In addition, the 2010 aerial nesting study did not identify any Golden Eagle nests within two miles of the Project Footprint and the 2014 survey results indicate no Golden Eagle nests within three miles. The closest active Golden Eagle nest to the Project Footprint in 2014 was located approximately 5.79 miles north-northwest of the Project Footprint.

Overall, the body of information regarding Golden Eagle use, abundance, and behavior (fall and winter point count and UDA surveys) in the Panoche Valley provides sufficient baseline information and data to conduct a risk assessment for Golden Eagles consistent with the requirements and standards set forth in the USFWS Eagle Conservation Guidelines.

Based on the information collected in the studies summarized above it does not appear that the Project Footprint is located in an important eagle-use area.

Bald Eagle

With no historical studies focused on Bald Eagles and the lack of observations during the Golden Eagle point counts, UDA and nesting surveys, and anecdotal observations made during Christmas Bird Counts, it has been determined that there is no risk to the Bald Eagle associated with the Panoche Valley Solar Project. Therefore, no further discussions about Bald Eagles will be addressed in this document.

4.0 RISK ANALYSIS (STAGE 3)

Per the USFWS recommendations, the Golden Eagle studies followed the Land-based Wind Energy Guidelines in Tier 3 and Stage 2 of the Eagle Conservation Guidance which includes site-specific surveys and assessments in anticipation of preparing this Eagle Conservation Plan (USFWS 2013). Data from the studies was used to determine any mortality projections for the Project.

4.1 Nesting and Breeding

The Project's risk to nesting and breeding Golden Eagles is discountable. The only documented minimal foraging use of the Project Footprint was on an animal carcass during the studies conducted. This lack of foraging activity is likely due to relatively poor foraging conditions and sparse prey base. In the Project Footprint, there are a limited number of potential nesting trees (*Eucalyptus* sp.) which are not suitable due to their height and branch structure (Hunt et al. 1998) and no suitable cliffs present. The 2010 and 2014 nesting surveys have shown that no nesting has taken place within two miles of the Project Footprint. As a result, there should be no disturbance from pre-construction, construction, or operation and maintenance activities that might disturb nesting Golden Eagles. Although no loss of nesting territories is anticipated based on the Project Footprint's proximity to the nearest documented active nest sites, development within the Project Footprint could result in potential loss of unutilized poor quality foraging habitat.

4.2 Fatality Estimates

At the time of the ECP preparation, no fatality studies for Golden Eagles from nearby solar projects were known. A report (*Avian Mortality at Solar Energy Facilities in Southern California: A Preliminary Analysis*) on bird mortality at three solar energy facilities in southern California was published by the National Fish and Wildlife Forensics Laboratory in April 2014. The facilities use different solar technologies, but avian mortality was documented at each site (Kagan et al. 2014). The study indicated that impacts to avian species from post-construction (i.e. operation) occurred at the Desert Sunlight Solar Farm in Riverside County, California. The study found avian fatalities were related to waterbirds and impact trauma from the solar cells. The result of the study indicated no raptor species fatalities, including Bald Eagles or Golden Eagles, were recorded at the photovoltaic solar study site even with numerous potentially active Golden Eagle nests found within a 10-mile radius of the Desert Sunlight Project. Overall, there does not appear to be outlying habitat elements, topographical features, or land use practices that would distinguish this Project from other photovoltaic solar facilities that would provide a discernable mortality risk for eagles.

Because there is no scientific evidence to suggest direct take of eagles will occur at a solar facility and potential impacts to the unutilized foraging habitat will be offset at greater than a 2:1 ratio (estimated to be approximately 9:1), no eagle fatalities are expected to result from the construction and operation of the Project.

4.3 Site Categorization Based on Mortality Risk to Eagles

The ECP Guidelines recommend a standardized approach to characterize risk and categorize the likelihood that a project will meet the standards for issuance of a programmatic eagle take permit.

Those categories are listed below.

- Category 1 — High risk to eagles/potential to avoid or mitigate impacts is low.
- Category 2 — High to moderate risk to eagles/opportunity to mitigate impacts.
- Category 3 — Minimal risk to eagles.

PVS is considered a Category 3 Project based on the risk analysis described above. PVS is considered minimal risk because the Project Footprint is not considered an important eagle use area or a fall migration concentration site from the results of the point count, UDA, and nesting studies. There is little to no risk of a direct take during Project construction or operation. The planned avoidance and minimization measures and compensatory mitigation for the unutilized foraging habitat loss will more than offset any Project related impacts. Additionally, it appears from recent surveys that no eagle nests or suitable nest sites are within two miles of the Project.

5.0 AVOIDANCE AND MINIMIZATION OF RISK, ADVANCED CONSERVATION PRACTICES, AND MITIGATION (STAGE 4)

PVS has adopted numerous avoidance and minimization measures, as well as compensatory mitigation for potential habitat loss, as part of its permitting and environmental compliance processes for the Project. The overall eagle conservation strategy includes two elements: 1) avoidance and minimization of risk, and 2) compensatory mitigation.

5.1 Project- and Population-Level Effects

5.1.1 Project-Level Effects

Without a conservation strategy which includes avoidance measures for construction and operation, and compensatory mitigation for habitat loss, the Project could introduce hazards onto the landscape and create other hazardous conditions for Golden Eagles within the Project Footprint.

5.1.2 Population-Level Effects

The construction of the Project will not have a significant impact on the overall population of Golden Eagles. The only impacts to Golden Eagles anticipated by the construction of the Project would be the loss of approximately 2,506 acres of unutilized minimal quality foraging habitat. The 2,506 acres of impacts is made up of 1,794 acres of permanent impacts and 712 acres of temporary impacts. The areas of temporary impacts will be restored after the construction of the Project. The Conservation Lands that will be set aside as mitigation will include foraging habitats utilized by Golden Eagles as stated in Section 3.0 of this document. These Conservation Lands will provide high quality habitat and will continue to support populations of Golden Eagles. Therefore the 24,176 acres of Conservation Land is suitable for Golden Eagle mitigation to compensate for any loss of existing potential foraging habitat caused from construction of the Project.

5.2 Construction and Operation and Maintenance-Related Avoidance and Minimization Measures

5.2.1 General Proposed Avoidance and Minimization Measures

PVS will implement the following best management practices (BMPs) and avoidance and minimization measures to minimize potential impacts on Golden Eagles during construction. Many of these measures are also described in the 2015 FSEIR for the Panoche Valley Solar Project.

1. Before commencing on-site construction activities, PVS will submit to CDFW and USFWS, the name, qualifications, business address, and contact information of one or more County-approved, qualified biologists. The Permittee shall ensure that each County-approved, qualified biologist is knowledgeable and experienced in the biology, and natural history of the special status species such as the Golden Eagle on the Project. The County-approved, qualified biologist(s) shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the take of Golden Eagles and to minimize disturbance of Golden Eagle foraging habitat. The County-approved, qualified biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place. All biological monitors

that work on-site will receive instruction from and report to the County-approved, qualified biologist(s).

2. Prior to surface disturbance or other covered activity, a County-approved, qualified biologist shall conduct a Workers Environmental Education Program on all resources and special status species (including Golden Eagles) for all Project personnel, which familiarizes the PVS employees and contractors with occurrence and distribution of Golden Eagles in areas impacted by the Action; take avoidance measures being implemented during the Project; and BMPs. This program is designed to ensure all personnel who work at the Project site are aware of and can identify Golden Eagles and the measures implemented to protect this species. An employee environmental awareness program will be administered to all employees prior to starting work on the Project.

3. Posters showing pictures of protected species, including Golden Eagles, with information and protocols to be followed will be placed in conspicuous locations (e.g. construction trailers). Verbiage will be in English and in Spanish.

4. A County-approved, qualified biologist or their representative shall be present while ground-disturbing activities are occurring. In addition to conducting preconstruction surveys, the biologist(s) shall aid crews in satisfying take avoidance criteria and implementing mitigation measures; will document (weekly) all pertinent information concerning effects on protected species; and shall assist in minimizing the adverse effects of construction activities on protected species.

5. County-approved, qualified biologists and biological monitors are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify the Applicant's environmental representative immediately.

6. PVS shall appoint a company representative who will be the contact source for any employee or contractor who inadvertently kills or injures a protected species or who finds a dead, injured, or entrapped protected species. The representative will be identified during the pre-performance educational briefing.

7. All spills of hazardous materials shall be cleaned up immediately in accordance with the Applicant's Spill Prevention Control Plan.

8. Pets are prohibited at the Action site with the exception of working dogs. Working dogs that assist ranchers are not considered pets. Any working dog entering the Project Footprint will be required to provide proof of inoculations to prevent disease transmission.

9. Firearms are prohibited within the Project Footprint.

10. All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from the Project Footprint.

11. The use of herbicides in areas impacted by the Project will be restricted to use within the prescriptions of the Weed Control Plan. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental

Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.

12. Any project-related electric distribution and substation structures will be designed and constructed following Avian Power Line Interaction Committee (APLIC)-based avian protection guidelines (APLIC 2006), where applicable, and the Avian Conservation Strategy prepared for the Project. The APLIC-based avian protection guidelines are designed to reduce avian electrocution risks that result from avian interactions with electric utility facilities. The goals of the Avian Conservation Strategy are to develop measures that, when implemented for the Project, will avoid and reduce potential impacts to birds during construction, O&M, and decommissioning of the Project; develop if necessary, effective post-construction monitoring and adaptive management procedures to guide management actions for the life of the Project; and develop a protocol for communication and reporting to the appropriate state and federal agencies.

5.2.2 Other Proposed Avoidance and Minimization Measures

The avoidance and minimization measures described below will be implemented during construction, operation, and maintenance (O&M) of the Project with regard to Golden Eagles. These additional measures are due to the requirements in the 2015 FSEIR.

1. PVS will conduct pre-construction surveys for nesting and breeding birds, including raptors. Surveys for nesting birds shall be conducted within the recognized breeding season in all areas within 500 feet of solar arrays, staging areas, substation sites, and access road locations. Surveys for raptors, shall be conducted for all areas between February 1 and August 15. If nesting Golden Eagles are identified, a 0.5-mile no activity buffer will be implemented. The required survey dates may be modified based on local conditions, as determined by the qualified biologist, with the approval of the County of San Benito.

   The prescribed buffers may be adjusted to reflect existing conditions including ambient noise, topography, and disturbance with the approval of the San Benito County as appropriate. The biological monitor(s) shall conduct regular monitoring of the nest to determine success/failure and to ensure that project activities are not conducted within the buffer(s) until the nesting cycle is complete or the nest fails. The biological monitor(s) shall be responsible for documenting the results of the surveys and ongoing monitoring and will provide a copy of the monitoring reports for impact areas to the respective agencies.

   Surveys shall be conducted to include all structural components of the solar arrays and related structures as well as all construction equipment. If raptors are found to be nesting in facility structures, buffers as described above shall be implemented.

2. To ensure the success of acquired mitigation lands, required for compensation of permanent impacts to vegetative communities and listed or special-status species, PVS shall retain a County-approved, qualified biologist to prepare a Habitat Management (HMP). The HMP will be submitted to the County of San Benito for approval, prior to the issuance of a construction permit.

3. PVS shall develop and implement measures to minimize O&M impacts and to significantly reduce fugitive dust emissions.

5.3 Advanced Conservation Practices (ACP)

Because there are no conservation measures that have been scientifically shown to reduce eagle disturbance at solar projects, the USFWS does not have any currently approved ACPs for solar energy projects. Therefore, no ACPs are proposed for this Project other than the practices noted above in Section 5.2 and the mitigation benefits of the Conservation Lands described below.

5.4 Mitigation

In addition to the avoidance and minimization measures described above, the Project will also implement a conservation package consisting of the permanent preservation and management of three large parcels of land (VFCL, VRCL, and SCRCL) to offset potential impacts to resources and species from Project construction totaling approximately 24,176 acres. These lands will be enhanced and managed for the species through implementation of a Habitat Management Plan. The lands were selected to provide local mitigation, preserve core populations of special status species and create permanent movement corridors with adjacent BLM controlled lands. Furthermore, as noted previously, the studies performed for Golden Eagles concluded that there was a greater use by Golden Eagle for foraging and roosting in the hills in the VRCL than within the Project or VFCL.

With the protection of these Conservation Lands, PVS shall compensate for permanent impacts to habitat for foraging Golden Eagles with the creation of permanent conservation easements. Conservation easements shall provide habitat preservation, in perpetuity at a ratio of 2:1 for all impacted acreage. These Conservation Lands are of equal or greater habitat quality and will support equal or greater populations of Golden Eagles, their prey species, and other available food sources such as carcasses. The avoidance, minimization and mitigation measures described above will reduce the potential risk to Golden Eagles and any potential impacts.

5.5 Effects of the Conservation Strategy

5.5.1 Methods

The population studies which include the point count study, the UDA study, and the aerial nesting surveys were developed and completed for the Project to determine the possibility and extent of potential impacts of the Project on the resident and migratory populations of Golden Eagles that utilize the Panoche Valley.

5.5.2 Project and Population-Level Effects

Project-level effects are expected to be minimal for the following reasons.

- The Project Footprint does not support significant populations of ground squirrels and other diurnal prey species for the Golden Eagle;
- As noted in the point count and the UDA studies, unless there is an attractant (i.e. animal carcass) found within the Project Footprint, that Golden Eagles usage of the Project Footprint is minimal. The UDA study also indicated that the Golden Eagles mostly are flying across or through the Panoche Valley to other habitat to forage or perch;

- The area is likely less attractive to foraging Golden Eagles due to lower prey availability, fewer perches to hunt from, poorer flight conditions for foraging (e.g. contour hunting), and greater levels of human disturbance within the valley;

- 2010 and 2014 aerial nesting study identified no Golden Eagle nests within two miles of the Project Footprint.

The Project will include all avoidance, minimization and mitigation measures pertaining to Golden Eagles and avoid the introduction of other hazards (e.g., prey attractants) into the Project to reduce the potential for Golden Eagle harassment, injury, or mortality. The mitigation strategy includes but is not limited to siting considerations, panel design, best management practices, incorporation of safety features into appurtenant facilities (e.g., transmission lines), compensatory mitigation, and adaptive management measures as described in the Project's 2015 FSEIR. The Project could result in an occasional indirect effect on individual eagles during operation; however, those effects are not anticipated to result in take.

The combination appropriately designed electrical facilities (e.g. APLIC guidelines), avoidance and minimization measures, and compensatory mitigation commitments (e.g. Conservation Lands) will result in no net loss to the Golden Eagle population from the Project's construction, operation, or maintenance. The addition of significant Conservation Lands could also benefit the existing and future Golden Eagle population. Therefore, the overall USFWS goal of maintaining stable or increasing breeding populations of Golden Eagles will be achieved.

5.5.3 Cumulative Effects

Analysis of cumulative effects typically considers the effects of a proposed project in combination with the effects of past, present, and reasonably foreseeable projects. To date, no other solar projects have been built in the vicinity of the Panoche Valley Solar Project. However, if in the future a solar facility is planned in the vicinity of the Panoche Valley Solar Project, that project will be subject to the same regulations, and will be required to ensure their effects are avoided, minimized, and mitigated, and that there is no net loss to the eagle population. Through implementation of the mitigation and avoidance measures, the cumulative effects on Golden Eagles, directly or indirectly would be considered less than significant as a result of the Project.

5.6 Summary and Conclusions

PVS will implement applicable [avian] safe electrical facility design guidelines (e.g. APLIC guidelines), avoidance measures, and conservation approach described above. The construction, operation and maintenance avoidance and minimization measures are expected to result in avoidance of direct effects to Golden Eagles during construction and long-term operations. Furthermore, the proposed compensatory mitigation will ensure that any impacts to Golden Eagle foraging habitat is mitigated to appropriate ratio. With implementation of these measures and particularly the compensatory mitigation, effects will be avoided, minimized, and mitigated, resulting in no net loss to the Golden Eagle population in the vicinity of the Project and achieving the overall USFWS goal of maintaining stable or increasing breeding populations of Golden Eagles.

6.0 POST-CONSTRUCTION MONITORING (STAGE 5)

An Avian Conservation Strategy (ACS) has been prepared for the Project. This Plan follows the guidelines outlined by USFWS and APLIC. This Plan includes monitoring strategies that will be conducted for two years following the solar facility becoming fully operational. The Applicant will conduct avian surveys within the Project Footprint in accordance with the ACS Plan.

Post-construction monitoring will facilitate documentation of any impacts (e.g. fatalities, injury, and disturbance) that might occur and will identify factors associated with potential avian impacts, which might warrant additional avoidance and minimization measures or improvement or elimination of avoidance and minimization measures found to be ineffective. Implementation of the proposed monitoring program will provide information to the USFWS, CFWS, San Benito County and PVS to assist in the evaluation of the effectiveness of the avoidance and minimization measures. As part of the Project's monitoring and reporting program, post-construction monitoring and reporting will be completed to determine whether baseline evaluations of impacts on avian species, including Golden Eagles, are consistent with operational outcomes.

The County-approved, qualified biologist will submit annual reports to the USFWS, CDFW and San Benito County describing the dates, durations, and results of monitoring and data collection. Original data sheets, photographs, and relevant shape files (if any) will be attached to the reports.

After the first year of data collection the biologist will prepare an overall report that describes the study design and results of the monitoring in the Project Footprint. Coordination with applicable agencies (USFWS, CDFW, and the County) will determine if avian monitoring will continue after the first two years of operation.

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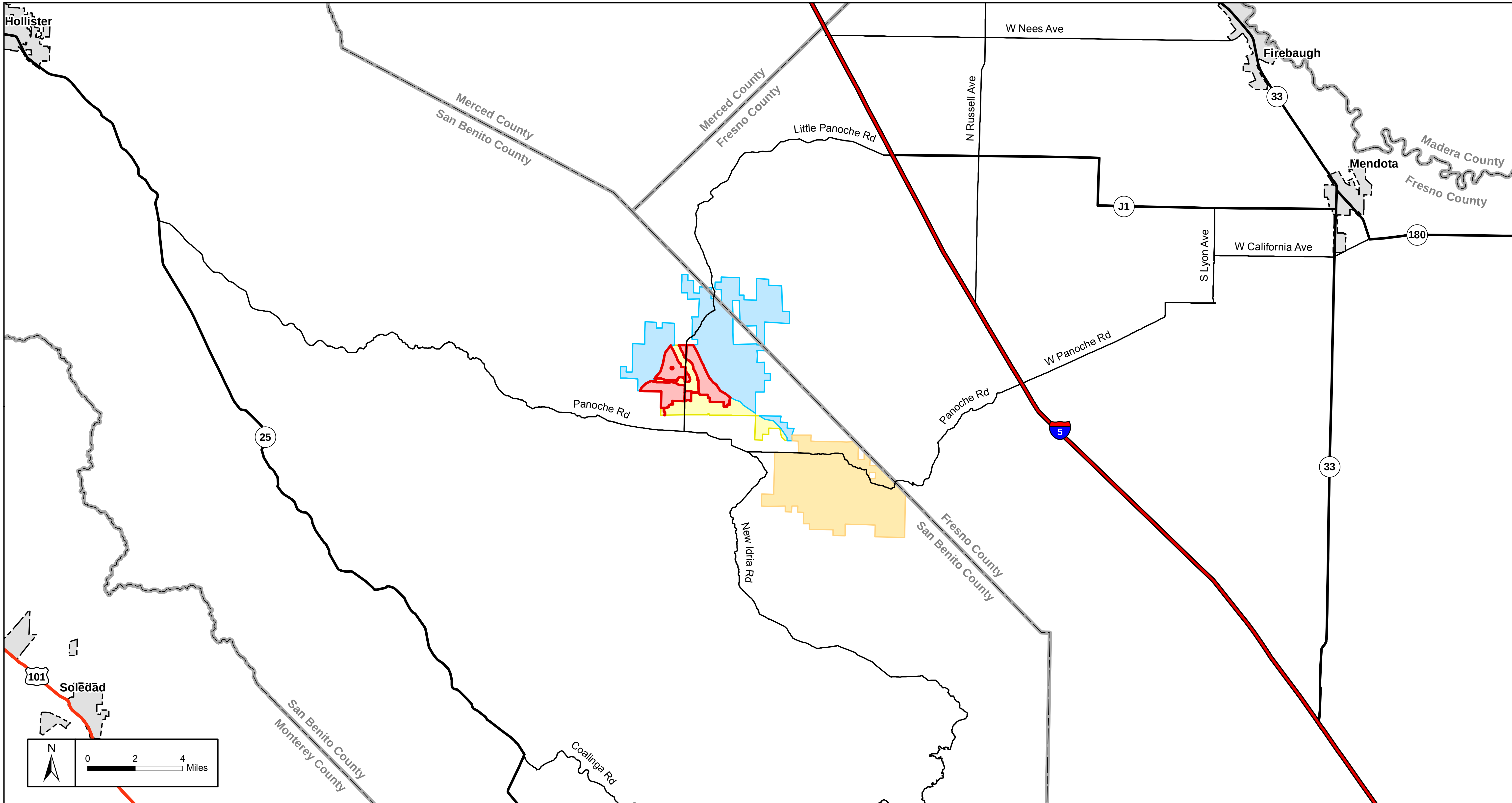
APPENDICES

Appendix A
Figures



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Energy Renewal
PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

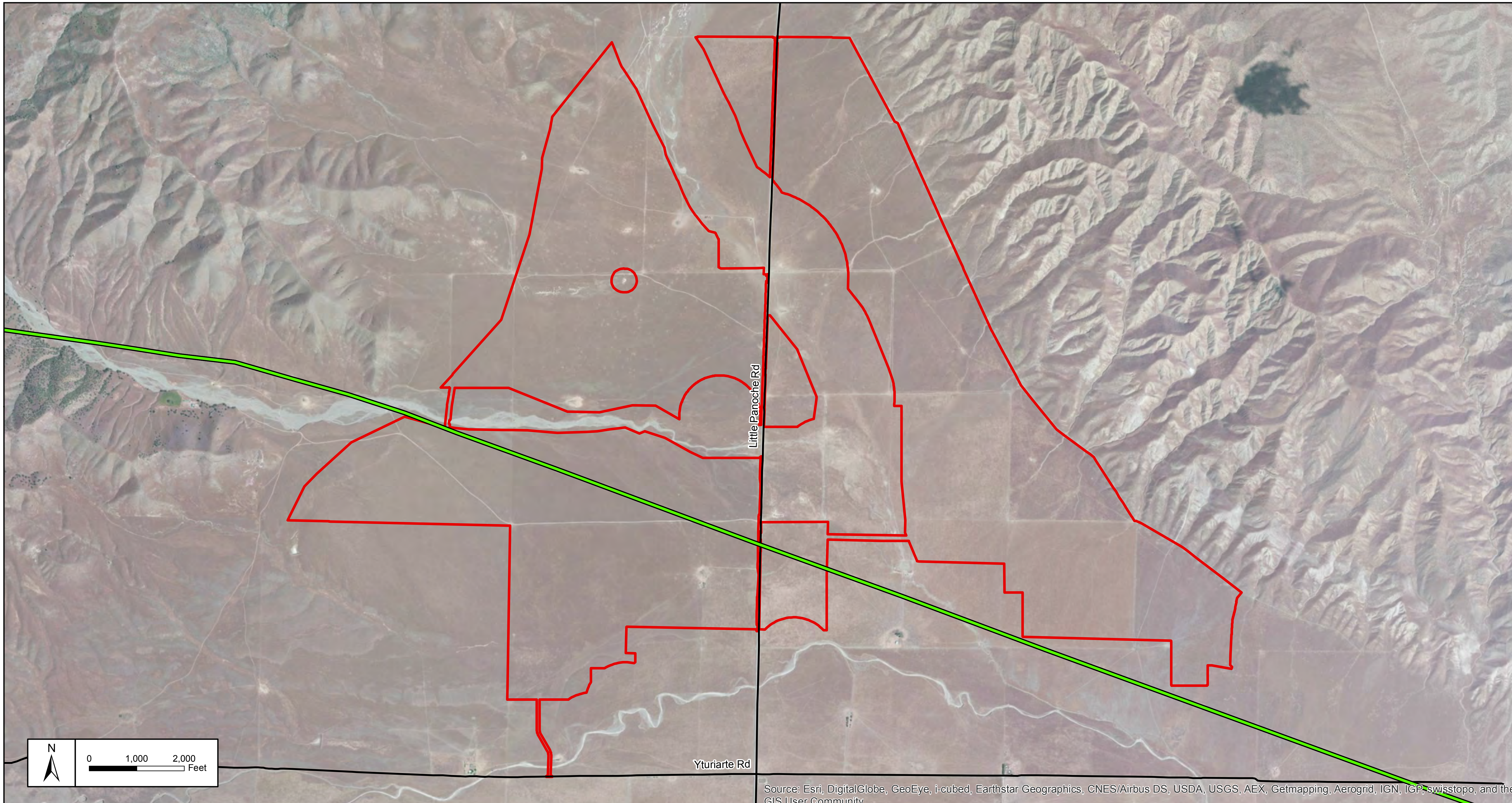
Panoche Valley Solar Project

Project Location

FIGURE

1

JH 2014-12-02



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Project Footprint

Existing Transmission Line

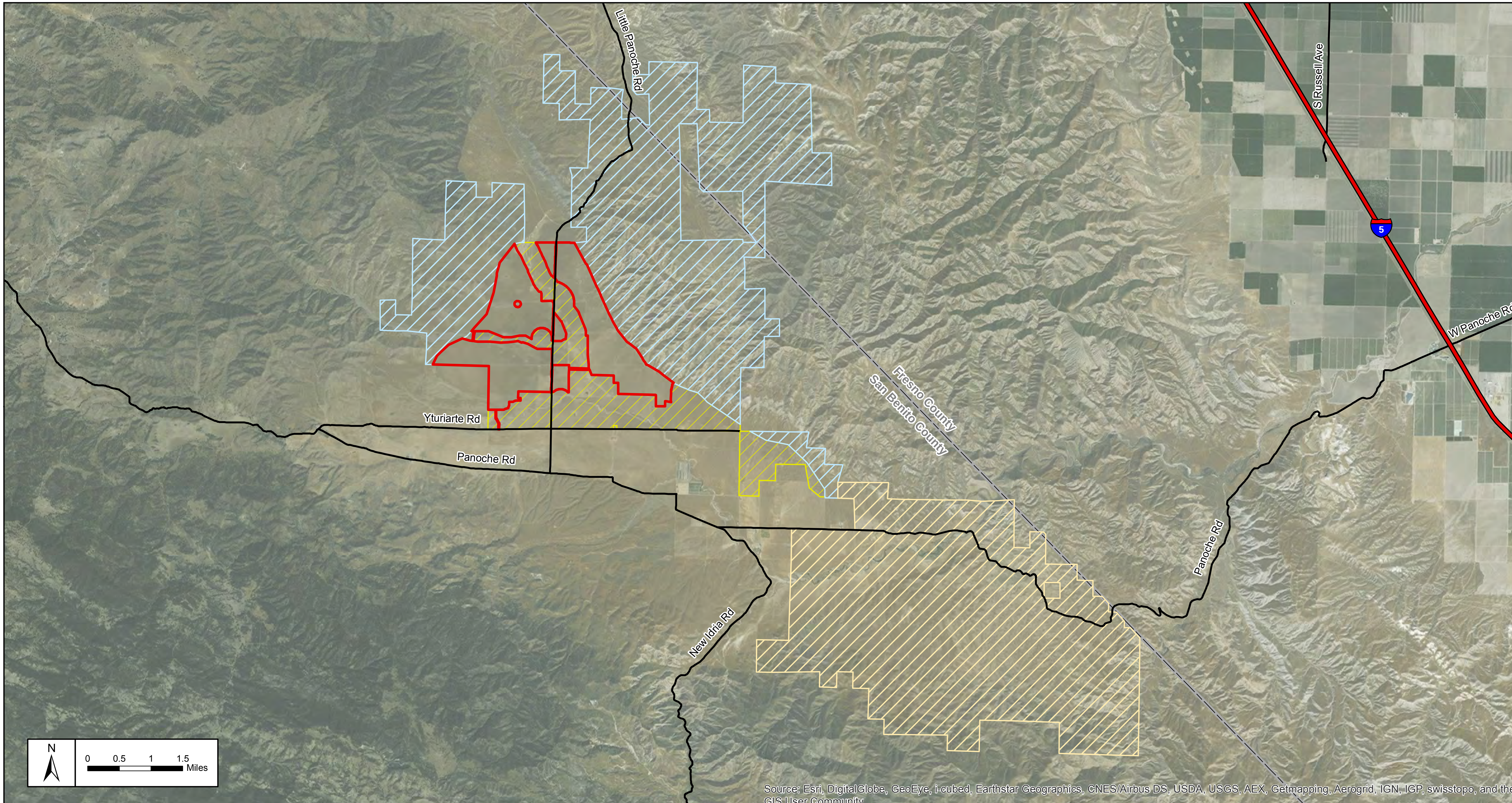
Panoche Valley Solar Project

Project Footprint

FIGURE

2

JH 2014-12-02



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

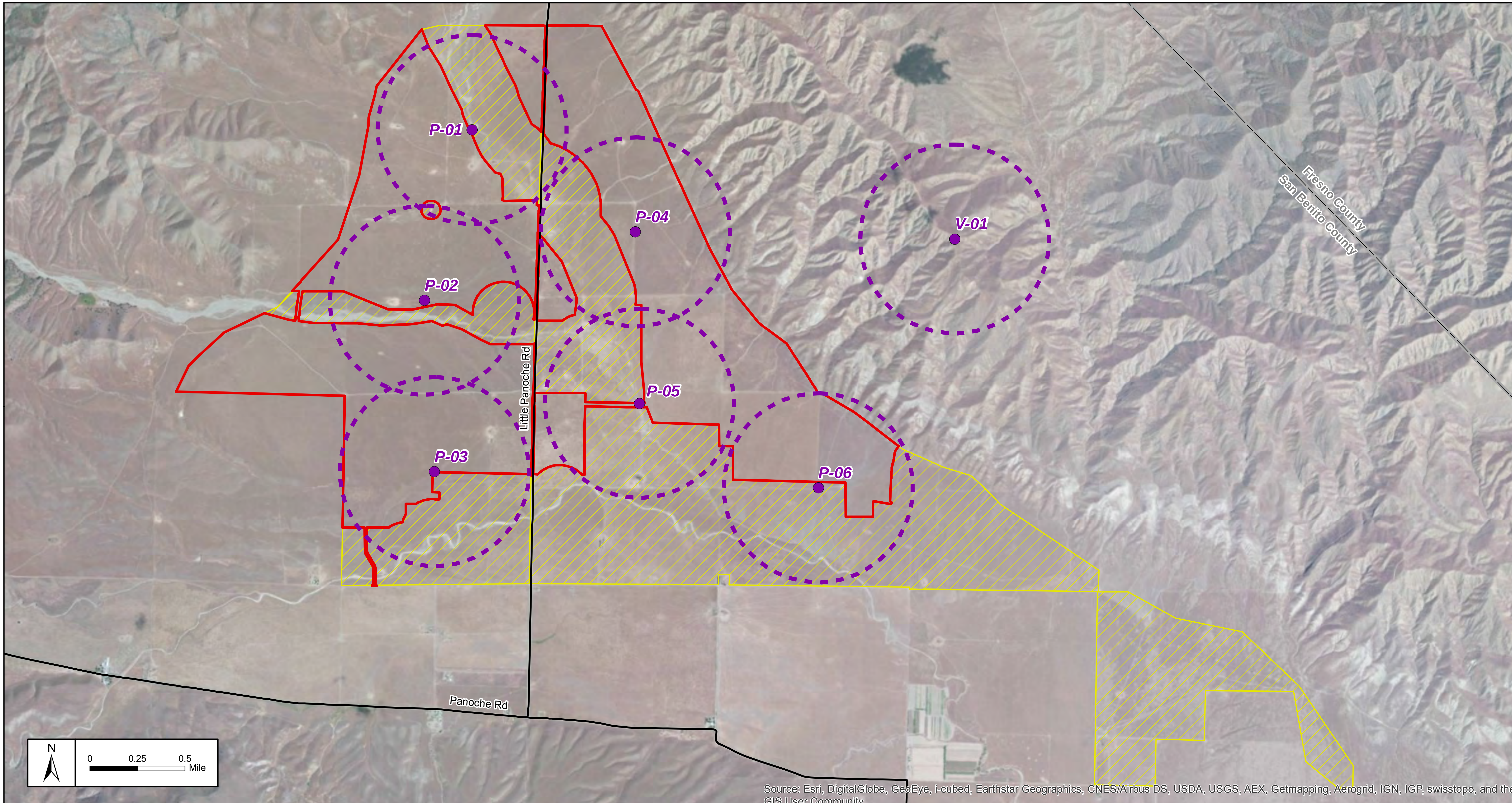
Panoche Valley Solar Project

Project Footprint and Conservation Lands

FIGURE

3

JH 2014-12-02



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Legend

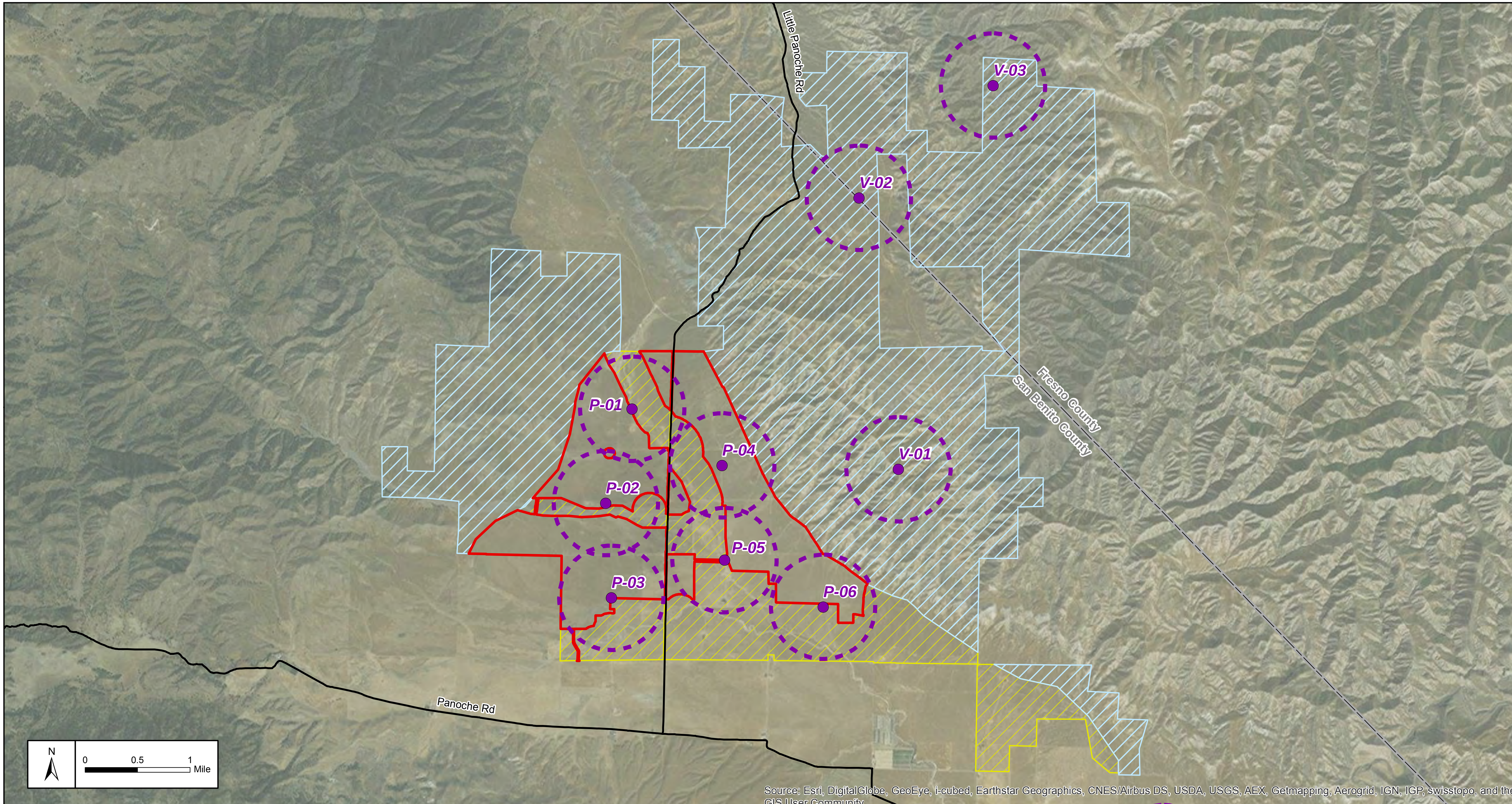
- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valley Floor Conservation Lands

Panoche Valley Solar Project

Point Count Stations
Project Footprint and Valley Floor Conservation Lands

FIGURE 4

JH 2014-12-02



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Legend

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

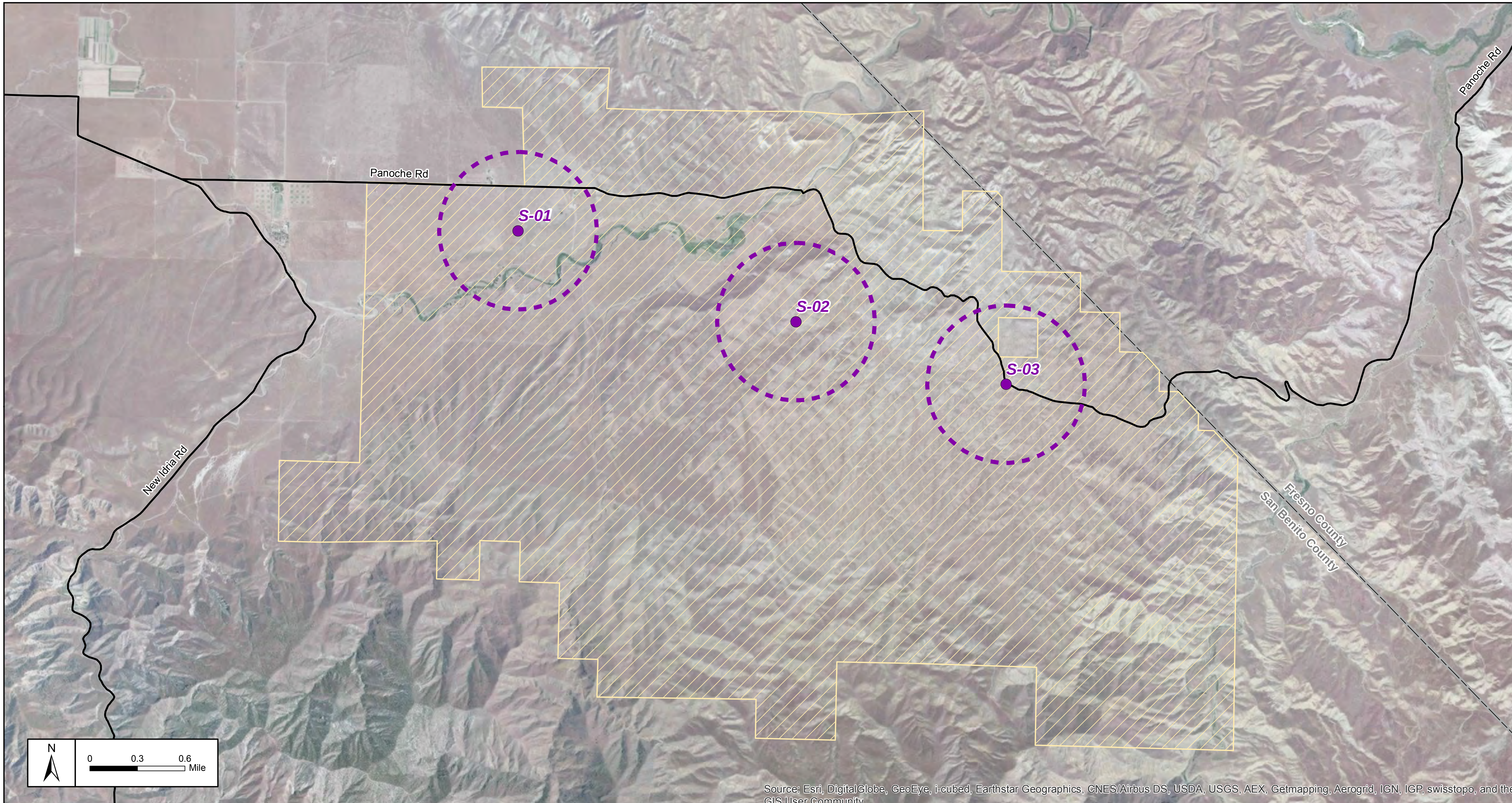
Panoche Valley Solar Project

Point Count Stations

Valadeao Ranch Conservation Lands

FIGURE 5

JH 2014-12-02



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Legend

- Point Count Station
- 800-meter Observation Area
- Silver Creek Ranch Conservation Lands

Panoche Valley Solar Project

Point Count Stations

Silver Creek Ranch Conservation Lands

FIGURE

6

JH 2014-12-02

Appendix B

Panoche Valley Solar Point Count Survey Study Report

Panoche Valley Solar Point Count

Survey Study Report

Panoche Valley Solar Project
San Benito County, California
April 2014

Image Courtesy of Michael Bumgardner

Prepared for:
Panoche Valley Solar, LLC
550 South Tryon
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Prepared by:
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Date:
April 2, 2014

Trisha Elizondo
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James McRacken Jr.
Senior Biologist

TABLE OF CONTENTS

Abbreviations and Acronyms

°F	Degrees Fahrenheit
AMSL	Above Mean Sea Level
BBCS	Bird and Bat Conservation Strategy
CNPS	California Native Plant Species
Duke Energy	Duke Energy Renewables
ECP	Eagle Conservation Plan
FEIR	Final Environmental Impact Report
GOEA	Golden eagle
GPS	Global positioning system
km	kilometer
MW	Megawatt
Project Footprint	The portion of the Proposed Project that includes the solar arrays and associated roads and equipment, totaling 2,492 acres.
Proposed Project	Panoche Valley Solar Project
PVS	Panoche Valley Solar, LLC
SCRCL	Silver Creek Ranch Conservation Lands
UDA	Utilization Distribution Assessment
USFWS	United States Fish and Wildlife Service
UTM	Universal Transverse Mercator
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands

1.0 Project Introduction and Background

Panoche Valley Solar, LLC (PVS) is proposing to construct the proposed Panoche Valley Solar Project (Proposed Project). PVS is proposing to construct the Proposed Project to operate an up to 399-Megawatt (MW) solar photovoltaic energy generation facility in San Benito County, California (Figure 1). The Proposed Project would be located approximately three-quarters of a mile north of the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County (Figure 2). The Proposed Project site is comprised of approximately 2,492 acres in the Panoche Valley and would also include approximately 24,185 acres of high quality Conservation Lands that are contiguous with the Proposed Project area (Figure 3).

On June 13, 2013, PVS consulted with the United States Fish and Wildlife Service (USFWS)-Ventura office concerning the requirement to prepare an Eagle Conservation Plan (ECP) and a Bird and Bat Conservation Strategy (BBCS) for the Proposed Project. It was determined during this discussion, the data presented in the 2010 Final Environmental Impact Report (FEIR) was dated, insufficient in coverage, and was conducted too late in the season. USFWS recommended a Phase II site-specific golden eagle (GOEA; *Aquila chrysaetos*) study be conducted (USFWS 2013).

This report documents the survey results of GOEA occurrence, frequency, and behavior conducted during the migratory and wintering phase (September through January) within the Proposed Project area and associated conservation lands in the Panoche Valley (Figure 3). The conservation lands include three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels. These parcels are called the Valley Floor Conservation Lands, the Valadeao Ranch Conservation Lands, and the Silver Creek Ranch Conservation Lands (Figure 3).

Additionally, aerial surveys conducted in January and March were completed to determine the number and locations of occupied nests and the approximate centers of occupied nesting territories of GOEA within a 10-mile radius centered on the Project Footprint. The results of these studies will be summarized in a separate report. Results of the combined studies will be used to prepare the ECP and the BBCS.

2.0 Study Purpose and Need

The Point Count and Utilization Distribution Assessment (UDA) studies were completed to provide baseline data on GOEA occurrence, frequency, and behavior to present results of spatial and temporal site use and potential risk based on time spent within the Proposed Project area.

3.0 Study Area

The Study Area includes the Proposed Project which is generally located approximately three-quarters of a mile north of the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County. This location is approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley. The Project Footprint is located within Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 of the United States Geologic Survey's Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche 7.5-minute topographic quadrangle maps. In addition to the Project Footprint, the Study Area also includes the Conservation Lands associated with the Proposed Project, which are located in both San Benito and Fresno counties within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27, and 32-36; Township 14S, Range 11E, Sections 19, and 29-32; Township 15S, Range 10E, Sections 1-8, and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6, and 8-12 (Figure 3).

The Study Area is comprised almost entirely of annual, non-native grasslands used mainly to graze cattle and sheep. The Study Area experiences a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates into the site's soils and flows in creeks and drainages when soil capacity has been reached.

The Study Area for this GOEA survey includes the habitats within the following areas:

- Project Footprint
- Conservation Lands associated with the project including the Valley Floor (VFCL), Valadeao Ranch (VRCL), and Silver Creek Ranch (SCRCL)areas

Project Footprint

The Project Footprint consists of the area within the fence line of the proposed solar facility and is composed of approximately 2,492 acres of rangeland. Historically, the Project Footprint was used for crop production; however, in the past approximately 40 years, the site has been used for cattle grazing. The site is surrounded by rangeland and bordered by hills of the Gabilan Range to the west and the Panoche Hills to the east. The topography of the site dips gently down to the east-southeast. The site elevation ranges from approximately 1,200 feet above mean sea level (amsl) near the southeast end of the site to approximately 1,400 feet amsl near the west end.

Prominent grass species within the Project Footprint include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum var. nitidum*), and vinegarweed (*Tricostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Areas which have not been previously disturbed by grazing or historic cultivation also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitaum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

Valley Floor, Silver Creek Ranch and Valadeao Ranch Conservation Lands

Project Conservation Lands include 3 areas totaling 24,185 acres that would be preserved in perpetuity for the benefit of the GOEA, as well as many other species of wildlife. An additional 2,523 acres interspersed throughout and adjacent to the Project Footprint would be left undisturbed and designated as the VFCL. In addition to the designation of the VFCL, the Proposed Action will include two large ranches for conservation purposes. These ranches, the VRCL (10,772 acres) and the SCRCL (10,890 acres), are contiguous with the Project site and each other (Figure 3).

<u>Valley Floor Conservation Lands</u>

The VFCL (approximately 2,523 acres) are contiguous with the Project Footprint, and primarily consist of the non-native annual grassland habitat found within the Project Footprint with some seasonal ponds and vernal and ephemeral pools, as well as the seasonally dry Panoche and Los Aquilas Creeks. The VFCL also includes the entire 100-year floodplain within the Proposed Project boundary on the valley floor.

The dominant vegetation in the VFCL includes ripgut brome, soft chess, red brome, foxtail barley, rat-tail fescue, broad-leaved filaree, red-stemmed filaree, shining peppergrass, and vinegarweed. Fiddleneck, devils lettuce, shepherds purse, turkey mullein, and bur clover were also common, especially in disturbed areas. Areas which have not been previously disturbed include a variety of native wildflowers such as blow wives, blue dicks, California gold fields, yellow daisy tidy-tips, and California creamcups.

<u>Valadeao Ranch Conservation Lands</u>

The VRCL (approximately 10,772 acres) are contiguous with the Project Footprint directly to the west, east, and northeast of the site (Figure 3). These lands are also contiguous with the VFCL and Silver Creek Ranch Conservation Lands (SCRCL). The VRCL include several seasonal drainages. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent. Elevations on the VRCL range from approximately

1,400 feet to 2,100 feet above mean sea level (amsl). The property which is currently grazed is dominated by introduced annual grasslands (approximately 6,700 acres), which have a very similar species makeup to the Project Footprint and VFCL. This property also mostly consists of ephedra shrubland (approximately 2,700 acres), barrens, and saltbush shrubland.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to Introduced Annual Grasslands.

Plant associations that are noted to occur within the Ephedra shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub. Ephedra Shrublands occur in the VRCL portion of Las Aquilas Creek in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, ephemeral drainages, and steep, rocky, and thin-soiled south-facing slopes.

Barrens are ridgelines and south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia macrostachys*.

The saltbush shrubland habitat consists of nearly pure to mixed stands of saltbush (*Atriplex polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest *Atriplex polycarpa* cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two plant associations exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages 5 to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *Eriogonum fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens that are often present on adjacent slopes of similar aspect. Shrub canopies are confined to wash edges due to trampling by cattle, and average cover rarely exceeds 10 percent.

Silver Creek Ranch Conservation Lands

The SCRCL (approximately 10,890 acres), which is currently being with grazed with livestock, is located southeast of the Project Footprint (Figure 3). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well drained and moderately permeable. SCRCL contains approximately 5,765 acres with slopes between 0 and 11 percent.

SCRCL are dominated by non-native species (approximately 8,400 acres), with the same species found on the Project Footprint and on the other conservation lands, distributed sparsely over the landscape. The other major habitats on this conservation lands includes ephedra shrubland (approximately 2,260 acres) with similar species noted on the VRCL and riparian/wetland habitat.

The riparian habitats occur along the Panoche and Silver Creeks. The Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.). Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site, both upstream and downstream. In this area, saltgrass (*Distichlis spicata*) appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site for at least three miles was observed to be completely dry and largely devoid of plants. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (*Typha* Herbaceous Alliance) centrally, *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge and *Frankenia salina* and *Juncus mexicanus*. Trees are largely absent, as are species adapted to a floating or submerged habitat.

4.0 Methodology

Per the USFWS recommendations, the GOEA studies followed the Wind Energy Guidelines in Tier 3, Stage 2 of which includes site-specific surveys and assessments in anticipation of ECP preparation (USFWS 2013). These site specific surveys included:

- Point Count Surveys (i.e., fixed-radius circular plot surveys) within the project footprint and Conservation Lands (conducted summer, fall, and winter of 2013/2014);
- Utilization Distribution Assessment (UDA) within the project footprint and VFCL (conducted summer, fall, and winter of 2013/2014); and
- Aerial survey of Project-area nesting population, location, and number of occupied eagle nests within a 10 mile radius of the Proposed Project center (results provided in separate report).

4.1 Point Count Surveys

The surveys for GOEA resources were conducted through the use of point counts that were conducted at established point count stations (Cooperrider et al. 1986; Hamel et al. 1996; Ralph et al. 1993; Ralph et al. 1995). Six point count stations were located within Project Footprint and VFCL (Figure 4) to ensure a minimum spatial coverage of at least 30 percent of the Project Footprint (USFWS 2013). Six point count stations were also located within the VRCL and the SCRCL (Figures 5 and 6). Three point count stations were located in the VRCL (Figure 5) and three point count stations in the SCRCL (Figure 6). The coverage for the VRCL and SCRCL is less than 30 percent, but provides adequate observations of GOEA use in these areas.

The survey locations were established by creating point count stations within an 800 meter (2,625 feet) radius observation area. The center point of each plot was geo-referenced using a global positioning system (GPS). The boundary of each point count plot was identified via distinct natural or any anthropogenic features at several points for distance reference.

The point count surveys consisted of observers recording GOEA detections from the point count stations for two hours at each point count station (Figures 4, 5, and 6) and recorded on point count field forms (Appendix A) (Pagel et al. 2010; USFWS 2013). The GOEA surveys were conducted between daylight hours (sunrise to sunset) on a bi-weekly basis from September 3, 2013 to January 24, 2014. During the fall migration, when possible, surveys were completed during midday to increase sampling efficiency by temporally stratifying surveys to cover the midday period during migration (CA Energy Commission 2007; USFWS 2013).

During the point count surveys, the observers, which were trained and their skills tested for GOEA observations (e.g. species, age class, activity), stayed with their vehicle to remain inconspicuous, which decreased the possibility that an individual eagle would avoid observers, which could reduce the likelihood of detection. The observers performed systematic scans of the point count plot using binoculars alternated with unaided eye scans to detect GOEA.

The data collected during each point count station survey beyond the typical conditions information (e.g. date, time, temperature, wind speed and direction, and etc.) included the number of GOEA seen, age class, GOEA activity/behavior, flight paths, estimated flight height and location in plot, and general description of observations.

The age class of the GOEA were broken down into juvenile eagles (first year), immature or subadult eagles (second to fourth year), adult eagles (fifth year or greater), or unknown (eagles where age class could not be determined due to distance, etc.). The activity/behavior data collected noted the prevalent behavior during each one-minute interval as soaring flight (circling broadly with wings outstretched); unidirectional flapping gliding; kiting-hovering; stooping or diving at prey; stooping or diving in an agonistic context with other eagles or other bird species; undulating/territorial flight; perched; or other. The flight path data included GOEA inside, as well as outside the plot. The flights were recorded on the point count data forms for each point count station (Appendix B).

In addition to the GOEA point count surveys and the UDA data, any miscellaneous observations information gathered during the 2013 PVS giant kangaroo rat and blunt- nosed leopard lizard surveys, conducted in March through September, 2013, was also used to supplement the point count/UDA data (Appendix C).

4.2 Utilization Distribution Assessment (UDA)

In addition to the point count surveys, a UDA for GOEA was completed during the survey season. The UDA was completed to document the GOEA spatial distribution of use on the Proposed Project Footprint. The observation data was noted on field maps (Appendix B) and then convert the data into GIS formats for analyses. The field maps were created by placing a grid of square cells, each 0.5 x 0.5 kilometer (km), which was framed by a Universal Transverse Mercator (UTM) system across a map of the PVS Project Footprint to record eagle observations in each 0.25 km^2 cell (Figure 7).

The Project Footprint/VFCL was divided into non-overlapping observation sectors centered on a designated Observation Point, each with a vantage point. The point count stations were utilized for the UDA Observation Points (Figure 7). These locations afforded an unobstructed viewing of the grid cells to more than one km in all directions. The UDA observation periods were conducted for two hours and were added to each point count survey period for the Project Footprint/VFCL. The UDA was not conducted on the VRCL and the SCRCL since they are outside of the Project Footprint.

During the UDA, when necessary, the observers worked together with the use of hand-held radios from separate vantage points to pinpoint the location(s) of GOEA through triangulation. This communication between observers also eliminated the duplication of GOEA sightings. The data recorded by the observers during the UDA included GOEA activity/behavior and flight path and location. The prevalent activity/behavior of each GOEA was recorded in one-minute interval as soaring flight (circling broadly with wings outstretched); unidirectional flapping gliding; kiting-hovering; stooping or diving at prey; stooping or diving in an agonistic context with other eagles or other bird species; undulating/territorial flight; perched; or other. The flight paths and location data was recorded on the gridded field maps (Appendix B), using topographic features or distance indicators as location references.

The data was analyzed by simply counting the number of flights intersecting each cell. If the data set had been larger, a specific GOEAs distribution of use would have been estimated by using standard kernel analyses (USFWS 2013).

5.0 Discussion, Analysis and Results

This discussion, analysis, and results section presents a compilation of the data that was gathered during the surveys point count and UDA surveys for GOEA. As stated previously, the surveys for GOEA resources were conducted through use of point counts and UDA surveys at 12 established stations within the PVS Project Footprint; Conservation lands associated with the Project include the Valley Floor, Valadeao Ranch, and Silver Creek Ranch areas.

Survey events occurred every other week between the weeks of September 3, 2013 until January 24, 2014, for a total of 11 survey events. Each survey event was made up of 12 point counts surveys that lasted 2 hours each and 6 UDA surveys which were also 2 hours each. The total hours surveying for GOEA during each survey event was 36 hours. This gives an overall total of 396 hours of survey time within the Project area. The overall sightings of GOEA during the surveys, excluding the aerial surveys, was 94. Weather was generally conducive to GOEA surveys; temperatures ranged between 20-97˚F, and winds ranged between 0 and 19.5 miles per hour (mph), though were typically less than 8 mph, nothing but a trace of rain throughout the surveys, and visibility that ranged from 80% to 100% (Appendix D).

5.1 Point Count Surveys

As stated previously, six point count stations (P-01 to P-06) were located within Project Footprint and VFCL (Figure 4), and six point count stations were located within Valadeao Ranch and Silver Creek Ranch Conservation Lands (Figures 5 and 6). Three point count stations were located in the VRCL (Figure 5) and three point count stations in the SCRCL (Figure 6).

The results of the point count surveys included a total of 61 observations of GOEA. This total includes 23 individual observations of GOEA seen within the point count plot boundaries and 38 observations outside the plot boundaries (Tables 1 and 2).

Table 1. Total GOEA by Survey Event

Survey Event	Total GOEA Observed (inside and out of boundaries)	Observation Location (Inside Point Count/Outside)	Juvenile GOEA (Inside Point Count/Outside)	Subadult GOEA (Inside Point Count/Outside)	Adult (Inside Point Count/Outside)	Unknown Age (Inside Point Count/Outside)
1st (September 3 -5, 2013)	10	2/8	0/0	0/0	2/0	0/8
2nd (September 17-19, 2013)	21[1]	9/12	2/0	1/0	3/2	2/10
3rd October 2-4, 2013	1	1/0	0/0	0/0	1/0	0/0
4th October 15-17, 2013	5	3/2	0/0	0/0	3/2	0/0
5th October 28-30, 2013	4	1/3	0/1	0/0	1/1	0/1
6th November 11-13, 2013	7	0/7	0/0	0/0	0/1	0/6
7th November 25-27, 2013	3	0/3	0/0	0/0	0/0	0/3
8th December 9-11, 2013	2	1/1	0/0	0/0	0/0	1/1
9th December 21-23, 2013	2	0/2	0/0	0/0	0/2	0/0
10th January 7-9, 2014	5	5/0	2/0	1/0	1/0	1/0
11th January 22-24, 2014	1	1/0	0/0	0/0	1/0	0/0

[1] - Data includes several GOEA (approx. 7 GOEA) that were feeding on a carcass of a dead cow inside the project boundary and GOEA stayed at carcass during point count and UDA.

Table 2. GOEA by Point Count Station

	Project Footprint/Valley Floor CL						Valadeao Ranch CL			Silver Creek Ranch CL			Age Class Total
Age Class	**P-01**	**P-02**	**P-03**	**P-04**	**P-05**	**P-06**	**V-01**	**V-02**	**V-03**	**S-01**	**S-02**	**S-03**	
Juvenile	2/1[1]	0/0	0/0	1/0	0/0	0/0	0/0	2/0	0/0	0/0	0/0	0/0	6
Sub-Adult	1/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	2
Adult	5/2	2/2	0/2	0/0	0/1	0/0	2/0	0/0	0/0	0/0	1/0	2/1	20
Unknown	2/10	0/3	1/0	0/0	0/7	0/0	0/0	0/5	0/2	0/0	1/1	0/1	33
Total – Inside/Out	10/13[2]	2/5	2/2	1/0	0/8	0/0	2/0	2/5	0/2	0/0	2/1	2/2	
Total	23	7	4	1	8	0	2	7	2	0	3	4	61

[1] - Numbers of GOEA observed inside point count plot/outside point count plot
[2] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead animal inside the P-01 boundaries.

Project Footprint/Valley Floor Conservation Lands

The GOEA observations in the Project Footprint/VFCL totaled 43 GOEA, with 15 observations within the point count plot boundaries and 28 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class (Table 2). The GOEA observation on the Project Footprint/Valley Floor Conservation Lands were made up of four juveniles, three inside the point count plot boundaries and one observation outside the plot boundaries. There were two subadult GOEA observed within the point count plot boundaries and none outside. The surveys also found 14 adult GOEA observations within the Project Footprint/Valley Floor Conservation Lands areas, with 7 adults being seen inside the plot boundaries, and 7 adult GOEA observed outside the plot boundaries. Furthermore, there were 23 GOEA observations where the age class could not be determined and were categorized as unknown (Table 2). A majority of the unknown age class observations were due to the distance between the observer and the GOEA.

The point count station with the highest number of observations of GOEA, both inside and outside the plot boundaries, was P-01 (Figure 4) with a total of 23 GOEA observations (10 inside/13 outside) (Table 2). Note that the reasons for the high number of GOEA observations at this point count station was due to numerous GOEA observed utilizing the hills of the VRCL and the hills to the west of the VRCL for perching, foraging, etc. An additional event elevated the number of GOEA observed at this point. During the second survey event (September 17-19, 2013), 7 GOEA were observed feeding on a carcass of a dead animal (i.e. cattle) during the entire point count survey period (Table 1). The point count station with the lowest number of GOEA observations during the survey season was P-06 (Figure 4) with no GOEA observed during all of the point count surveys (Table 2).

Of the 15 GOEA observations within the Project Footprint/Valley Floor Conservation Lands observed within the point count plots, over half of the observations (8 GOEA) were seen within the month of September (Table 3). As previously stated, during the second survey event (September 17-19, 2013), 7 GOEA were observed feeding on a carcass of a dead animal during the entire point count survey period. The next highest number of observations during a month was the events in October with four GOEA (Table 3). The observation numbers for the other months included two observations in January, one GOEA observation in December, and no observations of GOEA in November within the Project Footprint/Valley Floor Conservation Lands during the point count surveys (Table 3).

Table 3.Survey Event Results for Project Footprint/Valley Floor Conservation Lands

Survey Event	P-01	P-02	P-03	P-04	P-05	P-06	Total
1st (September 3 -5, 2013)	0	0	0	0	0	0	**0**
2nd (September 17-19, 2013)	7[1]	0	1	0	0	0	**8**
3rd (October 2-4, 2013)	1	0	0	0	0	0	**1**
4th (October 15-17, 2013)	1	2	0	0	0	0	**3**
5th (October 28-30, 2013)	0	0	0	0	0	0	**0**
6th (November 11-13, 2013)	0	0	0	0	0	0	**0**
7th (November 25-27, 2013)	0	0	0	0	0	0	**0**
8th (December 9-11, 2013)	0	0	1	0	0	0	**1**
9th (December 21-23, 2013)	0	0	0	0	0	0	**0**
10th (January 7-9, 2014)	1	0	0	1	0	0	**2**
11th (January 22-24, 2014)	0	0	0	0	0	0	**0**
Total	**10**	**2**	**2**	**1**	**0**	**0**	**15**

[1] - Data includes several GOEA that were feeding on a carcass of a dead animal inside the plot boundary.

Valadeao Ranch Conservation Lands

The GOEA observations in the VRCL totaled 11 GOEA with 4 observations within the point count plot boundaries and 7 observations outside the plot boundaries for the entire survey season (Table 2). These observations were also categorized by their age class. The GOEA observations on the Valadeao Ranch Conservation Lands were made up of 2 juveniles, all inside the point count plot boundaries. There were no subadult GOEA observed within the point count plot boundaries or outside the plot boundaries. The surveys also found 2 adult GOEA observations within the Valadeao Ranch Conservation Lands areas with all being seen inside the plot boundaries. Furthermore, there were 7 unknown age class observations that were observed outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the GOEA.

The point count station with the highest number of observations of GOEA, both inside and outside the plot boundaries was V-02 (Figure 5) with a total of 7 GOEA observations (2 inside/5 outside) (Table 2). The point count stations with the lowest number of GOEA observations during the survey season was V-01 and V-03 (Figure 5) with 2 GOEA observations each (Table 2). V-01 had 2 GOEA observations inside the plot boundaries, and V-03 had 2 observed outside the plot boundaries (Table 2).

Of the 4 GOEA observations within the VRCL observed within the point count plots, 75% of the observations (3 GOEA) were seen within the month of September (Table 4). The next highest number of observations during a month was the events in January with 1 GOEA observation. For the months of October, November, and December, no observations of GOEA were made within the VRCL during the point count surveys (Table 4).

Table 4. Survey Event Results for Valadeao Ranch/Silver Creek Ranch Conservation Lands

Survey Event	V-01	V-02	V-03	S-01	S-02	S-03	Total
1st (September 3 -5, 2013)	2	0	0	0	0	0	2
2nd (September 17-19, 2013)	0	1	0	0	0	0	1
3rd (October 2-4, 2013)	0	0	0	0	0	0	0
4th (October 15-17, 2013)	0	0	0	0	0	0	0
5th (October 28-30, 2013)	0	0	0	0	0	1	1
6th (November 11-13, 2013)	0	0	0	0	0	0	0
7th (November 25-27, 2013)	0	0	0	0	0	0	0
8th (December 9-11, 2013)	0	0	0	0	0	0	0
9th (December 21-23, 2013)	0	0	0	0	0	0	0
10th (January 7-9, 2014)	0	1	0	0	2	0	3
11th (January 22-24, 2014)	0	0	0	0	0	1	1
Total	**2**	**2**	**0**	**0**	**2**	**2**	**8**

Silver Creek Ranch Conservation Lands

The GOEA observations in the SCRCL totaled 7 GOEA with four observations within the point count plot boundaries (Figure 6) and 3 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class (Table 2). The GOEA observations on the SCRCL had no juvenile or subadult eagles inside or outside the point count plot boundaries. The surveys found 4 adult GOEA observations within the SCRCL areas with 3 observations inside the plot boundaries and one observation outside the plot boundaries. Furthermore, there were 3 unknown age class observations with 1 observation inside the plot boundaries and 2 observations outside the plot boundaries (Table 2). The unknown age class observations were due to the distance between the observer and the GOEA.

The point count station in the SCRCL with the highest number of observations of GOEA, both inside and outside the plot boundaries was S-03 (Figure 6) with a total of 4 GOEA observations (2 inside/2 outside) (Table 2). The point count stations with the lowest number of GOEA observations during the survey season was V-01 and V-03 (Figure 6) with 2 GOEA observations each. V-01 had 2 GOEA observations inside the plot boundaries and V-03 had 2 observed outside the plot boundaries (Table 2). The point count station with the lowest number of GOEA observations during the survey season was S-01 (Figure 2) with no GOEA observed during all of the point count surveys.

Of the 4 GOEA observations within the SCRCL observed within the point count plots, 75% of the observations (three GOEA) were seen within the month of January (Table 4). The next highest number of observations during a month was the events in October with 1 GOEA observation. For the months of September, November, and December, no observations of GOEA were made within the SCRCL during the point count surveys (Table 4).

5.2 Utilization Distribution Assessment (UDA)

Like the Point Count Survey events, the UDA Survey events occurred every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. Each survey event was made up of 6 UDA surveys from designated Observation Points (Figure 7) for 2 hours each. The total hours surveying for GOEA during the UDA study was 132 hours of survey time within the Project Footprint/VFCL.

The results of the UDA surveys included a total of 33 observations of GOEA (Table 5) which includes observations inside the Project Footprint/ VFCL (the UDA Study Area) and outside the UDA Study Area. Of those 33 observations, 16 GOEA observations were recorded within the UDA Study Area (Table 5) with 5 identified as adult GOEA, 3 as subadult GOEA, 4 as juvenile GOEA, and 4 birds were not able to be identified by age class (Table 6).

Table 5. Total UDA Observations

Date of Observation	UDA Observation Point	Observation Location - In or Out of UDA Study Area	Age Class	Flight Height (feet)	Observation Minutes
9/4/2013	P-06	In	SA	150	5
9/17/2013[1]	P-01	In	UK	0[2]	10
9/17/2013	P-01	In	UK	0	120
9/17/2013	P-01	In	AD	0	80
9/17/2013	P-01	Out	UKN	200-300	16
9/17/2013	P-01	Out	UKN	200-300	16
9/17/2013	P-01	Out	UKN	200-300	16
9/17/2013	P-01	In	JUV	0	52
9/17/2013	P-01	Out	UKN	350	11
9/17/2013	P-01	In	UKN	0	15
9/17/2013	P-01	In	UKN	0	8
9/17/2013	P-02	In	JUV	NR	6
9/18/2013	P-05	In	AD	120	4
9/18/2013	P-06	Out	UKN	100	13
10/3/2013	P-03	In	AD	150-300	2
10/3/2013	P-03	Out	JUV	150-300	2
10/3/2013	P-03	Out	AD	150-300	2
10/3/2013	P-05	Out	JUV	800	2
10/16/2013	P-03	Out	AD	50-200	6
10/16/2013	P-03	Out	AD	50-200	6
10/16/2013	P-03	Out	UKN	150-200	3
10/16/2013	P-03	Out	UKN	150-200	3
10/16/2013	P-04	In	JUV	400 - 800	7
10/28/2013	P-01	Out	UKN	250	1
10/30/2013	P-02	In	SA	200 - 1,000	13
11/12/2013	P-06	In	AD	150	3
11/12/2013	P-06	In	AD	100	3
12/9/2013	P-02	Out	UK	1100	6
12/21/2013	P-04	Out	JUV	NR	19
12/21/2013	P-04	Out	JUV	NR	30
12/21/2013	P-04	Out	AD	NR	5
1/8/2014	P-01	In	SA	0	120
1/22/2014	P-02	In	JUV	200	4

AD – Adult, SA – Subadult, JUV – Juvenile, UKN – Unknown age, NG – Not Recorded
[1] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead animal inside the P-01 boundaries on September 17, 2013.
[2] – 0 feet flight height indicates perched on ground or rock.

Table 6. UDA Survey Overview by Age Class/Survey Point within Study Area

Age Class	P-01	P-02	P-03	P-04	P-05	P-06	Totals by Age Class
Juvenile	1	2	0	1	0	0	4
Sub-Adult	1	1	0	0	0	1	3
Adult	1	0	1	0	1	2	5
Unknown	4	0	0	0	0	0	4
Total per Observation Station	7[1]	3	1	1	1	3	

[1] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead cow inside the P-01 boundaries.

Table 5 indicates the majority of the GOEA observations came from outside the UDA Study Area near Observation Points P-01 and P-03 (Figure 7). This is due to numerous sightings of GOEA observed utilizing the hills of the western portion of the VRCL and the hills beyond the western portion of the VRCL for perching, foraging, etc.

During the UDA surveys there were 452 observation minutes of GOEA inside the UDA Study Area and 157 observation minutes of GOEA outside the UDA Study Area for a total of 609 observation minutes for the entire study period. Note that totals for the UDA study included several GOEA that were observed feeding on a carcass of a dead animal (cattle) inside the UDA Study Area near P-01 within Grid Cell 79 (Figure 7) and remained on the carcass a majority of the UDA survey event on September 17, 2013. These observations made up 63% (285 observation minutes) of the observation time for GOEA for the UDA Study. In addition, the observation time (120 observation minutes) for a subadult eagle noted on January 8, 2014, that perched on the hillside for the entire UDA survey period near P-01, make up 90% of the observation minutes made during the entire study within the UDA Study Area.

The average observed flight height noted during the study, excluding perched GOEA, for all observations of GOEA made during the UDA surveys, was approximately 300 feet above ground level. The average flight height for the GOEA observations noted inside the UDA Study Area was similar with an average flight above ground level of approximately 270 feet (Table 5).

Lastly, due to the small size of the data set, only 16 GOEA flight observations that utilized 57 grid cells within the UDA Study Area (Figure 8), a standard kernel analyses was unable to be utilized. The data was analyzed by calculating the number of flights intersecting an individual grid cell (Figure 8). With exception of the several GOEA observed feeding on a carcass in Grid Cell 79, the cells noted to be utilized by GOEA within the Study Area indicates that the GOEA are not using the southwest and south central areas of the Project Footprint and VFCL. They did not frequent the northern portion of the Project Footprint/VFCL, as well. However, Figure 8 does show that the GOEA are utilizing the hills in the VRCL on both the eastern and western sides of the Study Area for perching, foraging, etc. This area's usage was also noted during the point count surveys.

6.0 Conclusion

This report provides the findings of the 2013/2014 Phase II site-specific surveys (USFWS 2013) for GOEA for the Panoche Valley Solar Project. Point Count and UDA studies were completed to provide baseline data on GOEA occurrence, frequency, and behavior to present results of spatial and temporal site use and potential risk based on time spent within the Proposed Project area, which will assist in the preparation of the BBCS and the ECP.

The results of the point count surveys indicated that 93% of the GOEA observations made within the Project Footprint and VFCL point count station boundaries were from the western point count stations, which are in close proximity to the hills located within the western portion of the VRCL (Figure 4). Of the total 15 GOEA observations made during the entire study within point count plots, approximately 47% of those observations were seen during a single survey event (September 17-19, 2013), where 7 GOEA were observed feeding on a carcass of a dead animal within the proposed Project Footprint. This indicates that unless there is an attractant (i.e. food) found within the Project Footprint and the VFCL, that GOEA usage is nominal.

With exception of the several GOEA observed feeding on a carcass in the northeast corner of the UDA Study area, the cells noted to be utilized by GOEA within the UDA Study Area indicates that the GOEA are not using the northern, southwest, and south central areas of the Project Footprint and VFCL. The UDA Study does show, as seen in the point count surveys, that the GOEA are utilizing the hills in the VRCL on both the eastern and western sides of the Study Area for perching, foraging, etc. In addition, the study indicated that flight heights noted inside the UDA Study Area averaged approximately 270 feet with exception of the GOEA noted feeding on the carcass during a September survey event. This shows that the eagles mostly are flying across or through the Panoche Valley (i.e. Project Footprint and VFCL) to other habitat to forage or perch.

7.0 References

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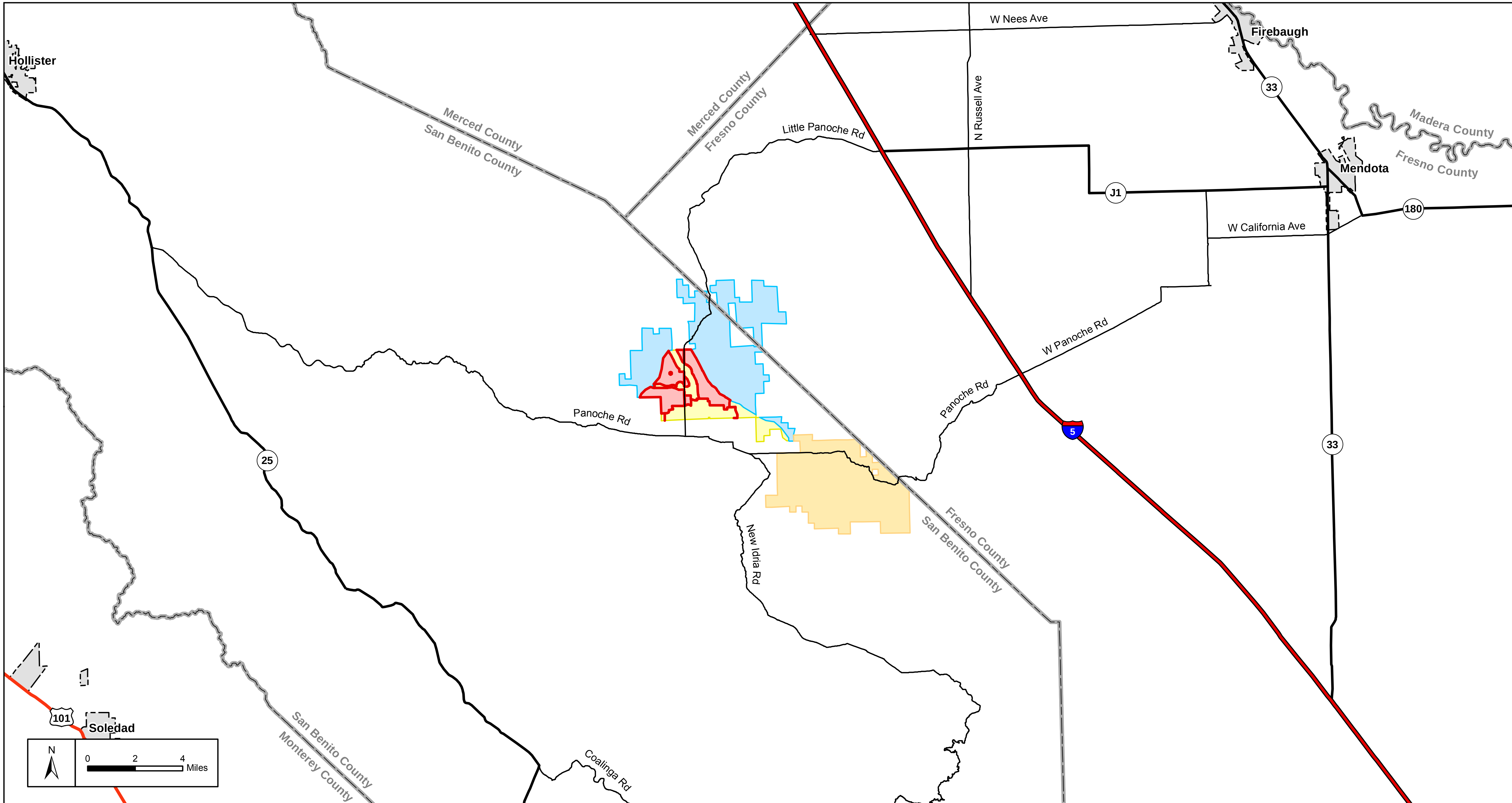
FIGURES



305 Camp Craft Road, Suite 575
West Lake Hills, Texas 78746
512-222-1125
www.energyrenewalpartners.com

Energy Renewal PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

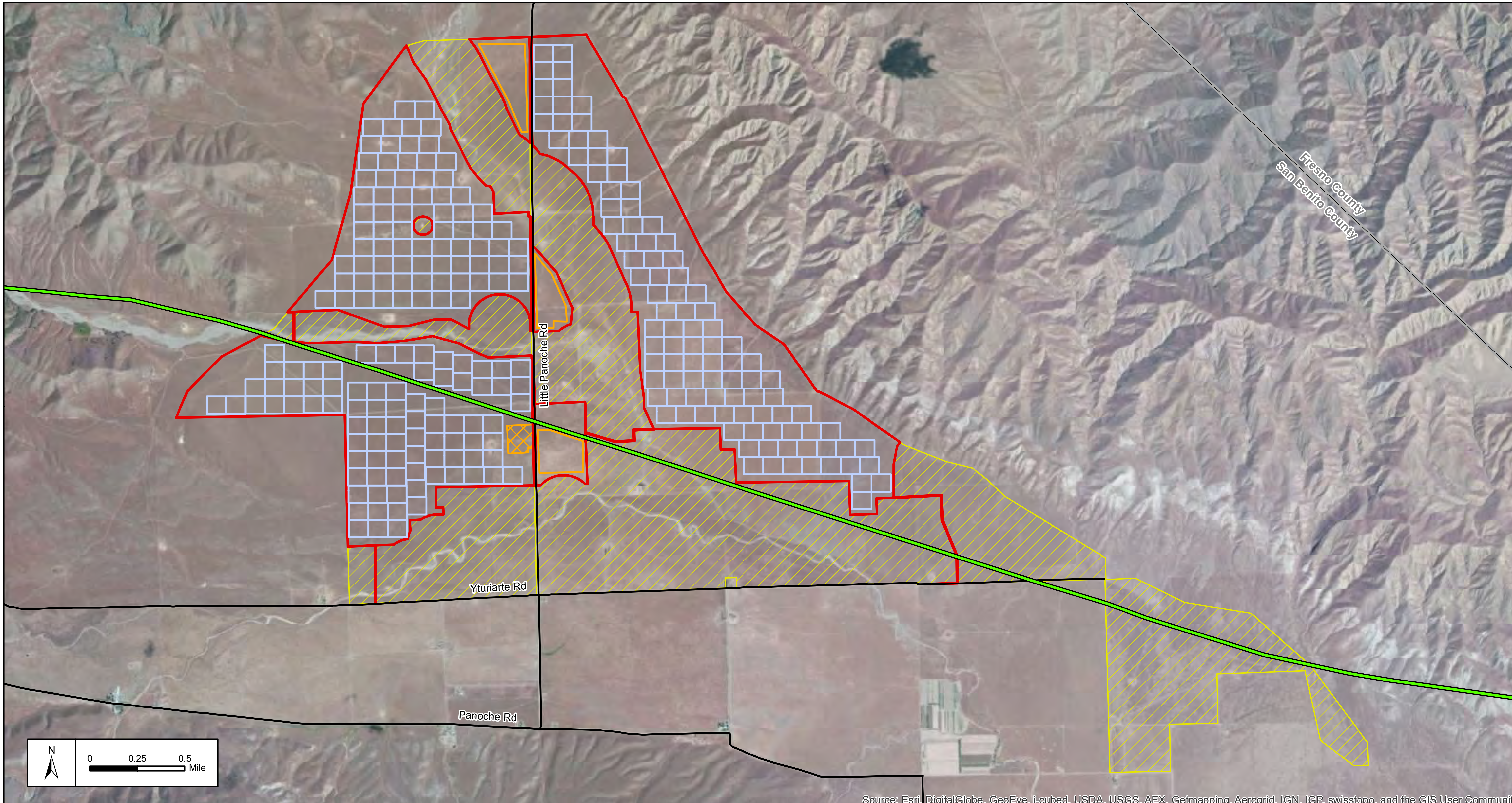
Panoche Valley Solar Project

Project Location

FIGURE

1

JH 2014-03-18



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Legend

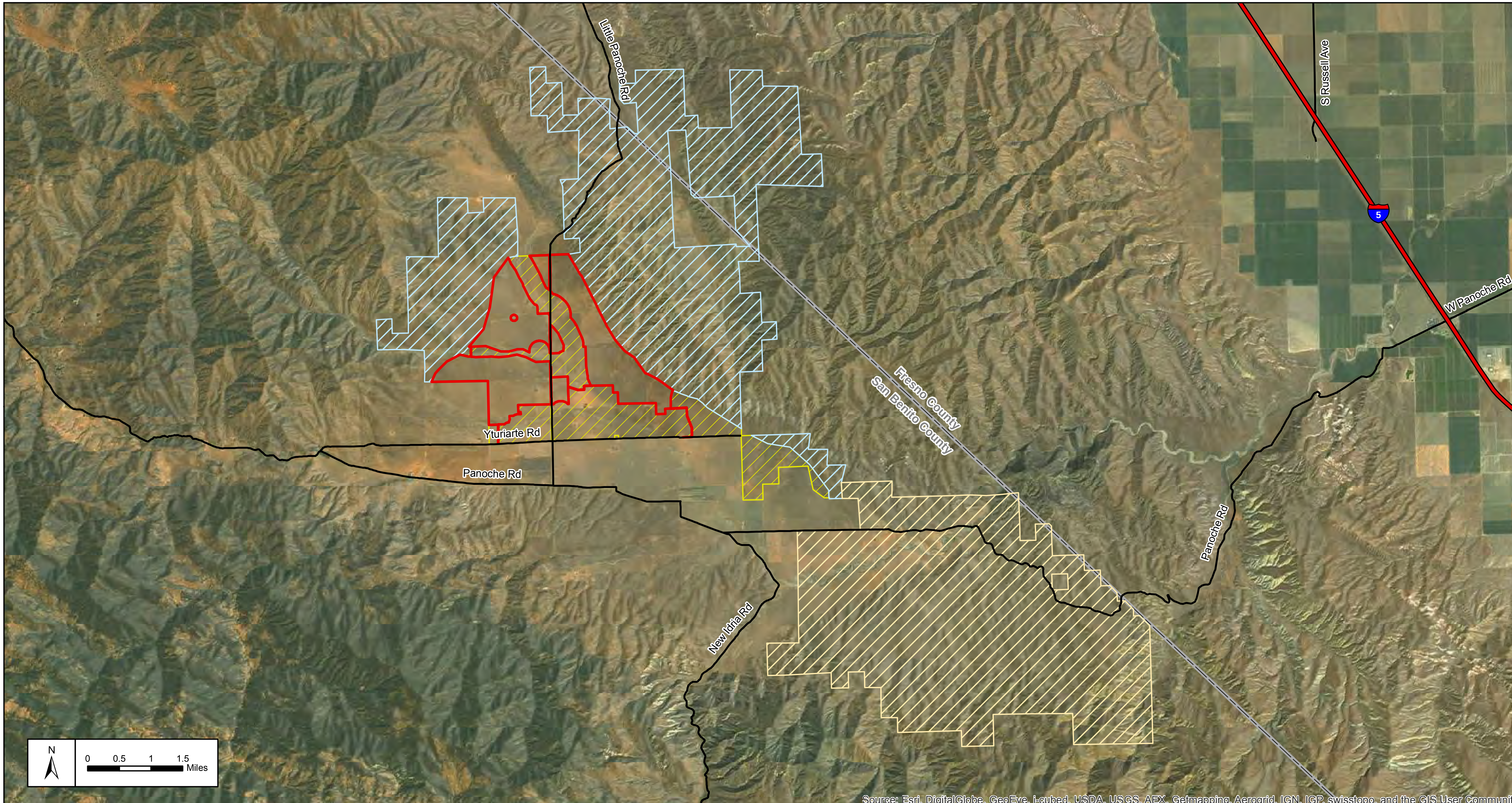
- Project Footprint
- Valley Floor Conservation Lands
- Proposed Panel Block
- Existing Transmission Line
- Project Substation
- Laydown Yard

Panoche Valley Solar Project

Proposed Layout

FIGURE 2

JH 2014-03-17



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Energy Renewal PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

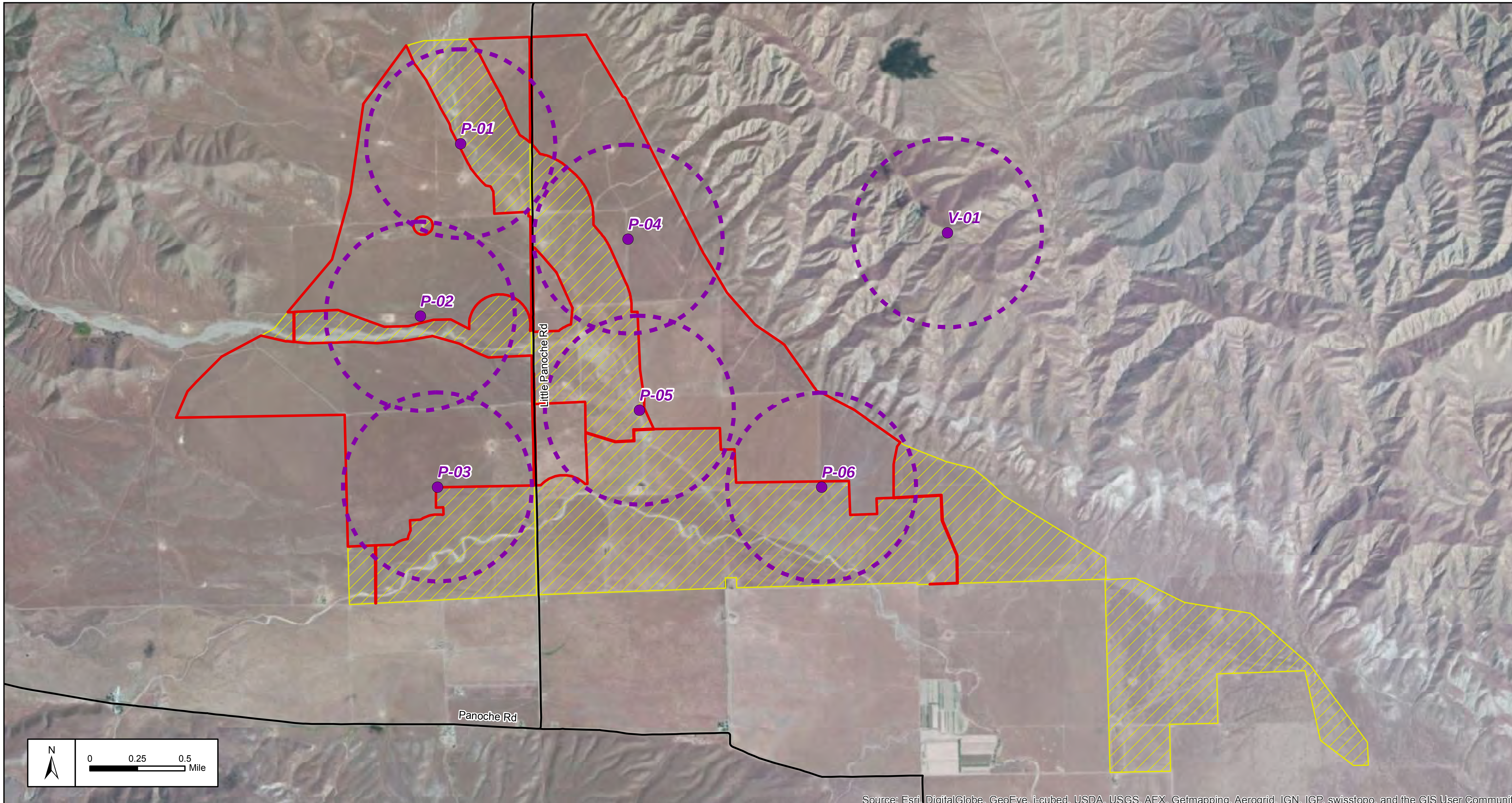
Panoche Valley Solar Project

Project Footprint and Conservation Lands

FIGURE

3

JH 2014-03-18



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Legend

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valley Floor Conservation Lands

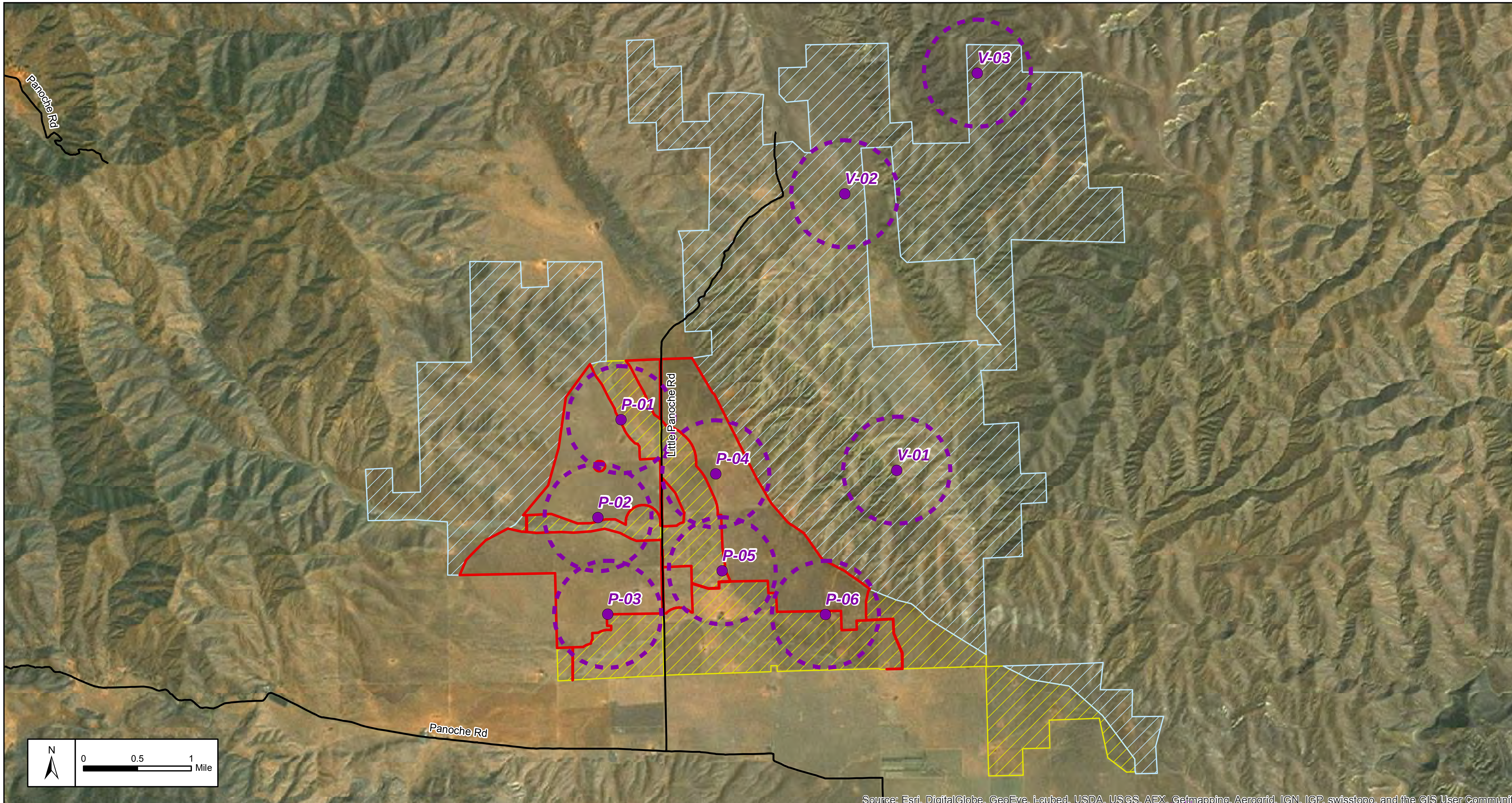
Panoche Valley Solar Project

Point Count Stations

Project Footprint and Valley Floor Conservation Lands

FIGURE 4

JH 2014-03-17



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Legend

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

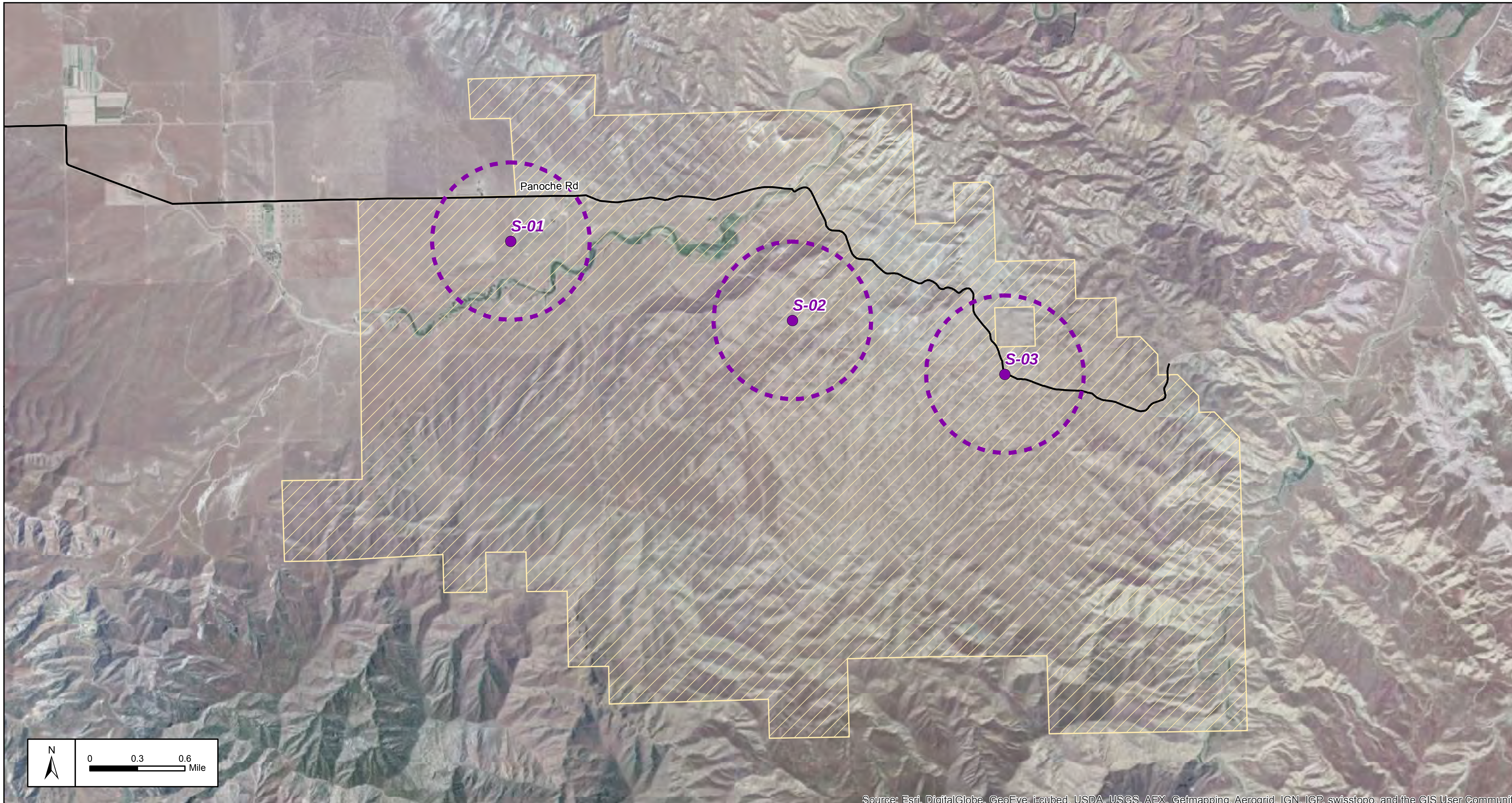
Panoche Valley Solar Project

Point Count Stations

Valadeao Ranch Conservation Lands

FIGURE
5

JH 2014-03-17



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Energy Renewal PARTNERS, LLC

Legend

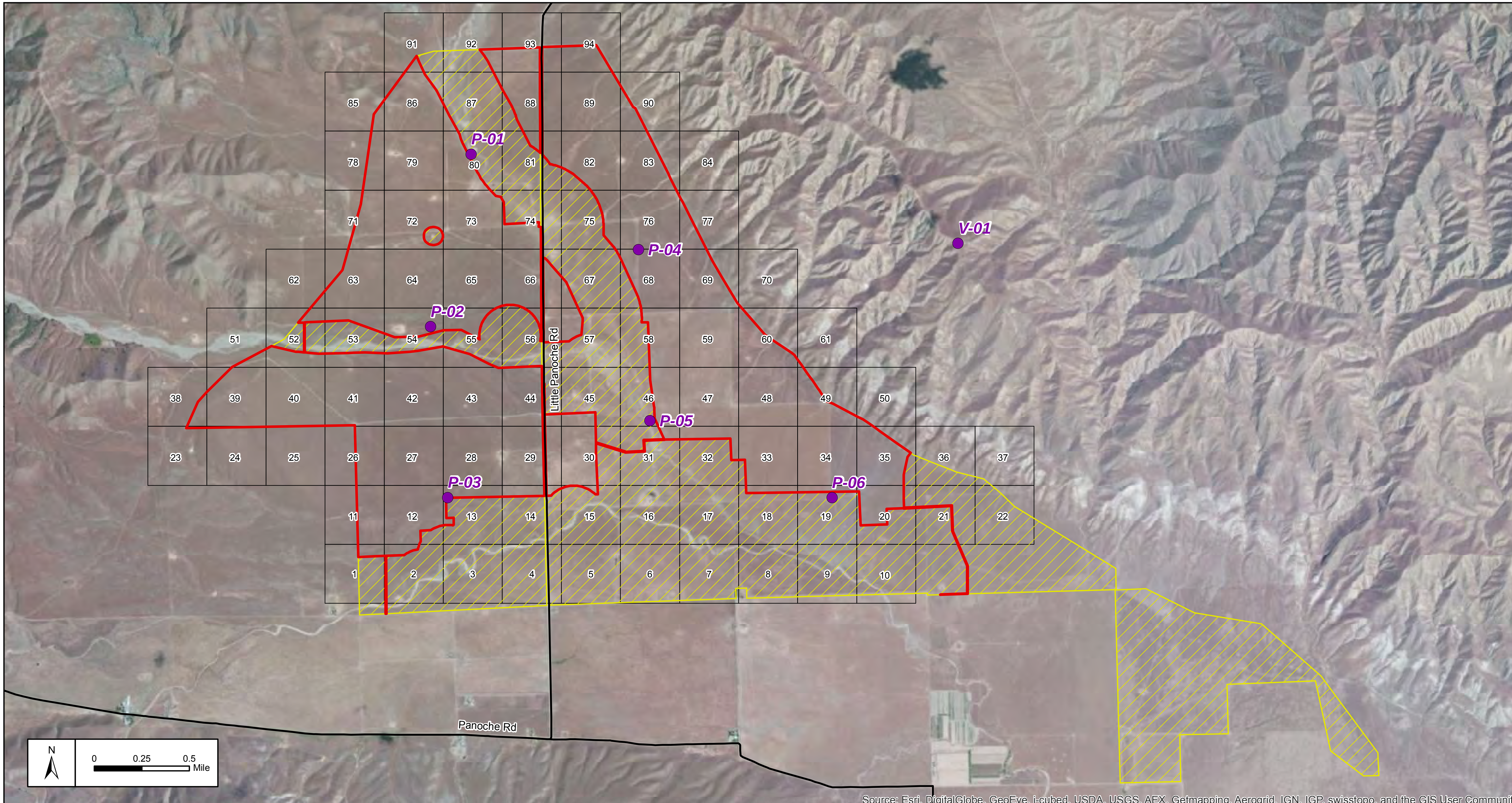
- Point Count Station
- 800-meter Observation Area
- Silver Creek Ranch Conservation Lands

Panoche Valley Solar Project

Point Count Stations
Silver Creek Ranch Conservation Lands

FIGURE 6

JH 2014-03-17



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Energy Renewal PARTNERS, LLC

Legend

- UDA Observation Point
- Project Footprint
- Valley Floor Conservation Lands
- 0.5 x 0.5 Kilometer Grid Cell

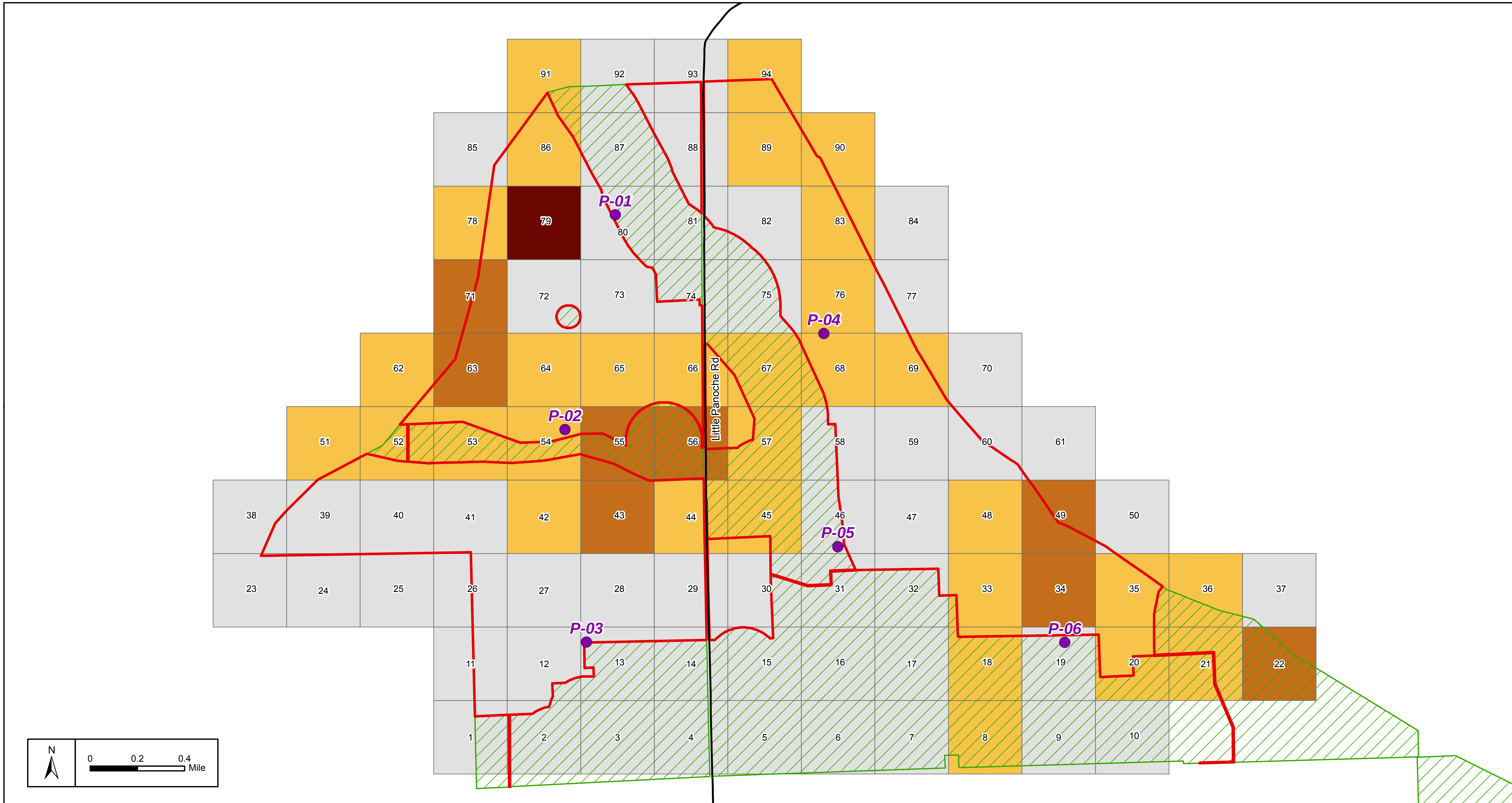
Panoche Valley Solar Project

UDA Observation Points

Project Footprint and Valley Floor Conservation Lands

FIGURE 7

JH 2014-03-17



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Energy Renewal PARTNERS, LLC

Legend

- UDA Observation Point
- Project Footprint
- Valley Floor Conservation Lands

Number of Times a Grid Cell was Utilized by GOEA

- 0
- 1
- 2 - 3
- 4 - 7

Panoche Valley Solar Project

UDA Study Results

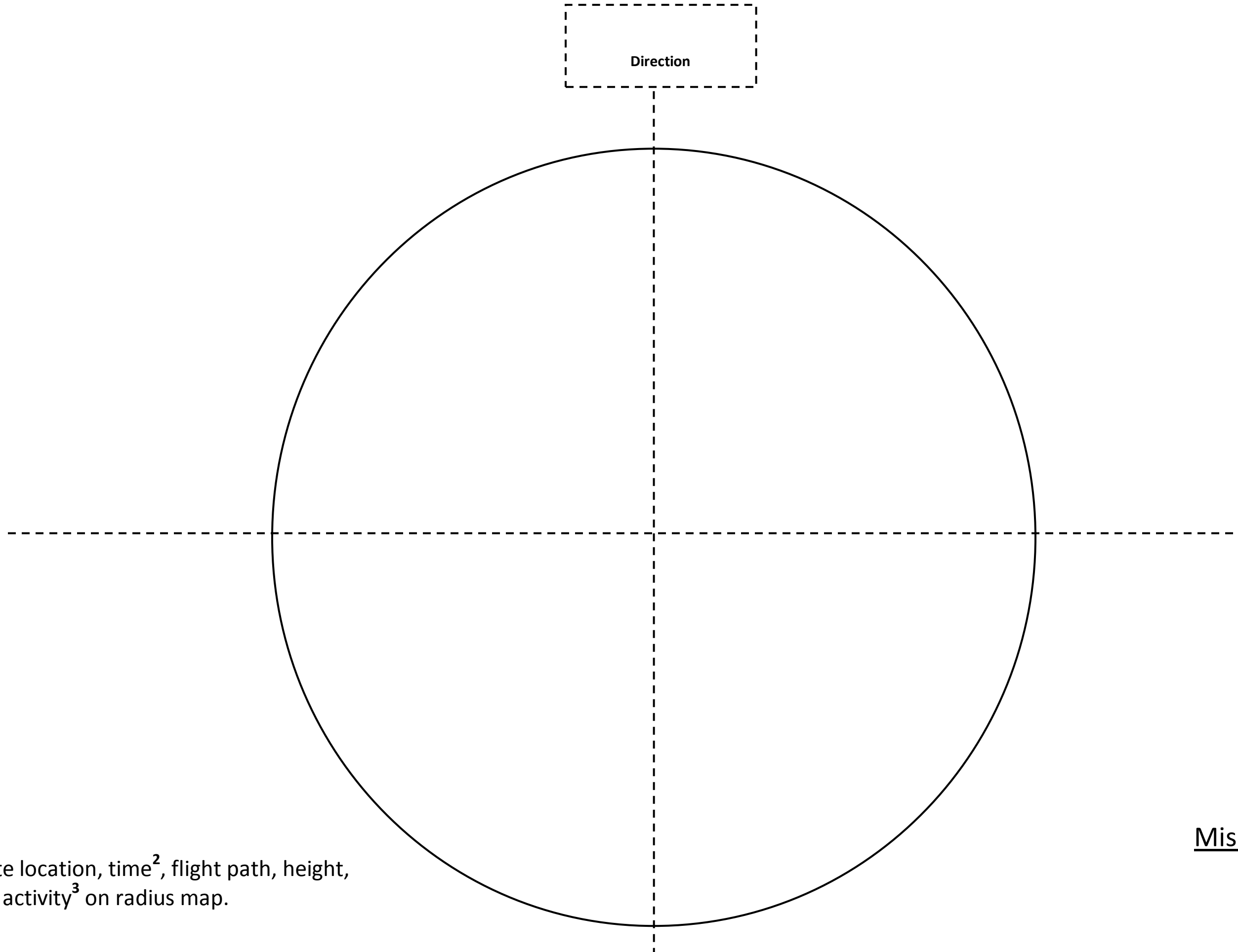
FIGURE

8

JH 2014-03-17

APPENDIX A
FIELD FORMS

Panoche Valley Solar Golden Eagle 800 Meter Point Count Survey		
Point Count Station Number	Start Time	Temp Start °F
Date (mm/dd/yy)	End Time	Temp End °F
Observer(s)	Precip. (amt. last 24hr)	Visibility (% clear)[1]
Wind (mph/direction)	Cloud Cover (% cloudy)	



Misc. Obs

Indicate location, time[2], flight path, height, and activity[3] on radius map.

GOLDEN EAGLE OBSERVATIONS

GOEA #	Age Class[4]	Obs Time Start/End	Eagle Minutes	Description of Observation/Comments

[1]Percent clear within 800 meter and 200 meter vertical
[2]Prevalent behavior noted at one minute intervals
[3]Activity - PE (Perched), SO (Linear Soaring/Gliding), CS (Circle soaring), FL (Flapping), HU (Hunting), HO (Hovering/Kiting), and OT (Other).
[4]Age Class – JUV (Juvenile), SA (Sub-adult), and AD (Adult)

UDA Point #: ______________ Date: ______________

Start Time: ______________ End Time: ______________

Draw Flight Path on Grid Map:

Record1-Minute Interval Description:
- Observation Time
- Activity*
- Estimated Elevation

Example: 1410 GL 150 ft

*See opposite side for Activity Code

Energy Renewal PARTNERS, LLC

BR
9/11/2013

Legend

Approximate Project Boundary

Valley Floor Conservation Lands

Survey Point Location

800 meter Observation Area

Duke Energy Renewables
Panoche Valley Solar Project

Golden Eagle Utilization Distribution Assessment (UDA) Grid Map

N

0 1,000 2,000
Feet

Panoche Valley Solar Golden Eagle Utilization Distribution Assessment (UDA)			
UDA Point Number	**Start Time:**	**Temp Start: °F**	**Wind (mph/direction)**
Date (mm/dd/yy)	**End Time:**	**Temp End: °F**	**Observer(s)**

GOLDEN EAGLE OBSERVATIONS

GOEA #	Age Class[1]	Obs Time Start/End	Eagle Minutes	Description of Observation[2]/Comments[3]

Indicate location, time, flight path, estimated height, and activity[2] on grid map (opposite side).

KEY

[1]Age Class – JUV (Juvenile), SA (Sub-adult), and AD (Adult)

[2]Includes prevalent behavior/activity noted at one minute intervals. Activity description includes - PE (Perched), SO (Linear Soaring/Gliding), CS (Circle Soaring), FL (Flapping), HU (Hunting), HO (Hovering/Kiting), and OT (Other).

[3]Include grid numbers utilized from attached grid map

APPENDIX B
COMPLETED FIELD FORMS
ELECTRONIC FORMAT

APPENDIX C
MISCELLANEOUS GOLDEN EAGLE OBSERVATIONS

Miscellaneous Golden Eagle Observations during other Surveys

Date	GOEA Observations
5/13/2013	1
5/25/2013	1
5/26/2013	2
5/28/2013	1
5/29/2013	1
6/17/2013	1
6/22/2013	1
7/6/2013	1
7/8/2013	1
8/4/2013	1
8/9/2013	2
8/29/2013	1
9/5/2013	3
9/7/2013	2

APPENDIX D
WEATHER DATA

Survey Date	Weather Conditions
September 3, 2013	Temp 83-95° Fahrenheit (F) Wind 6.5-10.4 miles per hour (mph) N Cloud Cover 25% Precipitation 0 inches (in) Visibility 100%
September 4, 2013	Temp 66-97°F Wind 1.5-6.6 mph N Cloud Cover 0% Precipitation 0 in. Visibility 100%
September 5, 2013	Temp 70-96°F Wind 6.1 – 7.4 mph E Cloud Cover 100% Precipitation 0 in. Visibility 95%
September 17, 2013	Temp 61-72.3°F Wind 15.4 mph W Cloud Cover 0% Precipitation 0 in. Visibility 100%
September 18, 2013	Temp 64-79°F Wind 7.9-13.2 mph NNW Cloud Cover 0% Precipitation 0 in. Visibility 100%
September 19, 2013	Temp 64-93.5°F Wind 0.6 mph N Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 2, 2013	Temp 59-70°F Wind 3.2 mph SW Cloud Cover 10% Precipitation 0 in. Visibility 100%
October 3, 2013	Temp 52-66°F Wind 1-12.7 mph S Cloud Cover 0% Precipitation 0 in.

Survey Date	Weather Conditions
	Visibility 100%
October 4, 2013	Temp 53-68°F Wind 1.4 mph E Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 15, 2013	Temp 52-84°F Wind 1.1 – 5.9 mph S Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 16, 2013	Temp 51.5-85°F Wind 0-5 mph S Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 17, 1913	Temp 77-90°F Wind 1.1-5 mph S Cloud Cover 0% Precipitation 0 in. Visibility 100%
October 28, 2013	Temp 48-62°F Wind 8.9-19.5 mph W Cloud Cover 35% Precipitation Trace Visibility 100%
October 29, 2013	Temp 53.4-75°F Wind 3.6-6 mph NW Cloud Cover 98% Precipitation 0 in. Visibility 90%
October 30, 2013	Temp 42-67°F Wind 0.9 -7 mph S Cloud Cover 10% Precipitation 0 in. Visibility 100%
November 12, 2013	Temp 58-64.4°F

Survey Date	Weather Conditions
	Wind 1-6 mph N Cloud Cover 80% Precipitation Trace Visibility 100%
November 13, 2013	Temp 49-74.6°F Wind 2-8.1 mph N Cloud Cover 5% Precipitation Trace Visibility 100%
November 14, 2013	Temp 52-76°F Wind 1 -5 mph NW Cloud Cover 15% Precipitation 0 in. Visibility 100%
November 25, 2013	Temp 32-73°F Wind 0.8-3.6 mph SE Cloud Cover 0% Precipitation 0 in. Visibility 80%
November 26, 2013	Temp 46-66°F Wind 1-4 E Cloud Cover 90% Precipitation 0 in. Visibility 100%
November 27, 2013	Temp 41-64°F Wind 1 mph W Cloud Cover 35% Precipitation 0 in. Visibility 100%
December 9, 2013	Temp 20-50.3°F Wind 1-1.7 mph SE Cloud Cover 0% Precipitation 0 in Visibility 100%
December 10, 2013	Temp 27-51.6°F Wind 1-5 mph NE Cloud Cover 0%

Survey Date	Weather Conditions
	Precipitation 0 in Visibility 100%
December 11, 2013	Temp 31.4-53°F Wind 0.9-2.7 mph W Cloud Cover 0% Precipitation 0 in Visibility 100%
December 21, 2013	Temp 33-40°F Wind 2.5- 7.5 mph W Cloud Cover 0% Precipitation 0 in Visibility 100%
December 22, 2013	Temp 30-49°F Wind 0.6-8.2 mph N Cloud Cover 0% Precipitation 0 in Visibility 100%
December 23, 2013	Temp 43-60°F Wind 0.6-2 mph W Cloud Cover 0% Precipitation 0 in Visibility 100%
January 7, 2014	Temp 39-69°F Wind 1-5 mph E Cloud Cover 75% Precipitation 0 in. Visibility 100%
January 8, 2014	Temp 36-71°F Wind 0-5 mph S Cloud Cover 50% Precipitation 0 in. Visibility 100%
January 9, 2014	Temp 41-47°F Wind 0-5 mph N Cloud Cover 50% Precipitation 0 in. Visibility 100%

Survey Date	Weather Conditions
January 22, 2014	Temp 38-66°F Wind 1-4 mph N Cloud Cover 40% Precipitation 0 in. Visibility 100%
January 23, 2014	Temp 47-68°F Wind 3-6 mph NW Cloud Cover 5% Precipitation 0 in. Visibility 100%
January 24, 2014	Temp 48-65°F Wind 0-10 mph S Cloud Cover 90% Precipitation 0 in. Visibility 100%

APPENDIX E
PHOTOGRAPHS

Photo 1. General habitat view of Valley Floor Conservation Lands (VFCL) and Project Site near P-01 looking southwest.

Photo 2. General habitat view of Project Footprint in vicinity of P-03 looking northeast toward P-04 and P-05.

Photo 3. General habitat view of Project Footprint in vicinity of P-03 looking southwest.

Photo 4. General view from Little Panoche Road toward P-05 with the Valadeao Ranch in background looking east/northeast.

Photo 5. General view of Project Footprint and VFCL looking west toward P-02 and the western Valadeao Ranch property.

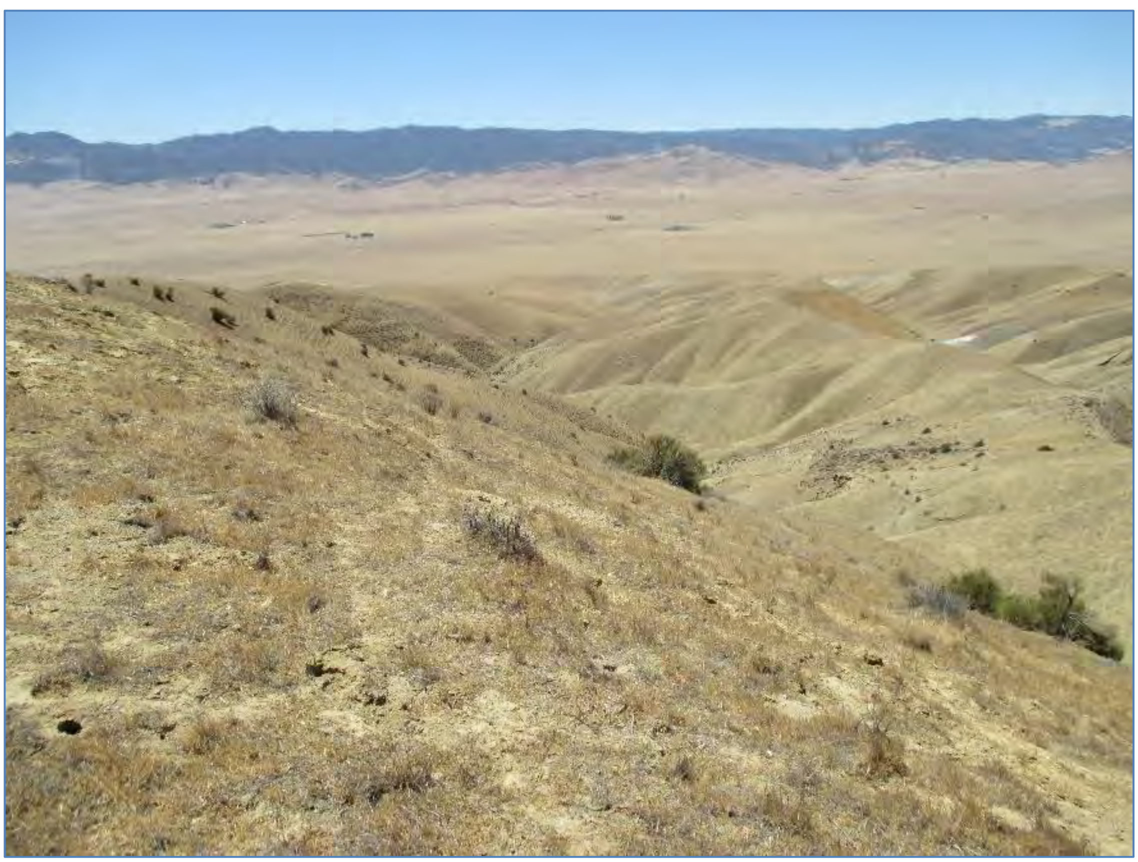


Photo 6. General view of Project Footprint and VFCL looking southwest from V-01 on the eastern Valadeao Ranch property.

Photo 7. General habitat view of eastern Valadeao Ranch property looking northeast from V-01.

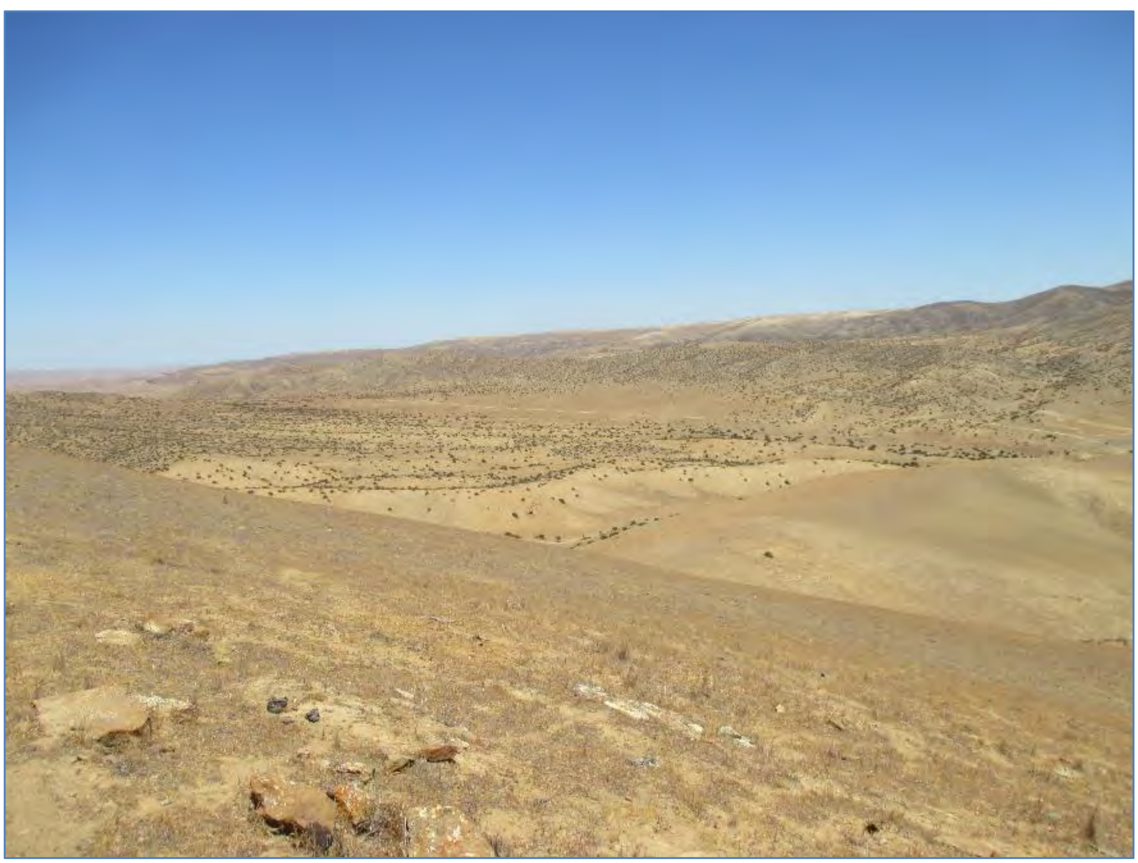


Photo 8. General habitat view of eastern Valadeao Ranch property looking north/northeast from V-01.

Photo 9. General habitat view of eastern Valadeao Ranch property looking east near V-02.

Photo 10. General habitat view of eastern Valadeao Ranch property near V-02.

Photo 11. General habitat view of the Silver Creek Ranch property looking northwest back towards S-01.

Photo 12. General habitat view of the Silver Creek Ranch property near S-02.

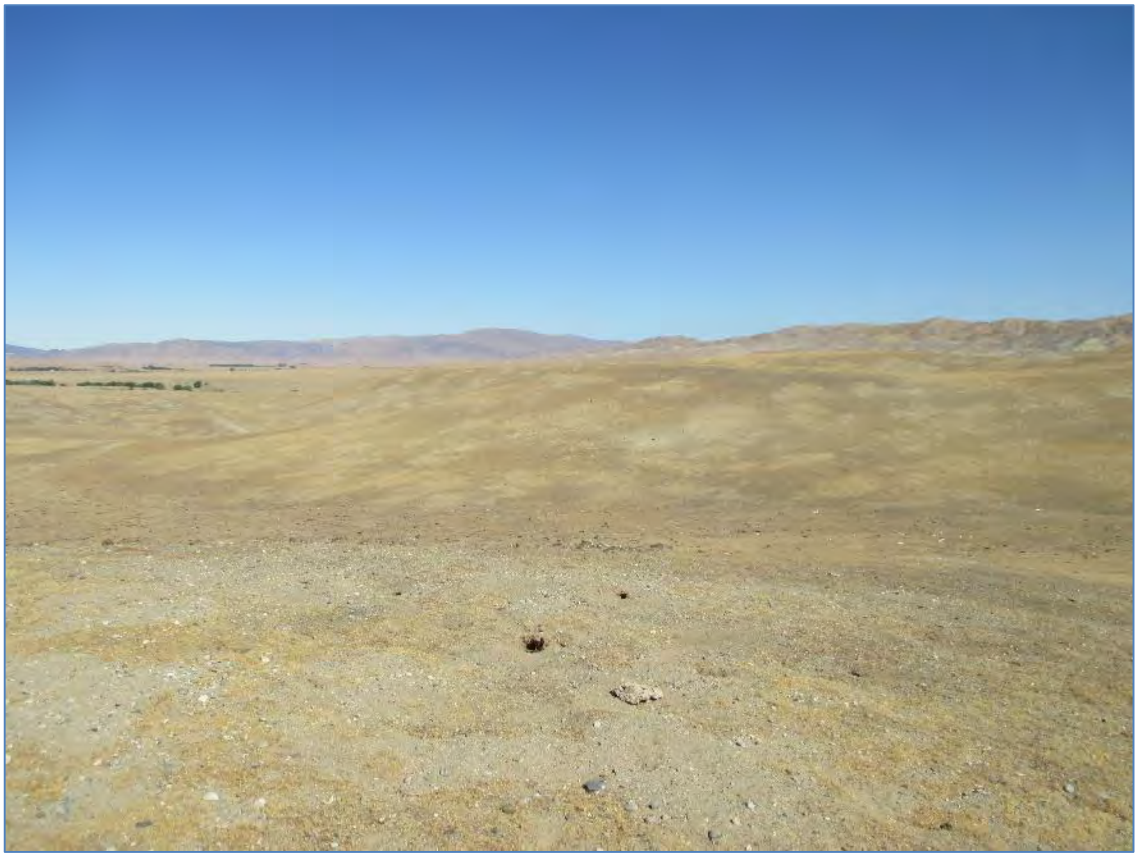


Photo 13. Additional habitat view of the Silver Creek Ranch property near S-02.

Appendix C

Panoche Valley Solar Facility - 2014 Final Golden Eagle Nesting Survey Report

Panoche Valley Solar Facility
2014 Final Golden Eagle Nesting Survey Report

Prepared for:

Duke Energy
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Huntersville, North Carolina 28078

Contact: Scott T. Fletcher

Prepared by:

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May 2014

BBI

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GIS & Maps: Michael Kuehn, Ph.D.

ABOUT BLOOM BIOLOGICAL, INC.

For more than 35 years, Bloom Biological, Inc. (BBI) has provided biological consulting services for large and small clients. Our resume of services includes raptor and endangered species research, biological monitoring, impact assessment, permitting, conservation planning and geospatial analysis. Our innovative approach has provided solutions to complex problems for clients and projects throughout a range of industries including alternative energy, residential development and the public sector. Collectively, the management and staff of BBI hold permits or memoranda of understanding for participating in the conservation and recovery of more than a dozen endangered or threatened species, as well as a number of other special-status species, in California and the western United States. Over the years, BBI has established an impeccable relationship with the resource agencies, project proponents, and environmental organizations by skillfully balancing the needs and objectives of land planning, resource conservation, and the public interest. In addition to our work in California and the western United States, BBI biologists have worked in Alaska, Central and South America, Europe, Southern Asia, and the western Pacific. BBI is a certified Small Business Enterprise.

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Appendices

1.0 INTRODUCTION

Bloom Biological, Inc. (BBI) was retained by Duke Energy for Panoche Valley Solar, LLC (the Applicants) to conduct nesting surveys for Golden Eagle (*Aquila chrysateos*) associated with the Panoche Valley Solar Facility (Project), an approximately 399 megawatt solar photovoltaic energy generating facility proposed for construction in San Benito County, California. BBI previously conducted surveys for the proposed Project, documenting 15 potential Golden Eagle nests within ten miles of the proposed Project, 8 of which were designated as having been active in the 2010 breeding season (BBI 2010). The report authors noted however, that the survey was conducted late in the season and that a more complete survey should be conducted during the breeding season and prior to leaf-on of deciduous trees, when nests would be easier to detect. To augment the 2010 nest survey effort, the U.S. Fish and Wildlife Service (Service) recommended that the Applicants conduct "Stage 2" aerial surveys of the Project area nesting population during a January-February time frame before leaf-on. BBI conducted aerial surveys for Golden Eagle with ten miles of the proposed project in January and April 2014, resulting in the documentation of 46 Golden Eagle nests and an estimated 30 Golden Eagle territories, with nine of them active, though none were located within three miles of the limits of the proposed Project. This report presents BBI's detailed survey methods and results, identifying the location and status of all nests, and the distance from each nest to the Project.

2.0 NATURAL HISTORY

The Golden Eagle is found throughout most of the north Temperate Zone. In North America it ranges from arctic Canada and Alaska south through the western United States to central Mexico. Northern populations are migratory; however, most populations south of Canada are residents or short-distant migrants.

Kochert et al. (2002) provided a thorough description of the natural history of the Golden Eagle, noting that the species is found in a variety of habitats located in a wide range of latitudes throughout the Northern Hemisphere. In North America, Golden Eagles are most common in the western half of the continent near open spaces that provide habitat for foraging, and generally with cliffs present for nesting sites. While northern populations of the species are migratory, often making trips of thousands of miles to the wintering grounds; southern populations (including those in southern California) tend to be resident year-round.

While Golden Eagles are capable of killing large prey such as cranes, wild ungulates, and domestic livestock, they primarily subsist on rabbits, hares, ground squirrels, and prairie dogs (Bloom and Hawks 1982, Olendorff 1976). Golden Eagles are thought to typically reach sexual maturity, form territories and begin nesting at four years of age. Pairs are generally thought to stay within the limits of their territory, which can measure well over 20 square kilometers and may contain as many as 14 nests (Kochert et al. 2012, Bloom pers. obs.). The pair maintains and repairs one or more of these nests as part of its courtship. Over the course of a decade several of these nests will be used and will produce young, while others may only receive occasional fresh sticks. Most alternate nests are important in the successful reproduction of a pair of eagles. Kochert et al. (2002) also noted that the nesting season is prolonged, extending more than 6 months from the time the 1-3 eggs are laid until the young reach independence. A typical Golden Eagle raises an average of only 1 young per year and up to 15 young over its lifetime. Pairs commonly refrain from laying eggs in some years, particularly when prey is scarce. The number of young that Golden Eagles produce each year depends on a combination of weather and prey conditions.

3.0 REGULATORY STATUS

Regulatory protections for Golden Eagles include thorough surveys to determine the status of Golden Eagles for projects occurring within their range and habitat. The intent is to determine the extent of potential direct, indirect and cumulative effects projects may have on eagles, avoid and or minimize these effects, assess the potential for incidental take during project operation, and monitor eagle populations. These measures are predominantly driven by the Bald and Golden Eagle Protection Act.

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

For purposes of the guidelines, "disturb" means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

4.0 STUDY AREA DESCRIPTION

The Study Area includes all areas inside of, and within a 10-mile (16-kilometer) radius of the Project boundary (Figure 1, Exhibit 1), and encompasses approximately 305,004 acres (123,431 hectares). The Study Area is southeast of the City of Los Banos, California, and portions lie within San Benito, Fresno, and Merced Counties.

Terrain is variable throughout the Study Area, and includes relatively flat, largely agricultural fields in the extreme east, bordered by rolling arid grasslands that occupy the central portion. Most of the western half of the Study Area lies within the Diablo Range and includes more rugged hills and mountains with rocky outcroppings and cliff faces. The predominant land-use within the Study Area is ranching. Vegetative cover includes grasslands and agriculture in the east, chaparral at low elevations in the mountains, with Gray Pine (*Pinus sabineana*) occurring at higher elevations in the mountains, and various oak species, including the deciduous Blue Oak (*Quercus douglasii*), and evergreen Valley Oak (*Quercus lobata*) and Canyon Live Oak (*Quercus chrysolepis*). Elevation within the Study Area ranges from approximately 600 feet above mean sea level (amsl) in the southeast to approximately 4,000 feet amsl in the west.

Figure 1. Study area location

5.0 METHODS

As per guidance provided by the Service, an initial round of helicopter surveys was performed over a 10-day period during the early breeding season, from January 15-24, 2014. A second round of surveys was conducted over a 7-day period from April 2-8, 2014, when active nests were expected to contain eggs or young nestlings. The first round of surveys was conducted early enough that deciduous trees such as California Sycamore (*Platanus racemosa*), Valley Oak and particularly Blue Oak, which were very abundant in parts of the study area, had not yet leafed out, making it easier to detect large nests within their canopies.

All surveys were conducted by BBI biologist Peter H. Bloom, Ph.D. (lead observer), who was accompanied by one of three assistant observers, including Scott Thomas, Karyn Sernka and Michael J. Kuehn, Ph.D. The helicopter (Bell Jet Ranger 206) was owned and operated by a pilot experienced in conducting aerial Golden Eagle nesting surveys. Survey methodology described in Section VII.b of Aerial Surveys of Pagel et al. (2010) was followed to the extent possible. The biologists conducted an aerial examination of all appropriate nesting habitat inside the pre-defined Study Area described above (Section 4.0). During aerial surveys, BBI biologists searched for large stick nests of Golden Eagles and other raptors on cliff faces, rocky outcrops, trees, transmission towers, and other suitable nesting substrates.

GPS units (one primary and one backup) were used to mark locations of nest sites. The following information was recorded for each raptor or Common Raven (*Corvus corax*) nest found during surveys:

- Name of observer(s)
- Date/Time/Weather conditions
- Species of nest owner
- Location (GPS coordinates)
- Nest status (active, inactive, or unknown)
- Nest contents (empty, eggs, nestlings)
- Nest condition
- Nest substrate
- Nest description (or other indications of breeding behavior)
- Other pertinent descriptive information

Photographs were taken of Golden Eagle nests when feasible, and are presented in Appendix A of this report. Survey dates, times, and weather conditions are summarized in Table 1.

Table 1. Field Survey Dates, Times, and Weather Conditions

Date	Time	Weather	Biologists
1/15/2014	1300-1545h	Start: 62°F, 0% Cloud Cover, Breeze out of the SW End: 56°F, 0% Cloud Cover, Breeze out of the SW No Rain, No Fog, No Snow	Peter Bloom Scott Thomas
1/16/2014	0830-1700h	Start: 45°F, 0% Cloud Cover, Calm out of the SW End: 63°F, 0% Cloud Cover, Breeze out of the SW No Rain, No Fog, No Snow	Peter Bloom Scott Thomas
1/17/2014	0800-1630h	Start: 38°F, 0% Cloud Cover, Calm out of the N End: 58°F, 0% Cloud Cover, Light Wind out of the NW No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/18/2014	0830-1645h	Start: 41°F, 0% Cloud Cover, Calm out of the N End: 62°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/19/2014	0830-1645h	Start: 40°F, 0% Cloud Cover, Light Wind out of the NE End: 65°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka

Date	Time	Weather	Biologists
1/20/2014	0800-1630h	Start: 39°F, 0% Cloud Cover, Calm out of the N End: 61°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/21/2014	0800-1645h	Start: 38°F, 50% Cloud Cover, Light Wind out of the NW End: 60°F, 0% Cloud Cover, Light Wind out of the NE No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/22/2014	0840-1700h	Start: 41°F, 0% Cloud Cover, Calm out of the N End: 63°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
1/23/2014	0900-1700h	Start: 46°F, 0% Cloud Cover, Calm out of the N End: 64°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
1/24/2014	0850-1200h	Start: 51°F, 40% Cloud Cover, Calm out of the N End: 60°F, 100% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/2/2014	1200-1800h	Start: 62°F, 50% Cloud Cover, Light Wind out of the NE End: 60°F, 40% Cloud Cover, Light Wind out of the NE No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/3/2014	0730-1715h	Start: 43°F, 0% Cloud Cover, Calm out of the N End: 58°F, 0% Cloud Cover, Light Wind out of the NW No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/4/2014	0745-1730h	Start: 50°F, 0% Cloud Cover, Calm out of the N End: 58°F, 0% Cloud Cover, Breeze out of the W No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/5/2014	0730-1730h	Start: 48°F, 0% Cloud Cover, Breeze out of the W End: 67°F, 0% Cloud Cover, Light Wind out of the NW No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/6/2014	0730-1715h	Start: 46°F, 30% Cloud Cover, Calm out of the N End: 71°F, 20% Cloud Cover, Light Wind out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/7/2014	0715-1730h	Start: 51°F, 20% Cloud Cover, Calm out of the N End: 78°F, 0% Cloud Cover, Breeze out of the NW No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/8/2014	0700-1245h	Start: 54°F, 10% Cloud Cover, Calm out of the N End: 81°F, 30% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn

5.1 Nest Determination

5.1.1 Species Identification

Biologists determined the species that built or occupied all large stick nests discovered during surveys by observing defending or incubating adults, the size of the nest, stick size, eggs and chicks, volume and height of excrement, and anthropogenic material if present. These distinctions were based upon the experience of the principal investigator (Dr. Bloom), which includes the entry and inspection of thousands of California raptor nests of 22 raptorial species including Golden Eagle, and the four raptor species that might utilize Golden Eagle nests in this region; Red-tailed Hawk (*Buteo jamaicensis*), Peregrine Falcon (*Falco peregrinus*), Prairie Falcon (*Falco mexicanus*) and Great Horned Owl (*Bubo virginianus*).

Within the Study Area, the Red-tailed Hawk is the predominant raptor species that builds large nests constructed of sticks, which may overlap in size with Golden Eagle nests. Common Ravens are non-raptors that also construct reasonably large stick nests in this region. Of these three species, Red-tailed Hawk and Common Raven nests are the most abundant by a large factor. Fortunately, there are often predictable cues that can be used to differentiate among the nests of these species, beyond the direct observation of adults, young or eggs in the nest.

Common Ravens tend to have the smallest nests of the three species, followed by Red-tailed Hawks and finally, Golden Eagles, which may build nests 15 feet tall and 6 feet wide.

Though Red-tailed Hawk and Common Raven nests are sometimes difficult to distinguish from one another, Common Ravens are unique in that they often bring trash to their nest sites situated near civilization, and their nests tend to be very tightly structured. However, many Common Raven nests, and particularly those in very remote locations, do not incorporate anthropogenic materials into their nests.

Golden Eagle and Red-tailed Hawk nests can also be difficult to separate from each other without ample experience. The two species often use each other's nests for reproduction, though Red-tailed Hawks more commonly usurp Golden Eagle nests than the other way around. This may be because Golden Eagles often have more alternate nests than do Red-tailed Hawks and because the larger Golden Eagle nests tend to survive longer. Newly created, first year Golden Eagle nests are typically 6-10 inches thick and as small as 4 feet wide and may overlap in size with Red-tailed Hawk nests. At the other end of the size spectrum, Golden Eagles may build large tower nests that exceed 15 feet in thickness and 4-6 feet in width.

We considered nests greater than 5 feet wide and 3 feet thick to be definitive eagle nests. The size of the sticks, both in diameter and length also provides clues as to what species carried them and added them to the nest, with eagle nests containing much larger sticks than Red-tailed Hawks would generally bring to their nests.

5.1.2 Nest Status

A nest was considered *active* if any of the following three conditions was met: (1) fresh (live or dead) sticks had been added during the current nesting season, (2) the nest was found to contain eggs or young (dead or alive), or (3) an adult was observed on the nest in an incubating (or brooding) posture. Nests without any of these signs were considered *inactive*. A *failed* nest was an active nest that did not successfully fledge young. The newness (fresh sticks) of nest sticks can often be determined by their color and condition if they were recently collected from live plants and trees, however bleaching by the desert sun can sometimes make new sticks appear old quickly. The placement, compaction or lack of compaction of sticks can be a more accurate determination of the newness, such as the fresh sticks seen on the top of a recently active Golden Eagle nest compared with the compacted old sticks in the inactive nest. A *successful* nest was one that fledged at least one young (typically assumed if young were greater than eight weeks old during an observation). Active nests found at the end of the nesting cycle with considerable excrement in and around the nest, surrounding boulders or alternate nests were considered to have fledged.

Determining the activity status of nests during the breeding season is often unequivocal because in some instances there will be an adult eagle incubating eggs or brooding nestlings and/or visible eggs or nestlings. However, nest status can often be inferred even if a nest is visited outside of the actual nesting period (e.g., prior to egg laying or after fledging). Under these circumstances, more emphasis is placed on the condition of the nest and presence or absence of sign. Prior to egg laying, a typical active Golden Eagle nest will be relatively level on top, will have visibly newer sticks several inches thick arranged on the top of the nest, may have fresh greenery, and may have fresh feathers. Following fledging, the biologists primarily consider the condition of the nest and the amount (or lack of) and relative age of white-wash, which in the case of Golden Eagles should occur in significant amounts forming a broad splatter pattern composed of long, large broken streaks often referred to as slices. At some locations with recently fledged multiple young, it may appear as if it snowed below the nest edge.

Although there may be no definitive determination of whether nestling(s) fledged there will be strong indicators if the nest was active and at least contained chicks of more than a few weeks old. White wash sprays and slices behind the nest are not commonly deposited by adults. Significant accumulation of fresh white wash behind, around, directly below, and approximately level with the nest are indicators that nestling(s) were present.

Other factors considered include the nearby presence or absence of adult and/or fledgling eagles, active nearby perch sites with fresh sign and active alternative nests within close proximity to the nest in question.

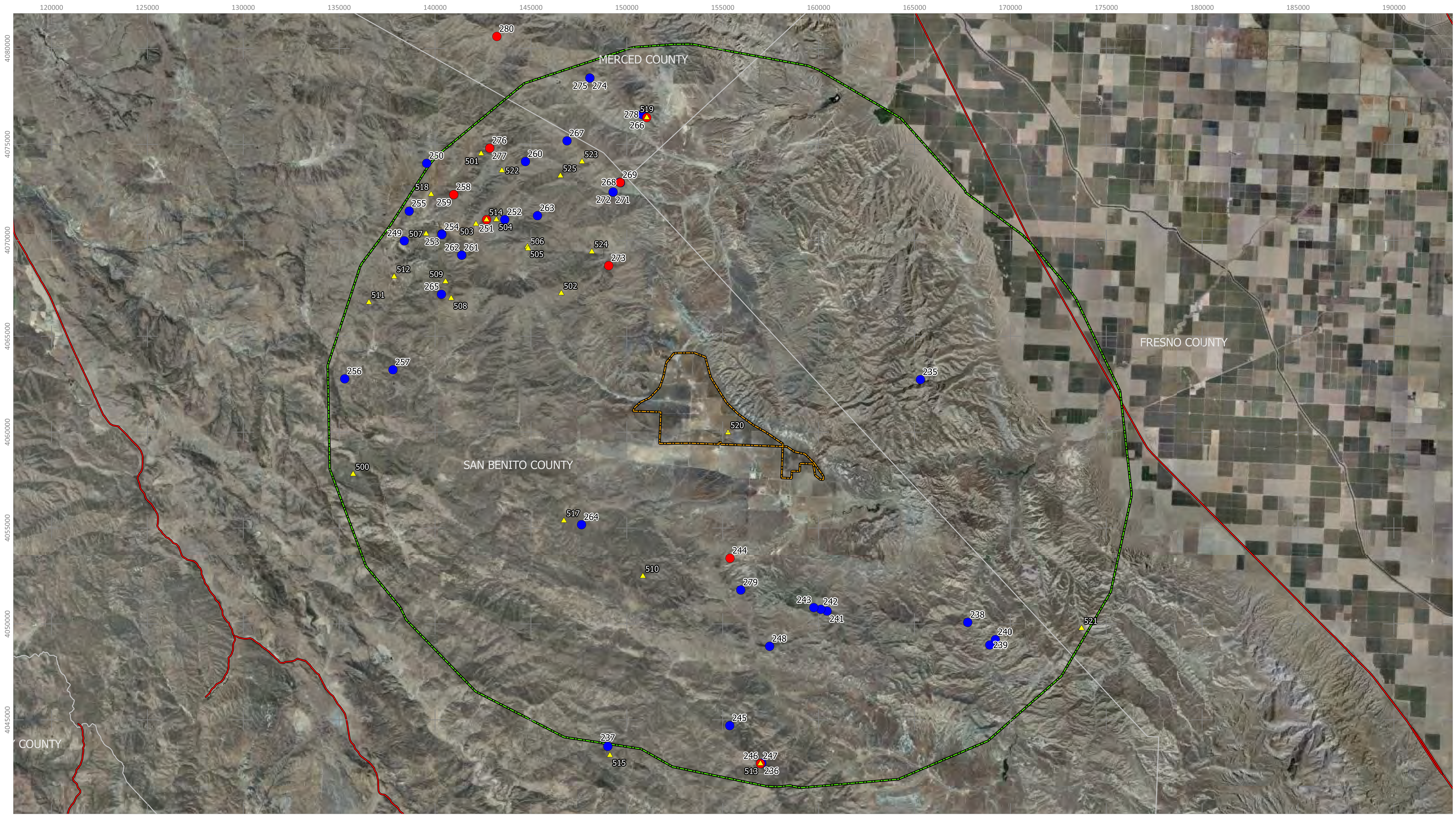
6.0 RESULTS & DISCUSSION

A total of 492 nests was documented by BBI within the Study Area, including 46 Golden Eagle nests. All Golden Eagle nests are listed in Table 2 below, and their locations are mapped in Exhibit 1. Photographs of all Golden Eagle nests that could safely be photographed are presented in Appendix A. All nests classified as belonging to species other than Golden Eagles are listed in Appendix B, including nests of 226 Common Ravens, 146 Red-tailed Hawks, 62 Prairie Falcons, 8 Barn Owls (*Tyto alba)*, 3 Great Horned Owls, and 1 Turkey Vulture (*Cathartes aura*).

Dr. Bloom estimates that the 46 Golden Eagle nests discovered during this survey effort comprise approximately 30 breeding territories, some of which contain one or more alternate nests. The actual number of territories could be slightly higher or lower than 30, and the exact number of territories depends, in part, on how alternate nests of a single territory are defined. In most cases, nests that were on the same cliff faces, or at least very close together could be safely designated as alternate nests within the same breeding territory. For example, nest IDs 266 and 278 were separated by less than 330 yards (300 meters) and were in the same watershed, and were attributed to the same breeding territory. In other cases, it was less clear if different nests were part of a single territory or not. Golden Eagle nesting density (and territory size) is driven primarily by habitat quality, with higher nesting density in better quality habitat. Given that habitat quality in the Study Area varies from quite high (in the northwestern quadrant, where most nests were located), to quite low, in extreme eastern portions, it would not be surprising for nests in some areas to be located as close together as 1 mile (1.6 kilometers), or even rarely 0.5 miles (0.8 kilometers), particularly in the areas of better quality habitat. Golden Eagle nests 251 and 252, in the northwestern quadrant, were separated by only 0.6 miles (1 kilometer), and this is a prime example of two nests that could comprise two breeding territories, but likely represent one.

In total, nine Golden Eagle nests were classified as active in the 2014 season, each representing a separate territory. Thus, active nesting occurred in almost one-third (9 of about 30) of the territories identified in this survey. Of these nine nests, eggs are presumed to have been laid in at least four. Adults were observed on nests in incubating posture, in April, at nest IDs 246 and 251, and two un-incubated eggs were observed in (presumed failed) nest ID 276 in April. Finally, two chicks were observed being tended to by a female Golden Eagle at nest ID 266 in early April. Of the remaining five Golden Eagle nests that were identified as active in 2014, none was known to contain eggs or nestlings as of April 8th. Given that Golden Eagles in this region normally lay eggs on or before this date, it is very unlikely that any of these nests went on to successfully fledge young during the 2014 nesting season.

No Golden Eagle nests were identified within 3 miles (5 kilometers) of the Project (Table 2), though four nests (IDs 244, 264, 273 and 279), comprising four breeding territories were located within four miles of the Project boundary. Two of these four nests (IDs 244 and 273) were active in 2014, though neither nest was ever found to contain eggs or nestlings. The next closest active Golden Eagle nest to the Project in 2014 was nest ID 269, located 5.79 miles (9.34 kilometers) north-northwest of the Project.



County Border
Major Road
Proposed Project Boundary
Study Area

Observation Type
Active Golden Eagle Nest
Inactive Golden Eagle Nest
Golden Eagle Observation

10000 0 10000 20000 30000 40000 ft
1:184,877

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/10/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

EXHIBIT 1. 2014 Golden Eagle Nesting Survey Results
Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI

Although it cannot be ruled out that some Golden Eagle nests within the Study Area could have gone undetected, the 10-day effort in late January represented a massive and comprehensive survey, during a period when deciduous trees such as Blue and Valley Oaks had not yet leafed out. This effort was followed by an 8-day effort in April, when special attention was paid to surveying areas where adult Golden Eagles had been observed, but no nests had been found; or where only inactive nests had been found and additional effort was dedicated to surveying for active nests that may have been missed.

Table 2. Golden Eagle Nests Discovered During Surveys

The following table lists the identification number (ID) of all 46 Golden Eagle nests discovered during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) substrate supporting nest (Substrate), (2) estimated nest height in feet (Est. Height [ft.], (3) nest contents (Contents), (4) quantity of nest contents (Quan.), (5) nest status (Status), (6) distance in miles from nest to the proposed Project (Project Dist. [mi.]), and (7) relevant notes (Notes).

ID	Substrate	Est. Height (ft.)	Contents	Quan.	Status	Project Dist. (mi.)	Notes
235	Cliff	50	Empty	0	Inactive	4.37	
236	Cliff	50	Empty	0	Inactive	9.24	Fledged young in 2013
237	Cliff	50	Empty	0	Inactive	9.93	
238	Cliff	150	Empty	0	Inactive	6.56	
239	Cliff	85	Empty	0	Inactive	7.58	Two nests on east face, one nest on west face
240	Cliff	85	Empty	0	Inactive	7.59	
241	Cliff	75	Empty	0	Inactive	4.25	Very old
242	Cliff	100	Empty	0	Inactive	4.19	Fledged young in 2013
243	Cliff	60	Empty	0	Inactive	4.14	Sticks below nest
244	Cliff	70	Empty	0	Active	3.09	Nest freshly rebuilt in January, but unattended, empty, and looked worn and inactive in April
245	Cliff	50	Empty	0	Inactive	8.18	On same cliff face as two inactive Common Raven nests
246	Cliff	50	Unknown	N.A.	Active	9.26	Nest with fresh greenery on Jan. 21. adult sitting tight, presumably on eggs, on nest on Apr. 2
247	Cliff	50	Empty	0	Inactive	9.26	Old nests near active Golden Eagle nest
248	Gray Pine	50	Empty	0	Inactive	5.46	
249	Valley Oak	80	Empty	0	Inactive	9.20	
250	Valley Oak	60	Empty	0	Inactive	10.07	Nest on mistletoe
251	Blue Oak	55	Unknown	N.A.	Active	7.42	Active and empty on Jan. 19. Adult sitting on nest in incubation posture Apr. 3.
252	Blue Oak	65	Empty	0	Inactive	6.97	Falling, only remnants remain in tree. Some whitewash. Not photographed
253	Blue Oak	70	Empty	0	Inactive	8.36	Near another nest in tree with bare branches
254	Blue Oak	70	Empty	0	Inactive	8.35	near another nest in tree with live (leaved) branches

ID	Substrate	Est. Height (ft.)	Contents	Quan.	Status	Project Dist. (mi.)	Notes
255	Valley Oak	70	Empty	0	Inactive	9.65	
256	Gray Pine	65	Empty	0	Inactive	9.38	Smaller nest above main nest in same tree
257	Gray Pine	55	Empty	0	Inactive	7.87	
258	Blue Oak	60	Empty	0	Active	8.76	Adults present near nest on Jan. 19 and Apr. 3, fresh greenery in bowl. Eggs never observed. Second, inactive nest 50 meters away.
259	Blue Oak	60	Empty	0	Inactive	8.76	50 meters from second, active Golden Eagle nest
260	Blue Oak	55	Empty	0	Inactive	7.84	
261	Blue Oak	55	Empty	0	Inactive	7.45	Two nests in same tree. Lower nest is smaller, older. Pair of adult Golden Eagles near
262	Blue Oak	60	Empty	0	Inactive	7.45	Two nests in same tree. Higher nest is larger, newer. Pair of adult Golden Eagles near
263	Blue Oak	65	Empty	0	Inactive	6.27	Very large nest; two adults and one 2nd-year bird nearby
264	Gray Pine	60	Empty	0	Inactive	3.64	
265	Blue Oak	55	Empty	0	Inactive	7.24	Yellow-billed Magpie nest in top of tree
266	Cliff	100	Nestlings	2	Active	7.67	Nest inactive on Jan. 15. An adult and 2 nestlings in nest on Apr. 4
267	Cliff	50	Empty	0	Inactive	7.69	
268	Cliff	150	Empty	0	Inactive	5.80	
269	Cliff	80	Empty	0	Active	5.79	Built on this season.
270	Cliff	50	Empty	0	Inactive	5.78	Used recently in a previous season
271	Cliff	60	Empty	0	Inactive	5.57	Old nest located above Red-tailed Hawk nest
272	Cliff	35	Empty	0	Inactive	5.57	Very old, located below and west of another old eagle nest
273	Cliff	50	Empty	0	Active	3.53	Two nests next to each other on same rock face; Inactive on Jan. 20, but significantly built on by Apr. 4. No eggs ever observed.
274	Cliff	50	Empty	0	Inactive	9.30	On west face
275	Cliff	60	Empty	0	Inactive	9.30	On east face
276	Blue Oak	40	Eggs	2	Active	8.91	Lower of two nests in same tree. Adult near on Jan. 23, but nest inactive. On Apr. 3, contained two un-incubated eggs, though two adult eagles were nearby. Eggs still not being incubated on Apr. 4.
277	Blue Oak	45	Empty	0	Inactive	8.91	Upper of two nests in same tree.
278	Cliff	70	Empty	0	Inactive	7.79	Inactive. More than 100 yards of ribbon with colored flagging strewn across vegetation above cliff with nest

ID	Substrate	Est. Height (ft.)	Contents	Quan.	Status	Project Dist. (mi.)	Notes
279	Cliff	60	Empty	0	Inactive	3.85	Good condition but no whitewash. Not active in last 5 years
280	Cliff	55	Empty	0	Active	11.73	Newly built nest this year.

Table 3. Golden Eagle and California Condor Observations Made During Surveys

The following table lists the identification number (ID) of all Golden Eagle and California Condor observations made during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) common name of species observed (Species), (2) number of individuals observed (Quan.), (3) age of individuals observed (Age), (4) sex of individuals observed (Sex), and (5) relevant notes (Notes).

ID	Species	Quan.	Age	Sex	Notes
500	Golden Eagle	1	Adult	Unknown	
501	Golden Eagle	1	Adult	Unknown	
502	Golden Eagle	2	Adult	Pair	
503	Golden Eagle	1	Adult	Unknown	
504	Golden Eagle	1	Adult	Unknown	
505	Golden Eagle	1	Subadult	Unknown	2nd year bird
506	Golden Eagle	2	Adult	Pair	Not aggressive toward 2nd year bird in area
507	Golden Eagle	1	Unknow n	Unknown	Perched
508	Golden Eagle	2	Adult	Pair	Perched at top of ridge
509	Golden Eagle	1	Adult	Unknown	Perched
510	Golden Eagle	1	Unknow n	Unknown	Soaring over peak
511	Golden Eagle	4	Mixed	Mixed	One group of three Golden Eagles (two adults, one subadult) and a fourth, lone adult in the distance
512	Golden Eagle	2	Adult	Pair	
513	Golden Eagle	1	Adult	Unknown	Adult on nest in incubation posture
514	Golden Eagle	1	Adult	Female	Adult on nest in incubation posture
515	Golden Eagle	1	Adult	Unknown	In flight
516	California Condor	2	Adult	Pair	Emerged from crevice in cliff
517	Golden Eagle	1	Adult	Unknown	Flying to south
518	Golden Eagle	1	Adult	Female	Flying over field
519	Golden Eagle	1	Adult	Female	Adult on nest in incubation posture
520	Golden Eagle	1	Adult	Unknown	Flying about 600 feet above ground
521	Golden Eagle	1	Adult	Unknown	In flight
522	Golden Eagle	1	Adult	Unknown	
523	Golden Eagle	1	Subadult	Unknown	
524	Golden Eagle	1	Adult	Unknown	Flying. One of two adults detected in territory
525	Golden Eagle	1	Adult	Female	Perched. One of two adults detected in territory

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APPENDIX A. PHOTOGRAPHS OF GOLDEN EAGLE NESTS

Nest ID 235

Nest ID 237

Nest ID 238

Nest ID 239

Nest ID 240

Nest ID 241

Nest ID 242

Nest ID 243

Nest ID 244

Nest ID 245

Nest ID 246

Nest ID 247

Nest ID 248

Nest ID 249

Nest ID 251

Nest ID 253

Nest ID 254

Nest ID 255

Nest ID 256

Nest ID 257

Nest ID 258

Nest ID 259

Nest ID 260

Nest ID 262

Nest ID 263

Nest ID 264

Nest ID 265

Nest ID 266

Nest ID 267

Nest ID 268

Nest ID 269

Nest ID 270

Nest ID 271

Nest ID 272

Nest ID 273

Nest ID 274

Nest ID 275

Nest ID 276

Nest ID 277

Nest ID 278

Nest ID 279

Nest ID 280

APPENDIX B. NON-GOLDEN EAGLE SURVEY RESULTS

The following table lists the identification number (ID) of all non-Golden Eagle nests discovered during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) species of nest-owner (Species), (2) substrate supporting nest (Substrate), (3) nest contents (Contents), (4) quantity of nest contents (Quan.), (5) nest status (Status), (6) distance in miles from nest to the proposed Project (Project Dist. [mi.]), and (7) relevant notes (Notes).

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
1	Barn Owl	Cliff	Empty	0	Inactive	8.56	Possible Prairie Falcon eyrie
2	Barn Owl	Cliff	Empty	0	Inactive	8.45	Possible Prairie Falcon eyrie
3	Barn Owl	Cliff	Empty	0	Inactive	8.27	Possible Prairie Falcon eyrie
4	Barn Owl	Cliff	Empty	0	Inactive	1.31	
5	Barn Owl	Cliff	Empty	0	Inactive	1.73	
6	Barn Owl	Cliff	Empty	0	Inactive	1.94	
7	Barn Owl	Cliff	Empty	0	Inactive	2.16	
8	Barn Owl	Cliff	Empty	0	Inactive	2.85	
9	Common Raven	Cliff	Empty	0	Inactive	7.96	Fallen nest
10	Common Raven	Cliff	Empty	0	Inactive	8.18	
11	Common Raven	Windmill	Empty	0	Inactive	5.71	
12	Common Raven	Cliff	Empty	0	Inactive	5.12	
13	Common Raven	Cliff	Empty	0	Inactive	5.06	
14	Common Raven	Cliff	Empty	0	Inactive	9.33	
15	Common Raven	Cliff	Empty	0	Inactive	7.99	
16	Common Raven	Cliff	Empty	0	Inactive	5.64	
17	Common Raven	Cliff	Empty	0	Inactive	7.28	
18	Common Raven	Cliff	Empty	0	Inactive	7.31	
19	Common Raven	Cliff	Empty	0	Inactive	8.22	
20	Common Raven	Cliff	Empty	0	Inactive	8.49	
21	Common Raven	Cliff	Empty	0	Inactive	6.05	
22	Common Raven	Rock	Empty	0	Inactive	7.04	
23	Common Raven	Cliff	Empty	0	Inactive	4.47	
24	Common Raven	Cliff	Empty	0	Inactive	4.88	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
25	Common Raven	Cliff	Empty	0	Inactive	9.57	
26	Common Raven	Cliff	Empty	0	Inactive	10.52	
27	Common Raven	Cliff	Empty	0	Inactive	10.53	Three Common Raven nests, same cliff
28	Common Raven	Cliff	Empty	0	Inactive	11.22	
29	Common Raven	Cliff	Empty	0	Inactive	10.23	
30	Common Raven	Cliff	Empty	0	Inactive	10.30	
31	Common Raven	Cliff	Empty	0	Inactive	9.50	
32	Common Raven	Cliff	Empty	0	Inactive	6.86	
33	Common Raven	Cliff	Empty	0	Inactive	5.89	
34	Common Raven	Cliff	Empty	0	Inactive	5.77	
35	Common Raven	Cliff	Empty	0	Inactive	6.35	
36	Common Raven	Cliff	Empty	0	Inactive	6.53	
37	Common Raven	Cliff	Empty	0	Inactive	6.57	
38	Common Raven	Cliff	Empty	0	Inactive	6.71	
39	Common Raven	Cliff	Empty	0	Inactive	7.37	
40	Common Raven	Cliff	Empty	0	Inactive	6.33	
41	Common Raven	Cliff	Empty	0	Inactive	4.55	
42	Common Raven	Cliff	Empty	0	Inactive	4.60	
43	Common Raven	Cliff	Empty	0	Inactive	4.10	
44	Common Raven	Cliff	Empty	0	Inactive	6.13	
45	Common Raven	Cliff	Empty	0	Inactive	5.99	
46	Common Raven	Cliff	Empty	0	Inactive	7.14	
47	Common Raven	Cliff	Empty	0	Inactive	9.49	
48	Common Raven	Cliff	Empty	0	Inactive	10.11	
49	Common Raven	Cliff	Empty	0	Inactive	10.12	
50	Common Raven	Cliff	Empty	0	Inactive	7.29	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
51	Common Raven	Cliff	Empty	0	Inactive	6.17	
52	Common Raven	Cliff	Empty	0	Inactive	4.25	
53	Common Raven	Cliff	Empty	0	Inactive	4.82	
54	Common Raven	Cliff	Empty	0	Inactive	5.88	
55	Common Raven	Cliff	Empty	0	Inactive	4.56	
56	Common Raven	Cliff	Empty	0	Inactive	4.58	
57	Common Raven	Cliff	Empty	0	Inactive	4.22	
58	Common Raven	Cliff	Empty	0	Inactive	3.72	
59	Common Raven	Cliff	Empty	0	Inactive	4.36	
60	Common Raven	Cliff	Empty	0	Inactive	1.27	
61	Common Raven	Cliff	Empty	0	Inactive	2.77	
62	Common Raven	Cliff	Empty	0	Inactive	2.30	
63	Common Raven	Cliff	Empty	0	Inactive	10.22	
64	Common Raven	Cliff	Empty	0	Inactive	2.89	
65	Common Raven	Cliff	Empty	0	Inactive	3.14	
66	Common Raven	Cliff	Empty	0	Inactive	2.78	Near Red-tailed Hawk nest
67	Common Raven	Cliff	Empty	0	Inactive	0.64	
68	Common Raven	Cliff	Empty	0	Inactive	2.98	
69	Common Raven	Cliff	Empty	0	Active	2.09	
70	Common Raven	Cliff	Empty	0	Inactive	2.43	
71	Common Raven	Cliff	Empty	0	Inactive	2.41	
72	Common Raven	Cliff	Empty	0	Inactive	3.40	
73	Common Raven	Cliff	Empty	0	Active	3.32	
74	Common Raven	Cliff	Empty	0	Inactive	3.06	
75	Common Raven	Cliff	Empty	0	Inactive	3.62	
76	Common Raven	Cliff	Empty	0	Inactive	5.07	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
77	Common Raven	Cliff	Empty	0	Inactive	5.04	
78	Common Raven	Cliff	Empty	0	Inactive	5.07	
79	Common Raven	Cliff	Empty	0	Inactive	10.04	
80	Common Raven	Cliff	Empty	0	Inactive	9.97	
81	Common Raven	Cliff	Empty	0	Inactive	9.65	Two nests next to each other
82	Common Raven	Cliff	Empty	0	Inactive	9.65	
83	Common Raven	Cliff	Empty	0	Inactive	6.37	Two old nests nearby
84	Common Raven	Cliff	Empty	0	Active	4.22	
85	Common Raven	Cliff	Empty	0	Inactive	4.99	
86	Common Raven	Cliff	Empty	0	Inactive	3.90	
87	Common Raven	Cliff	Empty	0	Inactive	3.04	
88	Common Raven	Cliff	Empty	0	Inactive	3.03	
89	Common Raven	Cliff	Empty	0	Inactive	3.16	
90	Common Raven	Cliff	Empty	0	Inactive	2.85	
91	Common Raven	Valley Oak	Empty	0	Inactive	3.24	
92	Common Raven	Cliff	Empty	0	Inactive	2.56	
93	Common Raven	Cliff	Empty	0	Inactive	2.29	
94	Common Raven	Tower	Empty	0	Inactive	0.82	
95	Common Raven	Tower	Empty	0	Inactive	0.36	
96	Common Raven	Tower	Empty	0	Inactive	0.23	
97	Common Raven	Tower	Empty	0	Inactive	0.41	
98	Common Raven	Tower	Empty	0	Inactive	0.00	
99	Common Raven	Tower	Empty	0	Inactive	0.00	Nest in a transformer pole
100	Common Raven	Tower	Empty	0	Inactive	0.00	
101	Common Raven	Tower	Empty	0	Inactive	0.00	
102	Common Raven	Tower	Empty	0	Inactive	0.21	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
103	Common Raven	Tower	Empty	0	Inactive	0.55	
104	Common Raven	Tower	Empty	0	Inactive	0.87	
105	Common Raven	Tower	Empty	0	Inactive	1.01	
106	Common Raven	Tower	Empty	0	Inactive	5.49	
107	Common Raven	Tower	Empty	0	Inactive	5.70	Two nests on one tower
108	Common Raven	Tower	Empty	0	Inactive	9.96	
109	Common Raven	Valley Oak	Empty	0	Inactive	9.11	
110	Common Raven	Blue Oak	Empty	0	Inactive	9.13	
111	Common Raven	Digger Pine	Empty	0	Inactive	7.48	
112	Common Raven	Blue Oak	Empty	0	Inactive	0.66	
113	Common Raven	Blue Oak	Empty	0	Inactive	2.87	
114	Common Raven	Blue Oak	Empty	0	Inactive	2.95	
115	Common Raven	Cliff	Empty	0	Inactive	3.77	
116	Common Raven	Blue Oak	Empty	0	Inactive	5.29	
117	Common Raven	Cliff	Empty	0	Inactive	9.23	
118	Common Raven	Cliff	Empty	0	Inactive	9.17	
119	Common Raven	Tower	Empty	0	Inactive	10.07	
120	Common Raven	Tower	Empty	0	Inactive	10.03	
121	Common Raven	Tower	Empty	0	Inactive	9.99	Two nests in two adjacent towers
122	Common Raven	Tower	Empty	0	Inactive	9.92	
123	Common Raven	Tower	Empty	0	Inactive	9.88	Two nests in one tower
124	Common Raven	Tower	Empty	0	Inactive	9.85	
125	Common Raven	Tower	Empty	0	Inactive	9.87	
126	Common Raven	Tower	Empty	0	Inactive	10.06	
127	Common Raven	Cliff	Empty	0	Inactive	4.72	
128	Common Raven	Cliff	Empty	0	Inactive	7.22	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
129	Common Raven	Cliff	Empty	0	Inactive	7.41	
130	Common Raven	Cliff	Empty	0	Inactive	7.42	
131	Common Raven	Cliff	Empty	0	Inactive	7.71	
132	Common Raven	Digger Pine	Empty	0	Inactive	8.36	
133	Common Raven	Cliff	Empty	0	Inactive	10.15	
134	Common Raven	Digger Pine	Empty	0	Inactive	9.72	
135	Common Raven	Digger Pine	Empty	0	Inactive	8.66	
136	Common Raven	Cliff	Empty	0	Inactive	5.39	
137	Common Raven	Digger Pine	Empty	0	Inactive	5.37	
138	Common Raven	Cliff	Empty	0	Inactive	4.67	
139	Common Raven	Cliff	Empty	0	Inactive	5.43	
140	Common Raven	Cliff	Empty	0	Inactive	5.59	
141	Common Raven	Cliff	Empty	0	Inactive	5.36	Next to Prairie Falcon
142	Common Raven	Cliff	Empty	0	Inactive	5.48	
143	Common Raven	Cliff	Empty	0	Inactive	4.43	
144	Common Raven	Cliff	Empty	0	Inactive	5.75	
145	Common Raven	Tower	Empty	0	Inactive	9.90	
146	Common Raven	Tower	Empty	0	Inactive	10.00	
147	Common Raven	Tower	Empty	0	Inactive	9.67	
148	Common Raven	Tower	Empty	0	Inactive	9.58	Two nests in one tower; old
149	Common Raven	Tower	Empty	0	Inactive	9.58	Two nests in one tower; old
150	Common Raven	Tower	Empty	0	Inactive	9.45	
151	Common Raven	Tower	Empty	0	Inactive	9.28	
152	Common Raven	Tower	Empty	0	Inactive	9.30	
153	Common Raven	Tower	Empty	0	Inactive	9.36	
154	Common Raven	Tower	Empty	0	Inactive	9.44	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
155	Common Raven	Tower	Empty	0	Inactive	9.49	
156	Common Raven	Tower	Empty	0	Inactive	9.56	
157	Common Raven	Tower	Empty	0	Inactive	9.62	
158	Common Raven	Tower	Empty	0	Inactive	9.67	Two nests in one tower
159	Common Raven	Tower	Empty	0	Inactive	9.67	Two nests in one tower
160	Common Raven	Tower	Empty	0	Inactive	9.23	
161	Common Raven	Tower	Empty	0	Inactive	8.70	
162	Common Raven	Tower	Empty	0	Inactive	8.54	
163	Common Raven	Tower	Empty	0	Inactive	8.41	
164	Common Raven	Tower	Empty	0	Inactive	8.26	Two nests in one tower
165	Common Raven	Tower	Empty	0	Inactive	8.26	Two nests in one tower
166	Common Raven	Tower	Empty	0	Inactive	8.18	Three nests in one tower
167	Common Raven	Tower	Empty	0	Inactive	8.18	Three nests in one tower
168	Common Raven	Tower	Empty	0	Inactive	8.18	Three nests in one tower
169	Common Raven	Tower	Empty	0	Inactive	8.12	
170	Common Raven	Tower	Empty	0	Inactive	8.06	
171	Common Raven	Tower	Empty	0	Inactive	7.85	Two nests in one tower
172	Common Raven	Tower	Empty	0	Inactive	7.85	Two nests in one tower
173	Common Raven	Tower	Empty	0	Inactive	7.66	
174	Common Raven	Tower	Empty	0	Inactive	7.66	
175	Common Raven	Tower	Empty	0	Inactive	7.70	Two nests in one tower
176	Common Raven	Tower	Empty	0	Inactive	7.70	Two nests in one tower
177	Common Raven	Tower	Empty	0	Inactive	7.93	
178	Common Raven	Tower	Empty	0	Inactive	8.04	
179	Common Raven	Tower	Empty	0	Inactive	8.38	
180	Common Raven	Tower	Empty	0	Inactive	8.51	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
181	Common Raven	Tower	Empty	0	Inactive	8.64	
182	Common Raven	Tower	Empty	0	Inactive	9.17	
183	Common Raven	Tower	Empty	0	Inactive	9.89	
184	Common Raven	Cliff	Empty	0	Inactive	6.38	
185	Common Raven	Digger Pine	Empty	0	Inactive	6.63	Bowl is deep
186	Common Raven	Digger Pine	Empty	0	Inactive	9.25	
187	Common Raven	Cliff	Empty	0	Inactive	6.91	Pair of Common Ravens near
188	Common Raven	Cliff	Empty	0	Inactive	5.97	
189	Common Raven	Cliff	Empty	0	Inactive	10.10	
190	Common Raven	Cliff	Empty	0	Inactive	10.12	
191	Common Raven	Cliff	Empty	0	Inactive	10.22	
192	Common Raven	Cliff	Empty	0	Inactive	7.29	
193	Common Raven	Blue Oak	Empty	0	Inactive	7.25	deep bowl
194	Common Raven	Blue Oak	Empty	0	Inactive	9.12	deep bowl
195	Common Raven	Cliff	Empty	0	Inactive	5.78	
196	Common Raven	Cottonwood	Empty	0	Inactive	0.00	
197	Common Raven	Blue Oak	Empty	0	Inactive	6.72	
198	Common Raven	Cliff	Empty	0	Inactive	7.88	
199	Common Raven	Digger Pine	Empty	0	Inactive	7.99	Fledged young in 2013
200	Common Raven	Cliff	Empty	0	Inactive	7.53	
201	Common Raven	Cliff	Unknown	N.A.	Active	4.57	Adult on nest in incubation posture. Near two inactive Common Raven Nests
202	Common Raven	Cliff	Empty	0	Inactive	8.31	
203	Common Raven	Cliff	Empty	0	Inactive	8.32	Active in 2013
204	Common Raven	Cliff	Empty	0	Inactive	8.18	Two Common Raven nests above and to right of inactive Golden Eagle nest
205	Common Raven	Cliff	Empty	0	Inactive	9.70	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
206	Common Raven	Cliff	Empty	0	Inactive	9.66	
207	Common Raven	Cottonwood	Unknown	N.A.	Active	8.80	Adult on nest
208	Common Raven	Cliff	Empty	0	Inactive	3.33	Lower of two nests on same cliff face
209	Common Raven	Cliff	Unknown	N.A.	Active	7.56	Adult on nest in incubation posture
210	Common Raven	Cliff	Empty	0	Active	7.60	Nest is freshly built on
211	Common Raven	Cliff	Empty	0	Active	4.81	
212	Common Raven	Cliff	Empty	0	Active	4.37	Upper and smaller of two nests on face
213	Common Raven	Cliff	Empty	0	Inactive	4.37	Lower and larger of two nests on face
214	Common Raven	Cliff	Empty	0	Inactive	9.56	
215	Common Raven	Cliff	Empty	0	Inactive	9.63	Large nest
216	Common Raven	Digger Pine	Empty	0	Inactive	9.65	
217	Common Raven	Digger Pine	Empty	0	Inactive	9.92	Lower of two nests in same tree
218	Common Raven	Digger Pine	Empty	0	Inactive	9.85	Upper of two nests in same tree; pine cones in bowl
219	Common Raven	Cliff	Empty	0	Active	5.63	
220	Common Raven	Cliff	Empty	0	Inactive	5.97	
221	Common Raven	Cliff	Unknown	N.A.	Unknown	4.16	Two nests close together. Difficult to fly, so hiked in to confirm status. Lower part of canyon used heavily as firing range, possibly used by Golden Eagles in the distant past
222	Common Raven	Cliff	Empty	0	Inactive	5.69	Near active Prairie Falcon nest
223	Common Raven	Cliff	Empty	0	Active	2.32	Likely failed
224	Common Raven	Cliff	Empty	0	Inactive	7.91	Directly below another Common Raven nest on same cliff
225	Common Raven	Cliff	Empty	0	Inactive	7.91	Directly above another Common Raven nest on same cliff
226	Common Raven	Cliff	Empty	0	Active	5.95	Below an older nest. Likely failed
227	Common Raven	Cliff	Unknown	N.A.	Active	5.78	Above a newer nest. Adult on nest
228	Common Raven	Cliff	Empty	0	Active	5.60	Rebuilt in 2014. Likely failed

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
229	Common Raven	Cliff	Empty	0	Active	8.26	Rebuilt in 2014. Likely failed
230	Common Raven	Valley Oak	Eggs	1	Unknown	7.91	One Common Raven egg in an old Red-tailed Hawk nest. No Common Ravens observed
231	Common Raven	Cliff	Unknown	N.A.	Active	8.74	Adult on nest in incubation posture
232	Common Raven	Cliff	Unknown	N.A.	Active	10.68	Adult on nest in incubation posture
233	Common Raven	Cliff	Unknown	N.A.	Active	11.38	Adult on nest in incubation posture
234	Common Raven	Cliff	Unknown	N.A.	Unknown	3.37	Adult near, could not see contents clearly
281	Great Horned Owl	Cliff	Empty	0	Inactive	6.81	
282	Great Horned Owl	Cliff	Empty	0	Inactive	2.78	
283	Great Horned Owl	Cliff	Empty	0	Inactive	2.79	
284	Prairie Falcon	Cliff	Empty	0	Inactive	8.98	On top of old Common Raven nest; same cliff as Golden Eagle and Red-tailed Hawk nests
285	Prairie Falcon	Cliff	Empty	0	Inactive	7.28	Lots of whitewash
286	Prairie Falcon	Cliff	Empty	0	Inactive	7.85	
287	Prairie Falcon	Cliff	Empty	0	Inactive	4.40	
288	Prairie Falcon	Cliff	Empty	0	Inactive	10.01	
289	Prairie Falcon	Cliff	Empty	0	Inactive	10.33	
290	Prairie Falcon	Cliff	Empty	0	Inactive	10.33	
291	Prairie Falcon	Cliff	Empty	0	Inactive	8.57	
292	Prairie Falcon	Cliff	Empty	0	Inactive	9.53	
293	Prairie Falcon	Cliff	Empty	0	Inactive	9.52	
294	Prairie Falcon	Cliff	Empty	0	Inactive	7.22	
295	Prairie Falcon	Cliff	Empty	0	Inactive	6.58	
296	Prairie Falcon	Cliff	Empty	0	Inactive	6.27	On old Common Raven nest
297	Prairie Falcon	Cliff	Empty	0	Inactive	6.58	
298	Prairie Falcon	Cliff	Empty	0	Inactive	6.59	
299	Prairie Falcon	Cliff	Empty	0	Inactive	7.03	
300	Prairie Falcon	Cliff	Empty	0	Inactive	6.93	
301	Prairie Falcon	Cliff	Empty	0	Inactive	4.20	
302	Prairie Falcon	Cliff	Empty	0	Inactive	6.31	
303	Prairie Falcon	Cliff	Empty	0	Inactive	6.13	
304	Prairie Falcon	Cliff	Empty	0	Inactive	9.54	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
305	Prairie Falcon	Cliff	Empty	0	Inactive	10.14	
306	Prairie Falcon	Cliff	Empty	0	Inactive	10.20	
307	Prairie Falcon	Cliff	Empty	0	Inactive	10.14	
308	Prairie Falcon	Cliff	Empty	0	Inactive	5.19	Prairie Falcon observed near nest
309	Prairie Falcon	Cliff	Empty	0	Inactive	4.97	
310	Prairie Falcon	Cliff	Empty	0	Inactive	4.48	
311	Prairie Falcon	Cliff	Empty	0	Inactive	4.66	
312	Prairie Falcon	Cliff	Empty	0	Inactive	4.38	
313	Prairie Falcon	Cliff	Empty	0	Inactive	3.59	
314	Prairie Falcon	Cliff	Empty	0	Inactive	2.85	
315	Prairie Falcon	Cliff	Empty	0	Inactive	2.78	
316	Prairie Falcon	Cliff	Empty	0	Inactive	10.22	
317	Prairie Falcon	Cliff	Empty	0	Inactive	3.86	
318	Prairie Falcon	Cliff	Empty	0	Inactive	4.22	
319	Prairie Falcon	Cliff	Empty	0	Inactive	4.21	
320	Prairie Falcon	Cliff	Empty	0	Inactive	3.79	
321	Prairie Falcon	Cliff	Empty	0	Inactive	3.13	Three nests within 50 feet of each other. One on top and two below
322	Prairie Falcon	Cliff	Empty	0	Inactive	2.76	
323	Prairie Falcon	Cliff	Empty	0	Inactive	2.54	
324	Prairie Falcon	Cliff	Empty	0	Inactive	2.75	
325	Prairie Falcon	Cliff	Empty	0	Inactive	2.86	
326	Prairie Falcon	Cliff	Empty	0	Inactive	2.78	
327	Prairie Falcon	Cliff	Empty	0	Inactive	2.88	Over old Common Raven nest
328	Prairie Falcon	Cliff	Empty	0	Inactive	3.30	Priarie Falcon pair observed
329	Prairie Falcon	Cliff	Empty	0	Inactive	3.94	
330	Prairie Falcon	Cliff	Empty	0	Inactive	3.09	
331	Prairie Falcon	Cliff	Empty	0	Inactive	2.40	
332	Prairie Falcon	Cliff	Empty	0	Inactive	7.24	
333	Prairie Falcon	Cliff	Empty	0	Inactive	2.75	
334	Prairie Falcon	Cliff	Empty	0	Inactive	4.95	Another Prairie Falcon eyrie located on same rock
335	Prairie Falcon	Cliff	Empty	0	Inactive	4.95	Another Prairie Falcon eyrie located on same rock
336	Prairie Falcon	Cliff	Empty	0	Inactive	4.68	
337	Prairie Falcon	Cliff	Empty	0	Inactive	8.18	
338	Prairie Falcon	Cliff	Empty	0	Inactive	8.18	
339	Prairie Falcon	Cliff	Empty	0	Inactive	7.56	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
340	Prairie Falcon	Cliff	Empty	0	Inactive	4.82	
341	Prairie Falcon	Cliff	Empty	0	Inactive	5.45	
342	Prairie Falcon	Cliff	Empty	0	Inactive	5.36	Nest to Common Raven
343	Prairie Falcon	Cliff	Empty	0	Inactive	10.12	
344	Prairie Falcon	Cliff	Empty	0	Inactive	5.43	
345	Prairie Falcon	Cliff	Unknown	N.A.	Active	5.68	Adult sitting in nest in incubation posture. Nesting in old Common Raven nest. Abundant whitewash above and in nest.
346	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	8.07	
347	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	8.07	
348	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	6.43	
349	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.07	
350	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.33	
351	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.41	
352	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	6.31	
353	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.33	
354	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.95	
355	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.38	
356	Red-tailed Hawk	Cliff	Empty	0	Inactive	6.93	
357	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.25	
358	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.33	
359	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.45	
360	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.65	
361	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.53	
362	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.41	
363	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.20	Two nests in same tree
364	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.20	Two nests in same tree
365	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.08	

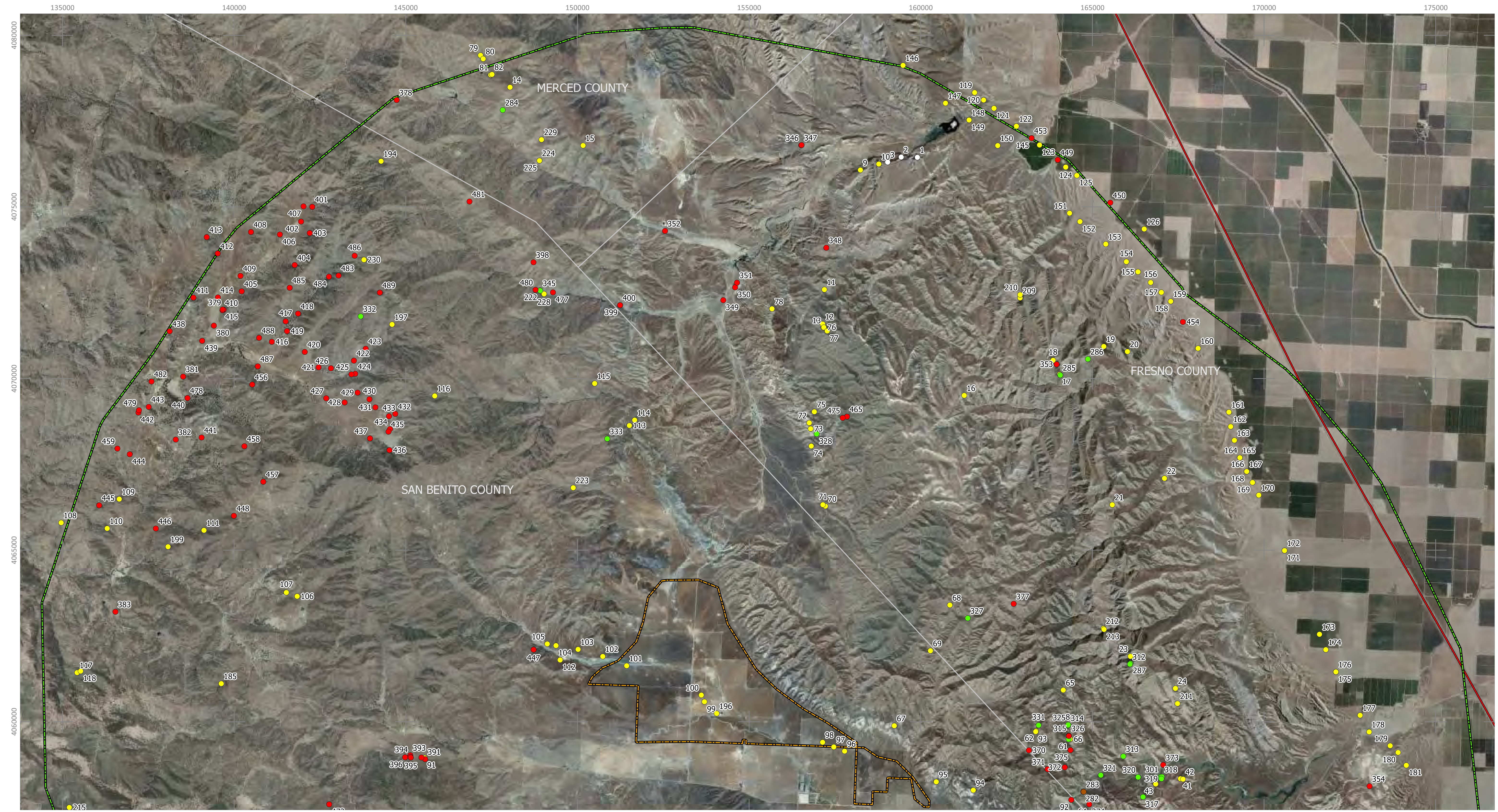
ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
366	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.07	
367	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	6.42	
368	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	1.26	
369	Red-tailed Hawk	Cliff	Empty	0	Inactive	1.85	
370	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.02	
371	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.21	
372	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.52	
373	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.27	
374	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.89	
375	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.71	
376	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.78	Near Common Raven nest
377	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.54	
378	Red-tailed Hawk	Cliff	Empty	0	Inactive	9.92	
379	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.26	
380	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.25	
381	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.17	
382	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.66	
383	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.64	
384	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.49	Near another Red-tailed Hawk nest in adjacent tree
385	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.51	Near another Red-tailed Hawk nest in adjacent tree
386	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	4.91	Same territory as nearby nest
387	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	4.97	Same territory as nearby nest
388	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	4.94	
389	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	5.01	
390	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	1.75	
391	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	3.24	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
392	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.29	
393	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.46	
394	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.47	
395	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.47	Nest falling apart
396	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.56	
397	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.56	
398	Red-tailed Hawk	Cliff	Empty	0	Active	6.20	
399	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.04	
400	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	5.04	
401	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.25	
402	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.19	
403	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.94	
404	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.75	
405	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.19	
406	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.31	
407	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.36	
408	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.73	
409	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.37	
410	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.27	
411	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.83	
412	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.95	
413	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	10.29	
414	Red-tailed Hawk	Windmill	Empty	0	Inactive	9.47	
415	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.28	
416	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.21	
417	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.23	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
418	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.14	
419	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.10	
420	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.62	
421	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.26	
422	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.82	
423	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.79	
424	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.65	
425	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.70	Two nests near each other
426	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.07	
427	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.84	
428	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.51	
429	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.42	
430	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.17	
431	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.00	
432	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.64	
433	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.71	
434	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	5.56	
435	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.56	
436	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.37	
437	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.78	
438	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.86	
439	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.29	
440	Red-tailed Hawk	Valley Oak	Empty	0	Active	8.88	
441	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.27	
442	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.49	
443	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.38	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
444	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.27	
445	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.41	
446	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	8.30	
447	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	1.17	
448	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	7.09	
449	Red-tailed Hawk	Tower	Empty	0	Inactive	9.87	Red-tailed Hawk perched nearby
450	Red-tailed Hawk	Tower	Empty	0	Inactive	9.93	Red-tailed Hawk perched nearby
451	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.82	
452	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.19	
453	Red-tailed Hawk	Tower	Empty	0	Inactive	9.90	Red-tailed Hawk perched nearby
454	Red-tailed Hawk	Tower	Empty	0	Inactive	9.47	
455	Red-tailed Hawk	Digger Pine	Empty	0	Active	8.14	New nest bowl. Two adults near
456	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.10	Two adults near
457	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.91	Old nest
458	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	7.54	
459	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.51	
460	Red-tailed Hawk	Cliff	Empty	0	Inactive	6.74	
461	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.51	
462	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.43	
463	Red-tailed Hawk	Cliff	Eggs	2	Incubating	4.50	Newly built nest this year.
464	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.33	Upper of two nests on same cliff face
465	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.87	
466	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	7.22	Fledged young in 2013
467	Red-tailed Hawk	Cliff	Empty	0	Inactive	10.19	Old nest, only remnants or possibly never built completely
468	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	8.64	Adult Red-tailed Hawk near nest acting territorial, but nest not built on

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
469	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	5.68	
470	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	4.34	
471	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	5.11	
472	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	5.16	Old nest
473	Red-tailed Hawk	Digger Pine	Unknown	N.A.	Active	8.25	Adult on nest
474	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	9.24	
475	Red-tailed Hawk	Cliff	Empty	0	Active	3.80	Fresh, built this year. No grasses.
476	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	9.55	
477	Red-tailed Hawk	Cliff	Empty	0	Inactive	5.57	Located below old Golden Eagle nest
478	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.88	
479	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.50	
480	Red-tailed Hawk	Cliff	Empty	0	Inactive	5.73	
481	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.68	
482	Red-tailed Hawk	Valley Oak	Eggs	2	Active	9.58	Adult observed incubating
483	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.03	
484	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.14	
485	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.55	
486	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.08	
487	Red-tailed Hawk	Valley Oak	Empty	0	Active	8.19	Freshly lined with lichens on Jan. 23. Empty and no activity on Apr. 5.
488	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.44	Large bowl
489	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.28	Old, remnants of a large stick nest
490	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	4.26	
491	Red-tailed Hawk	Cliff	Unknown	N.A.	Active	3.43	Adult on nest in incubation posture
492	Turkey Vulture	Cliff	Empty	0	Inactive	6.91	



County Border
Major Road
Proposed Project Boundary
Study Area

Nest Locations
Barn Owl
Common Raven
Prairie Falcon
Great Horned Owl
Red-tailed Hawk
Turkey Vulture

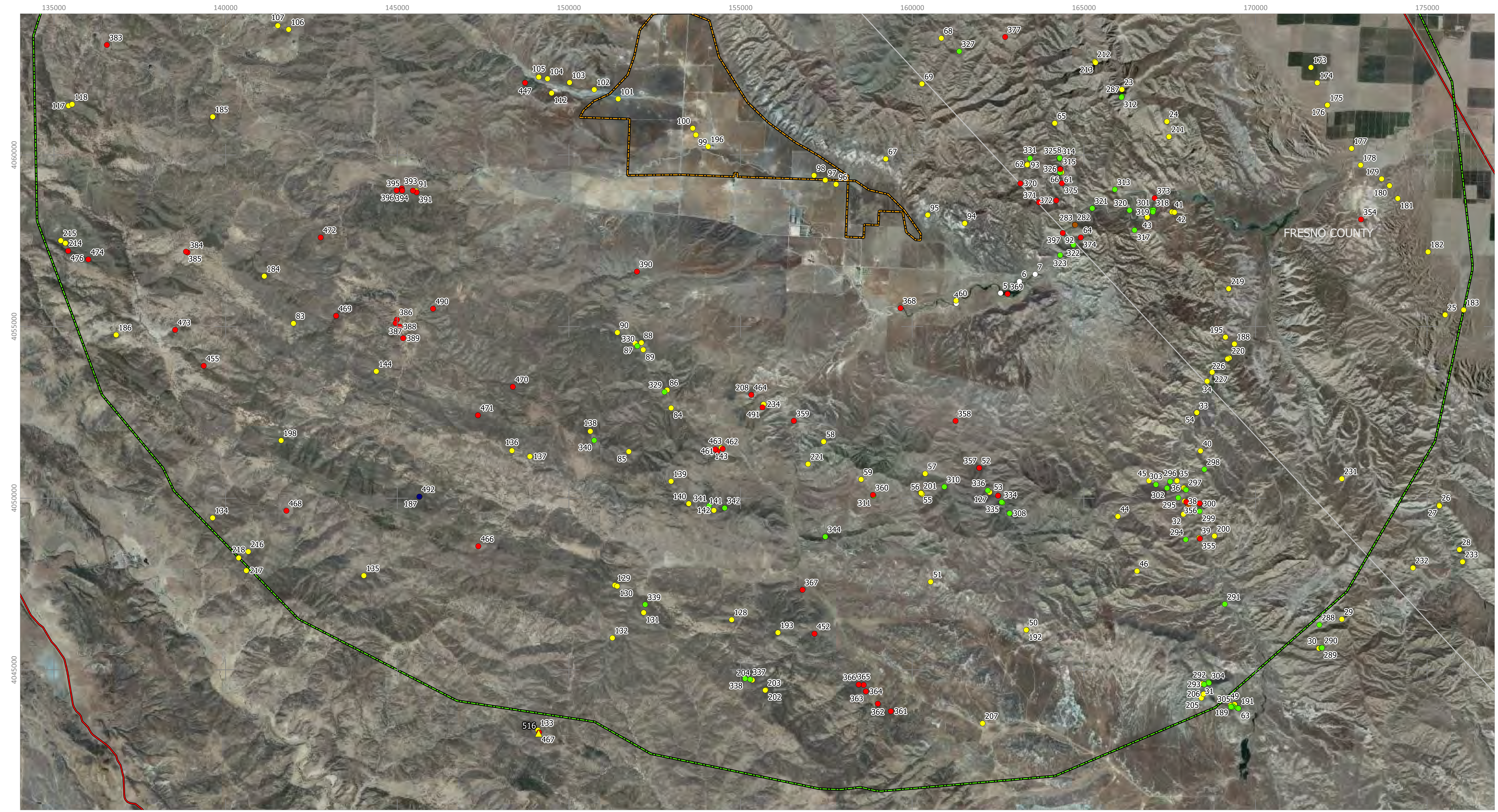
5000 0 5000 10000 15000 20000 ft
1:105,791

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/8/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

EXHIBIT 2. 2014 Nesting Survey: Non-Golden Eagle Results (Northern Study Area)

Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI



County Border
Major Road
Proposed Project Boundary
Study Area

Special Status Species Observations
California Condor

Nest Locations
Barn Owl
Common Raven
Prairie Falcon
Great Horned Owl
Red-tailed Hawk
Turkey Vulture

5000 0 5000 10000 15000 20000 ft
1:105,791

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/8/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

EXHIBIT 3. 2014 Nesting Survey: Non-Golden Eagle Results (Southern Study Area)

Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI

APPENDIX C. SPECIES LIST

The following list of 36 bird and 10 mammal species represents a complete compendium of vertebrate species detected during surveys by BBI biologists in January and April, 2014. Sensitive status designations are derived directly from the California Department of Fish and Wildlife's California Wildlife Habitats Relationship Database. Sensitive statuses in this database may pertain only to a subspecies or genetically distinct population of the species, and are included here only if the sensitive population has the potential to occur in the Study Area.

Birds

Common Name	Scientific Name	FE	FT	CE	CT	CFP	SSC
Mallard	Anas platyrhynchos						
California Quail	Callipepla californica						
Chukar	Alectoris chukar						
Wild Turkey	Meleagris gallopavo						
Cattle Egret	Bubulcus ibis						
White-faced Ibis	Plegadis chihi						
Turkey Vulture	Cathartes aura						
Bald Eagle	Haliaeetus leucocephalus			X		X	
Northern Harrier	Circus cyaneus						
Cooper's Hawk	Accipiter cooperii						
Red-tailed Hawk	Buteo jamaicensis						
Ferruginous Hawk	Buteo regalis						
Golden Eagle	Aquila chrysaetos					X	
Killdeer	Charadrius vociferus						
Rock Pigeon	Columba livia						
Greater Roadrunner	Geococcyx californianus						
Barn Owl	Tyto alba						
Great Horned Owl	Bubo virginianus						
Acorn Woodpecker	Melanerpes formicivorus						
Northern Flicker	Colaptes auratus						
American Kestrel	Falco sparverius						
Merlin	Falco columbarius						
Prairie Falcon	Falco mexicanus						
Loggerhead Shrike	Lanius ludovicianus	X					
Western Scrub-Jay	Aphelocoma californica						
Yellow-billed Magpie	Pica nuttalli						
American Crow	Corvus brachyrhynchos						
Common Raven	Corvus corax						
Canyon Wren	Catherpes mexicanus						
Western Bluebird	Sialia mexicana						
California Thrasher	Toxostoma redivivum						
European Starling	Sturnus vulgaris						

California Towhee	Melozone crissalis						
Western Meadowlark	Sturnella neglecta						
House Finch	Haemorhous mexicanus						

Mammals

Common Name	Scientific Name	FE	FT	CE	CT	CP	SSC
Desert Cottontail	Sylvilagus audubonii						
Black-tailed Jackrabbit	Lepus californicus						X
California Ground Squirrel	Spermophilus beecheyi						
Coyote	Canis latrans						
Gray Fox	Urocyon cinereoargenteus						
American Badger	Taxidea taxus						X
Bobcat	Lynx rufus						
Wild Pig	Sus scrofa						
Elk	Cervus elaphus						
Mule Deer	Odocoileus hemionus						

APPENDIX D. RESUMES

Peter H. Bloom, Ph.D. | President

Qualifications

Peter Bloom has been a professional environmental consultant for more than 35 years, principally in California. He specializes in the environmental sciences, is an internationally recognized expert in raptor biology and conservation and is considered one of the best all-around field biologists in California with his extensive knowledge and experience with all terrestrial vertebrate groups (amphibians, reptiles, birds, and mammals) and the vascular plants. Corporate clients for whom he has prepared or contributed to the production of numerous biological assessments and environmental impact reports include The Irvine Company, Rancho Mission Viejo, Tejon Ranch, Newhall Ranch, Ahmanson Ranch, Metropolitan Water District, and Los Angeles Department of Water and Power. He has also worked extensively with the Department of Defense, U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, U.S. Forest Service, California Department of Fish and Game, and various non-profit conservation groups providing valuable research and advice, primarily on raptor ecology and conservation. He has conducted avian and herpetological research in the western United States, Alaska, Peru, Ecuador, and India and has been responsible for a wide variety of biological, ecological, and conservation studies ranging from local biological assessments to regional conservation planning. Dr. Bloom has published more than 30 peer-reviewed scientific papers and technical reports and taught California natural history at a local junior college for more than 12 years.

Professional Experience

As founder and President of Bloom Biological, Inc., Dr. Bloom has prepared numerous biological assessments and worked on an array of avian research projects in the western United States, Alaska, Peru, Ecuador, and India, spending over 600 hours conducting helicopter and fixed-wing nest survey work and aerial radio-tracking of eagles, California condors, hawks, and herons. He has also been responsible for conducting or supervising:

- fiber-optics and electrical powerline installation surveys and construction monitoring;
- surveys of nesting and wintering birds of prey for the California Department of Fish and Game (CDFG), BLM, U.S. Forest Service, Department of Defense, and numerous private land owners;
- transponder and radio-tagging of adult California red-legged frogs in Ventura County;
- focused surveys for California gnatcatcher, southwestern willow flycatcher, least Bell's vireo, yellow-billed cuckoo, Swainson's hawks, golden eagles, arroyo toad, California red-legged frog, desert tortoise, Pacific pond turtle (including trapping and surveying habitat), coast horned lizard, flat-tailed horned lizard, Belding's orange-throated whiptail, coastal whiptail, southern rubber boa, coastal patch-nosed snake, California glossy snake, two-striped garter snake (including trapping and surveying habitat), red-diamond rattlesnake, southern flying squirrel, and Pacific pocket mouse;
- general herpetological, small mammal, breeding and winter bird surveys in southern California;
- translocation of several hundred arroyo toads at Camp Pendleton Marine Corps Base;
- sensitive herpetological, mammal, and raptor surveys for the Transportation Corridor Agency in Orange County; and
- a raptor status and management plan for Naval Weapons Station, Seal Beach and Fallbrook Detachment.

As a research biologist at the Western Foundation of Vertebrate Zoology, served on the Science Advisory Board of the South Orange County Natural Communities Conservation Program. During his tenure there he:

- provided herpetological input into the Orange County environmental GIS and Cleveland National Forest environmental inventory.
- managed a long-term (30 yr.) raptor ecology study in California;
- managed a successful Great Blue Heron mitigation project designed to increase numbers of nesting herons through placement of artificial nest platforms;
- supervised and performed predator management activities for USFWS related to protection of California least terns, snowy plovers, and light-footed clapper rails in southwestern California from avian and other vertebrate predators (locations included Vandenberg Air Force Base, Naval Weapons Station Seal Beach, Batiquitos Lagoon, Port of Long Beach, Port of San Diego, and Tijuana Slough National Wildlife Refuge);
- supervised a two year CalTrans radio-telemetry study of nesting peregrine falcons and their relationship to California least terns in southwestern California; and
- organized and finished seven years of a MAPS passerine monitoring station.
- Together with sub-permittees, banded ~ 45,000 birds, mostly nestlings (1970 – 2013).

While serving as a research biologist and advisor in India, responsibilities included educating local biologists in the various techniques needed to capture birds, and conducting radio-telemetry research.

Served as thesis advisor to seven students at CSU Long Beach, one student at CSU Humboldt, and one student at CSU Fullerton.

As research biologist for the National Audubon Society, was responsible for writing the grant proposal and ultimately the successful award of two grants totaling $300,000 for six years of fulltime research on the ecology of southern California raptor populations. Responsibilities included project management, personnel selection, supervision of 12 volunteers, proposal and budget preparation, method design, data analysis, report writing, and publication of results. Directed the effort to capture all wild free-flying California condors for transmitter placement or captive breeding. Radio-tracked condors and conducted contaminant studies involving condors and 180 golden eagles.

As a research biologist at the University of California, Santa Cruz, was principal investigator on a three year study designed to determine the status of northern goshawk populations in California for CDFG.

Trapped and placed transmitters on great gray owls for the National Park Service , prairie falcons for CDFG, and peregrine falcons in Peru for the Bodega Bay Institute of Pollution Ecology.

As a wildlife biologist for BLM, was principal investigator of a study designed to determine the status of the Swainson's hawk in California. Surveyed all semi-arid and desert regions, reviewed literature and museum records, assessed reproduction, banded adults and young, and prepared the final report. His efforts contributed to the state-listing of Swainson's hawk as threatened.

Surveyed and reported on the ecology and distribution of raptors inhabiting the 200-square-mile Camp Pendleton Marine Corps Base.

While serving as a biological technician for BLM, conducted reptile, amphibian, small mammal, and avian surveys of 3.25 million acres of public land as part of a grazing EIS.

Education

Ph.D., Natural Resources, College of Natural Resources, University of Idaho, Moscow
M.S., Biology, California State University, Long Beach
B.S., Zoology, California State University, Long Beach

Awards

Graduation with Honors – Best Thesis Award School of Natural Sciences 1979
The Wildlife Society Western Section: Professional of the Year, 2005

Association of Field Ornithologists: Bergstrom Award, 1981
The Nature Conservancy: $27,000 for satellite transmitters, 2004 and 2006

Permits & Certifications

Federal endangered species recovery permit (TE-787376) for red-legged frog (including placement of transmitters and transponders), arroyo toad, California gnatcatcher (including banding), least Bell's vireo (including banding), southwestern willow flycatcher (including banding), California least tern, snowy plover, peregrine falcon (banding), bald eagle (banding), and Swainson's hawk (banding).

California scientific collecting permit and memorandum of understanding for all raptors, including state-threatened Swainson's hawk, reptiles, amphibians, small mammals, and many additional species of birds, including state-threatened western yellow-billed cuckoo, California least tern, snowy plover, peregrine falcon, and bald eagle
Federal Master Banding Permit No. 20431
Federal Bird Marking and Salvage Permit
Predator Management Permit
Migratory Bird Relocation Permit (burrowing owl and other species)

Brown-headed cowbird trapping authorization

Desert Tortoise Council-approved for conducting desert tortoise monitoring surveys

Selected Publications

Home range and habitat use of Cooper's Hawks in urban and natural areas. C.A. Lepczyk and P.S. Warren (eds). Studies in Avian Biology No. 45. www.ucpress.edu/go/sab. 2012. (with Chiang, S.N., P.H. Bloom, A.M.Bartuszevige and S. E. Thomas)

Impact of the lead ammunition ban on reducing lead exposure in golden eagles and turkey vultures in California. PloS One. 18 pgs. 2011. (with Kelly, T.R., S. Torres, Y. Hernandez, R. Poppenga, W.M. Boyce, and C.K. Johnson)

Vagrant western Red-shouldered Hawks: Origins, natal dispersal patterns and survival. The Condor. 113:538-546. 2011. (with J.M. Scott, J.M. Papp, J.W. Kidd, S. Thomas)

Capture techniques. Pgs. 193 – 219. In Bird and Bildstein (eds). Raptor research and management techniques. Hancock House, Blaine, WA. 2007. (with W.S. Clark and J.W. Kidd)

Status of Burrowing Owls in southwestern California. In Proceedings of the California burrowing owl symposium, November 2003. Bird populations monographs No. 1. Institute for Bird Populations and Albion Environmental, Inc. 2007. (with Kidd, J.W., P.H. Bloom, C.W. Barrows and C.T. Collins)

Turkey vulture marking history: the switch from leg bands to patagial tags. *North American Bird Bander* 30:59-64. 2005. (with C. S. Houston)

Basic II and basic III plumages of rough-legged hawks. *Journal of Field Ornithology* 76:83-89. 2005. (with William Clark)

Molt and sequence of plumages of golden eagles, and a technique for in-hand ageing. *North American Bird Bander* 26:97-116. 2001. (with William Clark)

The status of Harlan's hawk in southern California. *Western Birds* 31:200-202. 2000. (with Charles Collins)

Post-migration weight gain of Swainson's hawks in Argentina. *Wilson Bulletin* 111:428-432. 1999. (with M. I. Goldstein, J. H. Sarasola, and T. E. Lacher)

Characteristics of red-tailed hawk nest sites in oak woodlands of central California. Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues. Pgs. 365-372. 1998. (with W. D. Tietje, and J. K. Vreeland)

The urban buteo: red-shouldered hawks in southern California. Pgs 31-39 in: Raptors in Human Landscapes, Adaptations to Built and Cultivated Environments. 1996. D. M. Bird, D. E. Varland,, and J. J. Negro, eds. Academic Press. (with M. D. McCrary)

Reproductive performance, age structure, and natal dispersal of Swainson's hawks in the Butte Valley, California. Journal of Raptor Research 29:187-192. 1995. 1995. (with B. Woodbridge and K. K. Finley)

The biology and current status of the long-eared owl in coastal southern California. Bulletin of the Southern California Academy of Sciences 93:1-12. 1994.

Red-shouldered hawk home range and habitat use in southern California. Journal of Wildlife Management 57:258-265. 1993. (with M. D. McCrary and M. J. Gibson)

The dho-gaza with great horned owl lure: an analysis of its effectiveness in capturing raptors. Journal of Raptor Research 26:167-178. 1992. (with J. L. Henckel, E. H. Henckel, J. K. Schmutz, B. Woodbridge, J. R. Bryan, R. L. Anderson, P. J. Detrich, T. L. Maechtle, J. O. McKinley, M. D. McCrary, K. Titus, and P. F. Schempf [Bloom senior author])

Lead hazards within the range of the California condor. The Condor 92:931-937. 1990. (with O. H. Pattee, J. M. Scott, and M. R. Smith)

Investigations of the decline of Swainson's hawk populations in California. Journal of Raptor Research 23:63-71. 1990. (with R. W. Risebrough, R. W. Schlorff, and E. E. Littrell)

Importance of riparian systems to nesting Swainson's hawks in the Central Valley of California. Pgs. 612-618 in Warner, R.E. and K.M. Hendrix eds., California Riparian Systems, Ecology, Conservation, and Productive Management. University of California Press. 1984. (with R. D. Schlorff)

Michael Kuehn, Ph.D. | Senior Biologist & Statistical Analyst

Qualifications

Dr. Kuehn is an avian ecologist with experience conducting field research throughout the Americas from Ecuador to Alaska. He also has a solid working knowledge of the other terrestrial vertebrate groups (amphibians, reptiles, and mammals), and has taught courses about their ecology and identification at UC-Santa Barbara. He is familiar with the fauna and flora of coastal California and the Mojave/Sonoran Desert regions. He has studied nesting birds for 15 years, principally in California, Nevada, Arizona, Montana, Idaho and Alaska, but also in Ecuador. Dr. Kuehn has been responsible for a wide variety of biological, ecological, and conservation studies ranging from local biological assessments to studies aimed at understanding specific stressors on regional avian communities. He has designed and conducted numerous avian field studies, and supervised field crews during the implementation of these studies in addition to performing statistical analysis and interpretation of data for report preparation.

Professional Experience

As a biologist at Bloom Biological, Dr. Kuehn has worked for three years in a variety of capacities to help design and conduct ecological assessments and prepare permitting documents, including the following:

Development of statistically valid pre-construction and post-construction avian survey protocols that meet federal and state permit requirements for alternative energy projects.

Managed multiple environmental assessments at alternative energy projects, involving survey design and site selection, training biologists to follow specific survey methods and protocols, scheduling and data management, as well as GIS management, data synthesis, statistical analysis and report preparation.

Contributed to the drafting of multiple Eagle Conservation Plans for wind energy projects seeking to apply for USFWS programmatic incidental eagle take permits.

Experienced with the application of field survey data to generate eagle fatality estimates for wind energy projects using the USFWS-developed Bayesian fatality prediction model using R Statistical software.

Conducted field surveys for a variety of passerine birds, owls, and other raptors.

Trained in raptor trapping (including Golden Eagles) and radio telemetry tracking of tagged birds.

Worked as an avian specialist, conducting nest searching and monitoring for the Sunrise Powerlink Project in San Diego and Imperial counties in California.

Assisted in creating burrows and conducting surveys for Burrowing Owls.

Dr. Kuehn also has the following experience:

As a research assistant at the Western Foundation of Vertebrate Zoology, conducted surveys for Loggerhead Shrikes on Santa Cruz Island and for all bird species along the Santa Clara River (Ventura County).

As a research associate at the University of California, Santa Barbara, designed and directed a two-year study investigating the effects of a tamarisk biocontrol agent on avian communities using riparian habitat in southern Nevada.

Served on a Technical Advisory Committee for a Walton Family Foundation funded initiative to restore habitat for Southwestern Willow Flycatchers in the Colorado Basin in the wake of Tamarisk biocontrol beetle introduction during 2011 and 2012.

Conducted independent research on reproductive strategies of birds breeding at high latitudes in central Alaska.

As a graduate student at UC Santa Barbara, conducted seven years of field research in Alaska, Idaho and Montana to investigate the behavioral defenses of hosts against Brown-headed Cowbird parasitism.

Participated for four years in a long-term ecological investigation of landscape effects on nesting success of riparian birds in Western Montana

Participated in a study of nesting birds in the cloud-forests of central and southern Ecuador.

Education

Ph.D., University of California, Department of Ecology, Evolution and Marine Biology, Santa Barbara

B.S., Fisheries and Wildlife Management, Lake Superior State University, Sault Ste. Marie, Michigan

Awards

Worster Award for Graduate/Undergraduate Collaborative Research, Department Ecology, Evolution and Marine Biology, University of California, Santa Barbara ($6000). 2007

Frank M. Chapman Memorial Grant, American Museum of Natural History ($2500). 2007
Student Research Award, Animal Behavior Society ($1000). 2007

Exploration Fund Award, Explorer's Club ($1200). 2007

Paul A. Stewart Research Award, Wilson Ornithological Society ($500). 2007

Ralph Schreiber Ornithology Research Award, Los Angeles Audubon Society ($2500). 2006

Student Research Award, American Ornithologist's Union ($1800). 2003

Permits & Certifications

USFWS Sci. Collector's Permit (MB085567-0)

USGS Bird Banding Subpermitee (22905-F)

Selected Publications

Kuehn, M. J., B. D. Peer, and S. I. Rothstein. (*Submitted Dec. 25, 2013*). Expression of Nest Defense Behaviors by a Brood Parasite Host is Experience-Dependent and Retained in the Absence of Parasitism. Evolution.

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Appendix D

Resume of Eagle Conservation Plan Preparer

James A. McRacken

Senior Scientist

Mr. McRacken has over 26 years of experience in wildlife studies including avian, mammal, and reptile and amphibian surveys, jurisdictional streams and wetlands delineations, as well as federal, state, and local permitting activities. During his career, he has conducted wildlife surveys, including rare, threatened, and endangered (RTE) plant and wildlife species, wetland evaluations, habitat and substrate assessments, and various National Environmental Policy Act (NEPA) related assessments for multiple branches of the federal government. He has also conducted wetland compensation design and monitoring to support development and hydropower and transportation projects.

In the area of protected species and wildlife studies, he has conducted and managed protected species assessments on projects throughout the eastern U.S. In addition, he has conducted U.S. Fish and Wildlife Service formal and informal consultations for protected species and provided client representation during the Endangered Species Act permitting. Mr. McRacken's major studies include wildlife habitat studies associated with avian studies – including waterfowl, raptor, breeding, and migratory bird surveys, as well as bat acoustic and trapping studies.

Mr. McRacken's wetland experience includes assessing, surveying, and managing wetland projects at over 270 sites throughout the eastern and southeastern United States. He has permitted impacts to jurisdictional waters of the U.S., including wetlands, impacts under the Nationwide Permit, and Individual Permit programs throughout the southeastern U.S. Mr. McRacken has provided client representation in court as an expert witness and at regulatory meetings for wetland permitting issues.

Selected project experience is summarized below.

Panoche Valley Solar Facility Project (247 MW) - Ongoing

California, Duke Energy Renewables, LLC

Served as a Senior Scientist by conducting biological surveys such as protected species surveys for golden eagle, burrowing owls, San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel, and various other terrestrial animal on the project footprint and conservation lands. Also responsible for the preparation of the Clean Water Act Section 404 Individual Permit and the Section 404(b)(1) Alternative Analysis for submittal to the USACE, and the preparation of the Biological Assessment report for submittal to the USFWS as part of the Section 7 Endangered Species Act consultation. Additional support included preparation of the California Department of Fish and Wildlife Endangered Species Act Incidental Take Permit Application (2081) for state protected species as well as the Lake or Streambed Alteration Agreement permit application, Weed Control Plan, Avian Conservation

Education
B.S. Biology/Naturalist,
Appalachian State University, 1989

Specialized Training and Certifications

Anabat Acoustic Monitoring Techniques - Bat Sense/Bats R Us

Bat Acoustic Monitoring Training - Bat Conservation International

Bat Conservation and Management Training – BCI

Bat Study Techniques - Indiana Bat - Bat Conservation and Management, Inc.

Basic Wetlands Training Program - The National Wetland Science Training Cooperative

Federal Highway Administration NEPA Training Program - FHWA and GDOT

Endangered Species Act Section 7 Consultation Training - Duncan & Duncan WEST

USACE Nationwide Permit Training - The Wetland Training Institute

Stream Restoration Trainings – NC State University

Florida Department of Environmental Protection Jurisdictional Wetland Identification Training

Florida Department of Environmental Protection Controlled Prescribed Burning Interagency Training – Florida Division of Forestry

Strategy, Eagle Conservation Plan, and the Wetland Mitigation and Monitoring Plan for the Project.

Avian Survey of the Los Vientos III, IV, V and Rio Bravo Wind Farms - Ongoing
Texas, Duke Energy Renewables, LLC

Served as Senior Scientist responsible for the Breeding, Migratory and Wintering Bird Study for the proposed wind farm in south Texas. The purpose of the avian study was to characterize the existing breeding, migratory, and wintering avian communities of the project area and to estimate the temporal and spatial use of the project area by birds, especially raptors, and also to create risk indices for bird assemblages (large and small birds).

Avian/Eagle Surveys of the Frontier City Wind Farm - Ongoing
Oklahoma, Amshore, LLC

Served as Senior Scientist responsible for the Breeding, Migratory and Wintering Bird Study for the proposed wind farm in northern Oklahoma. The purpose of the avian study was to characterize the existing breeding, migratory, and wintering avian communities of the project area and to estimate the temporal and spatial use of the project area by birds, especially raptors, and also to create risk indices for bird assemblages (large and small birds).

Bat Acoustic Surveys Associated With W.S. Lee Nuclear Station and Make-Up Pond C
Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Project Manager and Senior Scientist responsible for the acoustic bat surveys on the proposed nuclear station and the adjacent Make-Up Pond C parcel. The purpose of this study was to characterize the existing bat communities of the Project areas and assess the potential project-related impacts on the federally protected Northern Long-eared Bat (*Myotis septentrionalis*). The study focused on representative and high-value roosting and foraging habitat areas located within Project areas.

Bat Acoustic Surveys Associated With the Oconee and Catawba Nuclear Stations and the W. S. Lee Combined Cycle Power Plant
Oconee, York, and Anderson Counties, South Carolina, Duke Energy Carolinas, LLC

Served as Project Manager and Senior Scientist responsible for the acoustic bat surveys on the Oconee and Catawba Nuclear Stations and the W. S. Lee Combined Cycle Power Plant. The purpose of this study was to assess the potential project-related impacts on the federally protected Northern Long-eared Bat (*Myotis septentrionalis*) within areas of the power plants where development was planned.

The study focused on representative and high-value roosting and foraging habitat areas located within Project areas.

Keowee-Toxaway Hydroelectric Relicensing Project (FERC No. 2503), Avian Study
Oconee, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager responsible for the development of the comprehensive study plan and the field studies that characterize the avian resources within the Federal Energy Regulatory Commission (FERC) Project Boundary. Study objectives were to survey and evaluate existing breeding, resident, and migratory avian populations; survey and identify the presence of any avian state or federal rare, threatened or endangered species; assess any effects of current and any proposed Project-related hydropower operations on the breeding and migratory species and communities; and provide information to assist in developing any potential mitigation measures. Results of the avian study will be filed as part of Exhibit E in the overall FERC hydroelectric relicensing application.

Toledo Bend Relicensing Project, Red-cockaded Woodpecker Foraging Habitat Assessment
Texas and Louisiana, Sabine River Authority

Served as Task Manager responsible for the assessment of potential foraging habitat within the 0.5 mile foraging buffer around the red-cockaded woodpecker (*Picoides borealis*) nesting cluster found adjacent to the Toledo Bend Reservoir. Results of the study will be used in the FERC hydroelectric relicensing process.

Toledo Bend Relicensing Project, Terrestrial Special-Status and Species Assessment Studies
Texas and Louisiana, Sabine River Authority

Served as Task Manager responsible for surveys, planning, coordinating, and managing the Terrestrial Special-Status and Species Assessment studies for inclusion into the Integrated Licensing Process (ILP) application to FERC. These studies focused on federally and state protected species such as the Louisiana pine snake (*Pituophis ruthveni*) and the red-cockaded woodpecker that could be found adjacent to the Toledo Bend Reservoir. Results of the studies will be filed as part of Exhibit E in the overall FERC hydroelectric relicensing application.

Avian Survey of the William States Lee III Nuclear Station
Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the Breeding and Migratory Bird Study. The purpose of the avian study was to characterize the existing breeding and migratory avian communities of the approximately 2,068 acres project area and assess the potential project-related impacts on the breeding and migratory species and communities. The study focused on representative and high-value habitat areas located within the project area. The study also provided information that assisted in development of potential mitigation measures and any occurrences of state or federally protected avian species.

Avian Survey of the Railroad Corridor between Gaffney and the William States Lee III Nuclear Station

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the Breeding and Migratory Bird Study. The purpose of the avian study was to characterize the existing breeding and migratory avian communities of the project area and assess the potential project-related impacts on the breeding and migratory species and communities. The study focused on representative and high-value habitat areas located within approximately 6.8 miles (10.9 km) within a 100-foot (30.5 m)-wide corridor that would connect to the existing railroad line in Gaffney, South Carolina, to the proposed William States Lee III Nuclear Station. In addition, a survey to determine the presence/absence of breeding raptors (hawks, owls, and eagles) along the proposed railway was performed. The study also provided information that assisted in development of potential mitigation measures and any occurrences of state or federally protected avian species.

Breeding and Migratory Avian Species Associated With London Creek

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the Breeding and Migratory Bird Study. The purpose of this study was to characterize the existing breeding and migratory avian communities of the Project area and assess the potential project-related impacts on the breeding and migratory species and communities. The study focused on representative and high-value habitat areas located within Project area. The study also provided information that assisted in development of potential mitigation measures and any occurrences of state or federally protected avian species.

Sutton Hydroelectric Project

Braxton County, West Virginia, Brookfield Renewable Power Corporation

Served as Task Manager responsible for planning, conducting, and managing the terrestrial surveys for the project. Surveys included avian, bat mist netting and acoustic inventories, small and large mammal trapping and sampling, and reptile and amphibian assessments. Results of the studies were to be filed as part of Exhibit E in the overall FERC hydroelectric licensing application.

James A. McRacken

Senior Scientist

Catawba-Wateree Relicensing Project, Breeding and Migratory Bird Study

North and South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager responsible for the Breeding and Migratory Bird Study. The work included the characterization of the existing breeding, resident, and migratory bird communities of the relicensing project area; assessing any effects of current and any proposed relicensing project-related hydropower operations on the breeding and migratory species and communities; and providing information to assist in developing any potential protection, mitigation, and enhancement (PM&E) measures.

Tillery and Blewett Falls Lake Relicensing Project, Avian Assessment

Anson and Richmond Counties, North Carolina, Progress Energy

Served as Project Scientist assisting in conducting the avian survey on existing impoundments to anticipate various relicensing scenarios. Work included field reconnaissance for transect locations and performing surveys of existing bird communities, which would be utilized to provide information to assist in developing any potential PM&E measures.

John Scott Highway Indiana Bat Roost Survey

Steubenville, Ohio, Ohio Department of Transportation

Served as a Senior Scientist responsible for conducting a survey at the John Scott Connector Safety Project in Steubenville, Ohio, for potential maternity roost and day roost trees for the Indiana Bat (*Myotis sodalis*). This survey was for an emergency Ohio Department of Transportation Project, which involved surveying of the proposed spoil laydown and access road for the Project.

Linville Dam Embankment Seismic Stabilization Improvements (ESSI) Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys, stream surveys, stream and wetland mitigation, cultural resources oversight with Historic American Engineering Record (HAER) assessment. Responsible for the CWA Section 404 Individual Permit for submittal to the USACE and North Carolina Department of Environment and Natural Resources (NCDENR). Prepared Biological Assessment report for the Section 7 Endangered Species Act formal consultation regarding the dwarf-flowered heartleaf (*Hexastylis naniflora*). In addition, performed the erosion and control permitting as well as regulatory consultation.

James A. McRacken

Senior Scientist

Catawba Dam ESSI Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys, stream surveys, stream and wetland mitigation, cultural resources oversight with abandoned cemetery relocation, county watershed and shoreline protection permits, and sediment and erosion control permitting and regulatory inspections. Responsible for the Section 404 CWA Individual Permit for submittal to the USACE and several North Carolina agencies. Prepared Biological Assessment report for USFWS Section 7 Endangered Species Act informal consultation.

Paddy Creek ESSI Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys, stream surveys, county watershed and shoreline protection permits, and nursery stock inventory evaluations. Also responsible for the CWA Section 404 Individual Permit for submittal to the USACE and several North Carolina agencies and Biological Assessment report preparation (Section 7 Endangered Species Act) USFWS formal consultation. In addition, performed the erosion and control permitting and compliance inspections as well as regulatory consultation.

Catawba-Wateree Relicensing Project, Schweinitz's Sunflower Monitoring Study

North Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for the yearly monitoring surveys and reports to document population size and health of the Schweinitz's sunflower (*Helianthus schweinitzii*), which is a federally endangered species. This monitoring is in association with Duke Energy's Catawba-Wateree Comprehensive Relicensing Agreement to prepare and institute a species protection plans for the sunflower, which was documented within the FERC Project Boundary.

Lake Keowee/Little River Bypassed Reach Beaver Pond Leveler Installation

Oconee County, South Carolina, Duke Energy Carolinas, LLC

Served as the Project Manager and Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys for the installation of a pond leveling device for American beaver impacts to ensure dam safety. Also responsible for the Clean Water Act (CWA) Section 404 Nationwide Permit application for submittal to the U.S. Army Corps of Engineers (USACE) with Project concurrence letters to the U.S. Fish and Wildlife Service (USFWS) and South Carolina State Historic Preservation Office (SHPO).

Energy Renewal PARTNERS, LLC

James A. McRacken

Senior Scientist

Make-up Pond B Spillway Channel Repair on the William States Lee III Nuclear Station

Cherokee County, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager and Senior Scientist responsible for conducting biological surveys including wetland delineation, protected species surveys, and submittal of the Nationwide Permit application for impacts due to the necessary channel repair. The purpose of the project was to stabilize approximately 798 linear feet of the jurisdictional channel with engineered gabion mats to limit future erosion, protect against the planned flood event, and to ensure the adjacent meteorological tower is protected from slope subsidence.

Paddy Creek Spillway Improvement Project (FERC No. 2232)

Burke County, North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation, protected species surveys, and management of cultural resources evaluations. Also responsible for the submittal of the Shoreline Protection Act permit submittal to Burke County Planning and Development Department.

Caesars Head Mountain Transmission Line Environmental Review Project

Greenville County, South Carolina, and Henderson County, North Carolina, Duke Energy Carolinas, LLC

Conducted field surveys along the existing 22-mile transmission line. Duties included delineating and mapping wetlands and streams, managing field staff, and managing project financials. Work also involved the senior review and signoff of all submitted materials to client.

Bridgewater Powerhouse Penstock Tie-In Temporary Fish Relocation and Water Quality and Quantity Monitoring

North Carolina, Duke Energy Carolinas, LLC

Served as Project Manager and Senior Scientist responsible for conducting a field effort to relocate stranded fish following penstock closure of the existing Bridgewater Powerhouse penstock. Duties involved project management, deployment of temperature loggers throughout a one-mile reach of the Linville River immediately downstream of the Linville Dam, oversight of Hydrolab (dissolved oxygen, etc.) measurements at each temperature monitoring location, and field collection of the fish utilizing backpack electrofishing and seining. Duties also included obtaining a Scientific Fish Collecting License/Permit through the North Carolina Wildlife Resource Council (NCWRC) prior to the field effort.

James A. McRacken

Senior Scientist

Cedar Cliff Hydroelectric Station Proposed Minimum Flow Powerhouse Permitting, East Fork Tuckasegee River Hydroelectric Project (FERC No. 2698)

Jackson County, North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as jurisdictional waters delineation and protected species surveys. Submitted and received a request for a finding of "no permit necessary" for the construction of the new Cedar Cliff Hydroelectric Station Proposed Minimum Flow Powerhouse. This work and request included an on-site field assessment to document the extent of the jurisdictional ordinary high water mark (OHWM) within the proposed construction area and submittal of the findings to the USACE.

Lee Steam Station Combined Cycle Combustion Turbine Natural Resource Survey Project

Anderson County, South Carolina, Duke Energy Carolinas, LLC

Performed field surveys for wetlands and protected species and provided senior report review on all information concerning the 325-acre site.

Dan River Combined Cycle Combustion Turbine Environmental Survey Project

Rockingham County, North Carolina, Duke Energy Carolinas, LLC

Consulted and provided senior-level review of all information concerning stream and wetland and natural resources on the 250-acre site. Provided permitting support between clients and agencies. Obtained all NEPA-related permits for project to proceed.

Hawks Nest Hydroelectric Project

West Virginia, Brookfield Renewable Power Corporation

Served as Terrestrial Lead responsible for the preparation of the wildlife and botanical resources, wetlands, riparian and littoral habitat, and terrestrial rare, threatened, and endangered species sections of the pre-application document.

Keowee-Toxaway Hydroelectric Relicensing Project (FERC No. 2503), Bat Acoustic Study

Oconee, South Carolina, Duke Energy Carolinas, LLC

Served as Task Manager responsible for the Bat Acoustic Study. The work included the characterization of the bat species that utilize the relicensing project area; assessment of any effects of current and any proposed relicensing project-related hydropower operations on the bat populations; and providing information to assist in developing any potential protection, mitigation, and enhancement (PM&E) measures.

James A. McRacken

Senior Scientist

Buck Steam Station Combined Cycle Combustion Turbine Environmental Survey Project

Rowan County, North Carolina, Duke Energy Carolinas, LLC

Consulted and provided senior-level review of all information concerning stream and wetland and natural resources on the 80-acre site. Consulted with client to re-position station footprint to minimize stream and wetland impacts. Provided permitting support between clients and agencies. Obtained all NEPA-related permits for project to proceed.

Opekiska and Hildebrand Hydroelectric Project

Monongalia County, West Virginia, Brookfield Renewable Power Corporation

Served as Terrestrial Lead responsible for the preparation of the wildlife and botanical resources, wetlands, riparian and littoral habitat, and terrestrial rare, threatened, and endangered species sections of the pre-application document.

Island Point Substation Project, Wetlands Delineation

Iredell County, North Carolina, Duke Energy Carolinas, LLC

Delineated 12 acres of proposed substation property for potentially jurisdictional waters of the U.S., including wetlands. Work also involved the senior review and signoff of all submitted materials to client and agencies.

Hydroelectric Relicensing Project, Relicensing Application Field Studies and Application Development

City of Spearfish, South Dakota

Served as Task Manager responsible for the Botanical and Wildlife Resources study for the relicensing application of the hydroelectric project on Spearfish Creek. Assisted other HDR scientists with the wildlife and protected species studies. In addition, assisted with the instream flow study.

Gaston Shoals Hydroelectric Station Dam Stabilization and Probable Maximum Flood (PMF) Remediation Project

South Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation, protected species surveys, and cultural resources evaluations. Responsible for the CWA Nationwide Permit for submittal to the USACE and South Carolina Department of Health and Environmental Control (SCDHEC).

James A. McRacken

Senior Scientist

Claytor Lake Hydroelectric Relicensing Project

Virginia, Appalachian Power Company/American Electric Power

Served as Terrestrial Lead responsible for the preparation of the wildlife and botanical resources, wetlands, riparian and littoral habitat study plans for the Pre-Application Document.

Myers-Pinch Gut 100kV Transmission Corridor and Substation Project

North Carolina, Duke Energy Carolinas, LLC

Served as a Senior Scientist responsible for conducting biological surveys such as wetland delineation and protected species surveys. Responsible for the CWA Nationwide Permit for submittal to the USACE and South Carolina Department of Health and Environmental Control. Prepared the Biological Assessment report (Section 7 Endangered Species Act) for the USFWS informal consultation regarding the dwarf-flowered heartleaf.

Beaverdam Creek Sanitary Sewer Project

Anderson County, South Carolina, Anderson County Utilities

Served as Senior Project Scientist responsible for performing wetland delineation and federal and state protected species surveys within the Project's corridor. Responsible for the appropriate state and federal permits and certifications from the USACE and the SCDHEC. In addition, developed alternative analyses, wetland mitigative actions, or monitoring requirements due to the impacts to waters of the U.S. including wetlands. In addition, provided expert witness services.

Low Level Radiation Disposal Facility Siting Project, Biological Assessment and Permitting

Richmond, Chatham, and Wake Counties, North Carolina, Chem-Nuclear

Served as Project Scientist and Task Manager. Conducted and assisted in several wildlife population studies for an Environmental Impact Statement needed for the proposed location of a low-level radioactive waste facility. The studies involved were small mammal trapping with capture-recapture of small rodents, flora plot surveys, large mammal spotlighting, scent station monitoring, transect study of the avian community, and reptile and amphibian study.

James A. McRacken

Senior Scientist

Yamaha Facility Siting Project, Environmental Assessment

Alabama, Yamaha Motor Corporation, USA

Served as Project Scientist responsible for conducting biological surveys such as wetland delineation and endangered species assessment for Anthony's Riversnail (*Athearnia anthonyi*), and Section 404 permitting and site monitoring activities associated with the proposed engine testing facility.

Phase III Natural Gas Pipeline Expansion Project

Florida Gas Transmission Company, Central and East Coast Florida

Served as Spread Environmental Inspector/Advisor responsible for the supervision of the construction of an entire spread of the Florida Gas Transmission Company Phase III natural gas pipeline expansion project. The tasks included advising and instructing the construction contractor on state and federal environmental permit compliance issues; supervising the construction through environmentally sensitive natural features, such as wetlands and Outstanding Florida Waters; coordinating all construction and environmental activities with the appropriate federal, state, and local regulatory agencies; monitoring all hydrological and turbidity problems in construction areas that crossed either wetland or open water habitats; analyzing the hydrological and turbidity data for permit compliance; and interpreting the data to ensure total compliance or corrective measures.

L&C Development Project, Environmental Studies

South Carolina, L&C Development Corporation

Served as Project Manager and Senior Scientist responsible for conducting wetland and protected species surveys, ASTM Phase I environmental site assessments, and coordinating geotechnical and archaeology studies for potential commercial development sites.

Sony Property, Environmental Assessment and Permitting

Blythewood, South Carolina, Sony Corporation of America

Served as Senior Project Scientist responsible for performing the wetland delineation, assisting in the regulatory verification, and conducting a federal and state protected species survey on the subject property. Responsible for obtaining the appropriate permits and certifications from the USACE and SCDHEC. Performed wetland mitigation planning, implementation, and monitoring. In addition, represented Sony during a wetland-related dispute with a site development contractor, and fulfilled all mitigation requirements and coordinated with a local land trust conservancy group to arrange deeding of the remaining wetlands and associated upland buffers.

James A. McRacken

Senior Scientist

Marine Mammal Studies and Surveys

Northeast Florida, Florida Department of Environmental Protection and University of Miami

Served as Biologist assisting in the research of pelagic and intracoastal Bottle-nosed Dolphin (*Tursiops truncatus*) populations in the waters of northeast Florida. This study consisted of dorsal fin photography for individual identification and data gathering to show migrant populations, movements, group interactions, and habitat usage. In addition, logged over 40 hours flying aerial surveys for manatees along the St. John's River for research on movements, habitat usage, and population studies. Additionally, flew surveys to locate the presence of the Northern Right Whale off the coast of North Florida. Mr. McRacken also created a manatee scar sketch catalogue for the northeastern field office of the Florida Department of Environmental Protection Florida Marine Research Institute and tracked tagged manatees using telemetry in northeastern Florida and southeastern Georgia.

Panoche Valley Solar
Giant Kangaroo Rat Relocation and Translocation Plan

Panoche Valley Solar Project
San Benito County, California

December 1, 2015

Giant Kangaroo Rat Relocation and Translocation Plan
Panoche Valley Solar Project

Prepared for:
Panoche Valley Solar, LLC
Duke Energy Building 16A
550 South Tryon
Charlotte, North Carolina 28202

Prepared by:
Energy Renewal Partners, LLC
305 Camp Craft Road, Suite 575
West Lake Hills, Texas 78746

And

McCormick Biological, Inc.
4031 Alken Street, Suite B-1
Bakersfield, California 93308

Date:
April 25, 2014
Revised: December 1, 2015

Trisha Elizondo
Project Manager

James McRacken Jr.
Senior Biologist

Randi McCormick
Principal Biologist

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DEFINITIONS

Biological Monitor	Observers that work on-site to perform biological surveys or provide oversight of ground disturbing activities as needed and receive instruction from and reports to the Designated Biologist(s).
Conservation Lands	Three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels (Valley Floor Conservation Lands, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands).
Designated Biologist	Biologist knowledgeable and experienced in the biology and natural history of the special-status species on the Project and shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the incidental take of individual species and to minimize disturbance of special-status species' habitat. This biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place.
Project Footprint	The portion of the project that includes the solar arrays and associated roads and equipment, totaling 2,492 acres.
PVS	Panoche Valley Solar Facility; name of the proposed project.
Study Area	Project Footprint and Conservation Lands are collectively referred to for this relocation and translocation plan.

ACRONYMS

BNLL	Blunt-nosed Leopard Lizard
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
DNA	Deoxyribonucleic Acid
ESA	Endangered Species Act
˚F	Fahrenheit
FEIR	Final Environmental Impact Report
GPS	Global Positioning System
GKR	Giant Kangaroo Rat
m	meters
MW	megawatt
PV	photovoltaic
PVC	Polyvinyl chloride
SCRCL	Silver Creek Ranch Conservation Lands
SJKF	San Joaquin Kit Fox
USFWS	U.S. Fish and Wildlife Service
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands

1.0 Introduction

Panoche Valley Solar, LLC proposes to construct and operate a solar photovoltaic (PV) energy generating facility located in San Benito County, California that will generate approximately 247-megawatts (MW) (Figure 1). This project is called the Panoche Valley Solar Facility (PVS) Project (Proposed Project). The Proposed Project will include some unavoidable impacts on giant kangaroo rats (*Dipodomys ingens*; GKR) located within the boundaries of the Proposed Project Footprint. This relocation and translocation plan has been developed to minimize the unavoidable impacts due to the construction of the Proposed Project on recommendations from the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW).

The proposed solar site construction footprint (Project Footprint) contains approximately 2,153 acres of presently grazed (cattle and sheep) land in the Panoche Valley of eastern San Benito County, California (Figure 2). The Proposed Project would also include approximately 25,618 acres of quality Conservation Lands that are primarily contiguous with the approximately 2,153-acre Project Footprint (Figure 3). These high quality lands are the Valley Floor Conservation Lands (VFCL), Valadeao Ranch Conservation Lands (VRCL), and Silver Creek Ranch Conservation Lands (SCRCL). The Project Footprint and Conservation Lands are collectively referred to for this relocation and translocation plan as the "Study Area".

2.0 Species Description

The GKR is currently listed as endangered by the federal Endangered Species Act (ESA) and endangered by the California Endangered Species Act (CESA [Fish and Game Code §§ 2050 et seq]). The GKR was proposed for listing on August 13, 1985 (50 FR 32585 32587) and finalized on January 5, 1987 (52 FR 283 288). No critical habitat has been established for the GKR. The species does not have its own recovery plan, but is included in the Recovery Plan of Upland Species of San Joaquin Valley, California (USFWS 1998).

2.1 Historical Distribution of GKR

Historically, the GKR was known to occur over vast stretches of the western San Joaquin Valley, Carrizo Plain, and Cuyama Valley with scattered colonies located on steeper slopes and ridge tops in the Ciervo, Kettleman, Tumey, Panoche Hills, and Panoche Valley in California (Grinnell 1932, Shaw 1934, Hawbecker 1944, USFWS 1998). The Panoche Region located in western Fresno and eastern San Benito Counties is currently identified as one of the six major geographical units for remaining GKR populations. The other five remaining major geographical units are: 1) Kettlemen Hills in Kings County; 2) San Juan Creek Valley in San Luis Obispo County; 3) western Kern County in the area of the Lokern, Elk Hills, and other uplands; 4) Carrizo Plain Natural Area in eastern San Luis Obispo County; and 5) Cuyama Valley in Santa Barbara and San Luis Obispo Counties (USFWS 1998, USFWS 2005).

2.2 Characteristics of GKR

The GKR, compared to other kangaroo rat species found in the Study Area, is very large, brownish in color, with a light brown tail tip. An adult male GKR can weigh up to 157 grams, nearly double the weight of other coexisting kangaroo rats (Grinnell 1932), and can have a total length of approximately 31.1 centimeters (cm). In comparison, the San Joaquin kangaroo rat (*Dipodomys nitratoides*) has four toes on the hind feet while GKR has five toes which are longer than 4.7 cm (Best 1993).

The GKR is primarily a seed-eater, but will occasionally consume green plants and insects. Foraging takes place year round in all types of weather from around sunset to near sunrise, with most activity taking place within two hours of sunset. GKR cut ripening heads of grasses and forbs and places them in small surface pits or pit caches located near the GKR's burrow system. These pits have full sun exposure, ensuring the seeds become fully dried/cured. After the seeds have sufficiently dried, they are moved into underground storage for consumption at a later date. The purpose of this curing process is believed to prevent mold growth after the seeds are moved below ground (Shaw 1934). Largeleaf filaree (*Erodium* spp.) and shining peppergrass (*Lepidium nitidum*) are two important seed producing plants utilized by GKR. Peppergrass species ripen earlier in the year and may be one of the more important seed sources for GKR (Williams et al. 1993). The ability to transport large quantities of seeds in cheek pouches, coupled with the highly developed seed curing and caching behaviors, probably allows GKR to endure prolonged droughts of one or two years, without major regional population effects (Williams et al. 1993).

GKR live in burrow systems referred to as precincts, which are the most intensely used portion of their home range. Precincts consist of one to five separate burrow openings within one to eight meters (m) of one another. A typical precinct has three burrows that are independent of one another and not interconnected, and as Grinnell (1932) and Shaw (1934) purport, precincts are occupied by a single animal. Precincts of individuals are arranged in colonies with other precincts, and colonies are generally separated by several hundred meters (Williams and Kilburn 1991). These GKR precincts are easily spotted in spring due to the denser, lush vegetation compared to the intervening areas. Plants on a precinct are the first to turn green after autumn rains and the last to ripen and turn brown in the spring (Grinnell 1932, USFWS 1998). When sufficient annual vegetation is present, population density of GKR can be estimated by counting precincts within a colony. Using this method of estimating density, Grinnell (1932) found that colonies contained between 18 and 69 precincts, with a mean of 52 GKR individuals per hectare.

Female GKR have displayed an adaptable reproductive pattern that reflects surrounding population densities and food availability. During times of high population density, females have a short reproductive season. In times of low population densities, females may continue to breed well into the summer (December to September; USFWS 1998). This ability to extend the breeding season can potentially lead to population irruptions during favorable climatic conditions. For example, populations in the northern reaches of the GKR range went from an estimated 2,000 individuals between 1980 and 1985, to an estimated 37,125 individuals between 1992 and 1993, following the end of a prolonged drought (Williams et al. 1995). During the post-drought January – May breeding season, approximately 44% of counted litters contained two young; however, one female had a litter of three and the remaining 39% had a litter of one (USFWS 1998).

Young GKR begin to disperse at approximately 11 to 12 weeks after birth, but may remain in their natal precinct after the 12th week during times of high population densities. The young tend to remain in the precinct until there is an opportunity to disperse or they are driven off by the mother or a sibling. At this point, they typically disperse into existing burrows of other adults that have died or dispersed. When abundant, GKR out-compete other rodents within the colony area, becoming the only rodent species present (Grinnell 1932).

When abundant, GKR are a major prey item for numerous predators, including: great horned owl (*Bubo virginianus*), western burrowing owl (*Athene cunicularia hypugaea*), short-eared owl (*Asio flammeus*), coyote (*Canis latrans*), San Joaquin kit fox (*Vulpes macrotis mutica)*, and American badger (*Taxidea taxus*). Snakes that might prey on GKR include: coachwhip (*Coluber flagellum*), gopher snake (*Pituophis catenifer*), king snake (*Lampropeltis* spp.), and western rattlesnake (*Crotalus oreganus oreganus*). GKR are apparently more aggressive than other co-occurring rodents and tend to be the dominant small mammal where they are present (Grinnell 1932).

Presently, the GKR population in the northern portion of the species' range is divided into three main population sections: Tumey Hills, Ciervo Hills, and Monocline Ridge. Each main population is divided into several sub-populations. The population within the Project Footprint, VFCL, VRCL, and SCRCL are all within the same subpopulation of the Tumey Hills portion of the northern population (Loew et al. 2005, USFWS 1998). Connectivity and genetic flow between these sub-populations are key to maintaining genetic diversity in GKR throughout the northern populations. Loew et al. (2005) used microsatellite DNA loci to analyze the amount of gene flow taking place between the northern sub-populations using samples from the various Tumey Hills, Ciervo Hills, Monocline Ridge, and Panoche Valley colonies. Results of these analyses suggest current or relatively recent connectivity between sub-populations in the northern population section (Loew et al. 2005). Results propose that colonies in the Tumey Hills and Monocline Ridge sub-populations had recent connectivity, most likely via a corridor along Panoche Creek after its confluence with Silver Creek. Results also suggest that colonies in the Ciervo Ridge and Tumey Hills populations had been connected with the Panoche Valley population via long distance migrants or the use of smaller stepping-stone populations (Loew et al. 2005). Panoche Valley appears to be at the northwestern extent of the GKR sub-populations (USFWS 1998).

2.3 Site Survey Background - GKR

Reconnaissance surveys conducted in April 2009 found evidence of GKR precincts and scat throughout the Study Area. Multiple focused biological surveys performed in the Study Area between 2009 and 2012 (total of over 20,000 survey hours) documented the presence of GKR in multiple locations. These surveys included: protocol-level rare plant surveys, abridged 2009 protocol-level blunt-nosed leopard lizard (*Gambelia sila*; BNLL) surveys, distance sampling, occupancy sampling, and surveys specific to GKR for the purpose of documenting precinct locations.

Based on feedback and concerns expressed by the CDFW and the USFWS about the previous studies, a 100 % coverage survey of the Study Area (Figure 4) for GKR was conducted, and a systematic stratified sampling effort was completed on the Conservation Lands in February and March 2013. The survey methodology that was implemented was approved by CDFW.

Field surveyors with experience in GKR surveys used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR sign. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings.

Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area were devoid of other diagnostic sign (e.g. fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as “other kangaroo rat species”.

Within the Project Footprint, the survey grid accounted for 100% coverage, plus a 500 foot buffer (in areas where landowner access was granted). The VFCL are interlaced within the Project Footprint. For this reason, the VFCL was surveyed using the same grid system as the Project Footprint and was subject to 100% coverage. The data were post-stratified following collection in the field, and the results were treated separately.

The SCRCL and VRCL were surveyed using the same methodology described above, but with wider transects. No buffers were surveyed for the Conservation Lands since surveyors did not have landowner access outside these areas. Transects were systematically distributed across the Project Footprint and included areas previously identified as high and low suitability habitats in past studies. The SCRCL and

VRCL surveys were designed to cover approximately 20-30 % of the Conservation Lands; therefore, transect spacing was approximately 148 meters (485 feet).

3.0 GKR Occurrence Results

Based on feedback and concerns expressed by CDFW and USFWS, a 100% coverage survey of the Project Footprint for GKR was conducted, and a systematic stratified sampling effort was completed on the Conservation Lands in February and March 2013. Follow-up surveys on the Project Footprint were conducted from July 13 to July 15, 2013, to verify and/or update the status of inactive sites. The survey methodology that was implemented was approved by CDFW and was provided to USFWS prior to the start of the survey.

Field surveys used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR signs. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings.

Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area are devoid of all signs (fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as “other kangaroo rat”.

A total of 46,845 survey grid cells were evaluated (Figures 4-7) for GKR presence; 7,270 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell, or data equipment error. These areas are combined within the cells that are highlighted as “No Data”. Results are presented according to the various project/conservation land components in the sections below.

3.1 GKR Results within Project Area

Of the 12,398 total survey grid cells located within the Project Footprint and the 500-foot buffer study area, approximately 11,666 survey grid cells were able to be evaluated (10,355 within the project area boundaries and 1,311 within the 500-foot buffer). A total of 177 of these grid cells were observed to have GKR evidence at the time of the survey (approximately 2% of evaluated cells). A total of 130 cells within the Project Footprint have GKR evidence (1.2% of evaluated cells in the project footprint), while 47 cells within the 500-foot buffer were considered to be active (4% of evaluated cells in 500 foot buffer). It should be noted that cells along the boundary of the Project Footprint and 500 foot buffer may have been counted twice to account for cells that were split between the two areas. The remaining 732 grid cells were not evaluated primarily due to lack of landowner access. These areas are combined within the cells that are noted as “No Data”. Table 1 describes the results of the GKR survey within the Project Footprint.

Table 1 GKR survey results within the Project Footprint

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
Project Footprint	130	39	10,185	1	71	10,426
500-foot Buffer	47	57	1,207	0	661	1,972
TOTAL	**177**	**96**	**11,392**	**1**	**732**	**12,398**

*No data areas in the project footprint were located along fence line locations along the 500-foot buffer and Valley Floor Conservation Lands. None are wholly within the project area. The entire Project Footprint area was surveyed during the GKR survey.

3.2 GKR Results within VFCL

For the purpose of this Relocation (Translocation) Plan the GKR evidence found in the Onsite Conservation Lands will be included in the VFCL. Therefore, of the 13,973 total survey grid cells located within the VFCL study area, approximately 12,725 survey grid cells were evaluated. A total of 1,010 of these grid cells were observed to have GKR evidence at the time of the survey (8.0% of the cells evaluated). The 1,248 grid cells were not evaluated primarily due to lack of landowner access based on grazing operations or other restrictions. **Table 2** describes the results of the GKR survey on the VFCL.

Table 2 GKR survey results within the VFCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
VFCL	1010	805	10,909	1	1,248	13,973

VFCL = Valley Floor Conservation Lands which also includes the Onsite Conservation Lands for this Plan only.

3.3 GKR Results within SCRCL

Of the 10,309 total survey grid cells located within the SCRCL study area, approximately 8,211 survey grid cells were evaluated. A total of 1,883 of these grid cells were observed to have GKR evidence at the time of the survey (23.0% of the cells evaluated). The 2,098 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, or other reasons precluding surveyors from entering the grid cell. **Table 3** describes the results of the GKR survey on the SCRCL within the study area.

Table 3 GKR survey results within the SCRCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
SCRCL	1,883	1,414	4,914	0	2,098	10,309

SCRCL=Silver Creek Ranch Conservation Lands.

3.4 GKR Results within VRCL

Of the 10,165 total survey grid cells located within the VRCL, approximately 6,973 survey grid cells were evaluated. A total of 58 of these grid cells were observed to have GKR evidence at the time of the survey (1.0% of the cells evaluated). The 3,192 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls, or other reasons precluding surveyors from entering the grid cell. **Table 4** presents the results of the GKR survey.

Table 4 GKR survey results within the VRCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
VRCL	58	48	6,866	1	3,192	10,165

VRCL = Valadeao Ranch Conservation Lands

4.0 Discussion of Results

GKR evidence generally matched the results of past studies in the region with the highest densities occurring on SCRCL followed by the VFCL, Project Footprint, and VRCL. The low density of GKR evidence observed on the VRCL in many areas was likely due to the generally steeper topography. In the Little Panoche Valley area, near the northern extent of the VRCL, habitats appeared to be suitable for GKR occupancy, yet there were very few observations of GKR sign. Potential candidate relocation (receiver) sites could include areas where past GKR occupancy was observed, but that were not active during surveys or that represent suitable habitat in all other respects. Pockets of occupied habitat are present, indicating general suitability (Figure 8).

Evidence of GKR occupancy within the Project Footprint was relatively low, with most of the areas exhibiting evidence matching the Williams (1992) core area polygons that are excluded from the Project Footprint and are part of the VFCL.

The results of the 100% survey were used to generate estimates of the total number of GKR potentially supported in the Project Footprint. It was conservatively assumed that all 130 active cells were located in high quality GKR habitat, even though habitat quality in the Project Footprint appears to be compromised over much of the occupied area due to past land use practices. An attempt was made to field verify the density of GKR per active cell; however, based on field conditions (heavy grazing), it was not possible to identify individually clipped precincts within the grid cells. Without performing a systematic grid trapping study, it is assumed that each active cell within the Project Footprint is occupied with at least one individual GKR. This resulting assumed minimum density is within the range provided by Williams, and above the density is predicted by the Habitat Suitability Model for the Project.

Using this density estimate for GKR within the Project Footprint, a minimum of 130 GKR are expected to occur within the Project Footprint currently. Typically GKR populations can fluctuate significantly from year to year and within years, potentially leading to a population increase across the Project Footprint outside of the cells identified as active during the survey. A population increase would likely result in occupancy of at least the currently inactive GKR cells found within the Project Footprint. Therefore, a minimum reasonably expected estimate of the population potentially supported within the Project Footprint is 169 individual GKR.

To account for possible increases in density from one year to the next, a potentially higher density should be assumed. Project Footprint densities of GKR are not available in literature. The only colony evaluated in Williams (1992) from the Valley Floor was not trapped, and no density estimate specifically for that GKR colony was calculated. In the Panoche region, other density estimates are available for Silver Creek Ranch, the vicinity of Valadeao Ranch, and on the east side of the Panoche Region in the vicinity of Panoche Creek alluvial fan. Of these, the Project Footprint is most likely more similar to Valadeao Ranch than Silver Creek Ranch or Panoche Creek, given the very high quality habitat conditions present on the latter two. Therefore, using the maximum measured density for the Valadeao Ranch area (7.90 GKR/acre), up to 343 GKR may be present within the Project Footprint. The CDFW estimated between 505 and 998 GKR within the Project Footprint while the U.S. Fish and Wildlife Service estimated the number of individuals expected in Project Footprint to be 521 GKR utilizing the Project Footprint prior to the development of the Onsite Conservation Lands.

GKR are a species that has periodic population irruptions, resulting in large increases in numbers of individuals and potentially large areas of adjacent habitat becoming occupied over very short time periods. Although these population increases may follow years of favorable precipitation, a direct causative link has not been determined. When these events occur, existing populations can increase greatly. While this type of population increase is an observed phenomenon, predicting the resulting population on a particular area (e.g. Project Footprint) is problematic and not the typical condition.

5.0 GKR Relocation and Translocation

The following GKR conservation measures are pertinent to this plan and are consistent with those required in the Final Environmental Impact report (FEIR) (San Benito County 2010) and Supplemental Environmental Impact Report (SEIR) (San Benito County 2014) for the Project:

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a pre-construction survey for GKR by the Designated Biologist (or their representative) in the area of work no more than 30 days prior to commencement of ground disturbing activities. The Designated Biologist(s) will be a County and CDFW approved individual that specializes in GKR. If GKR sign is observed within the area of work, the area of work will be saturated with traps to capture GKR and relocate them off-site. If the Designated Biologist deems exclusion fencing necessary, it will be buried deep enough in the ground to deter GKR from digging under and high enough to deter them from jumping over. Exclusion fencing may be designed to exclude multiple species. Special care will be taken in exclusion fence design if cattle or sheep are adjacent to the site and to ensure that the fencing does not enclose or trap the fully protected BNLL. Construction will not commence in the area of exclusion fencing until that area has been completely trapped, and no more GKR are expected to use the area as determined by the Designated Biologist. These areas may be fenced and trapped in smaller sections within the larger Project Area. At the end of trapping, no GKR should remain within a proposed construction area.
- Appropriate buffers will be established with highly visible markers. All active GKR burrows shall be identified by flagging and avoided by a buffer with a radius of at least 15.24m (50 feet).

Relocation procedures to implement these measures are described in Section 5.1. All individuals detected will be relocated to suitable nearby habitat as described below. This GKR Relocation Plan will implement methodology consistent with other successful kangaroo rat relocations (Bender et al. 2010; Germano 2001, 2010; Germano and Saslaw 2007; Germano et al. 2009; Tennant et.al. 2013), the project CDFW Incidental Take Permit, and includes guidance with local knowledge of the GKR. The relocation methodology includes trapping to remove GKR from the Project Footprint that will be impacted by construction activities and hand or mechanical excavation (as appropriate) of burrows/precincts. The GKR will be relocated to suitable areas adjacent to the project footprint including unoccupied areas within the VFCL, and potentially in the VRCL and SCRCL as detailed in the translocation plan. Specific relocation receiver site criteria are detailed herein.

The ultimate goal and objective of relocating GKR is to preserve and minimize harm, injury, or death of individual GKR during project build-out and to possibly recolonize nearby locations where GKR are no longer colonized or within suitable habitat near occupied colonies. The conservation strategy is built largely on the conservation principle that 90% of the source population of GKR as defined in the USFWS Recovery Plan (1998) is preserved in perpetuity.

Recolonization of suitable habitat that is not occupied by GKR will create opportunities to grow the population beyond its current levels and occupancy. The relocated individuals and/or populations will be monitored for five years to determine success of the relocation and inform future relocation efforts through post-project reporting.

Conducting successful relocations requires careful consideration for each animal's well-being during capture, transport, release, and successive monitoring. Risk to the animal should be minimized, and acclimation and survival at the release site will be maximized by implementing accepted practices. At a minimum, the following procedures will be implemented:

5.1 Relocation and Translocation Procedures

Relocation and Translocation Procedures will be implemented subsequent to preconstruction surveys and will be based on survey results and any incidental observations during Project Site preparation.

I. Project Site Preparation
   - A. PVS or their contractor will mark work area limits with stakes and flagging.
   - B. All potential GKR burrows within the Project Footprint and a 50-foot buffer will be documented (size, location and aspect), mapped, and staked and/or flagged.
   - C. Prior to any excavation, trenching, or digging associated with this Relocation Plan, the party or parties responsible for such activities will contact the project safety personnel to ensure all safety requirements are followed (e.g. location of underground utilities).
   - D. A Biological Monitor, under the direct supervision of a Designated Biologist and that has been trained, will be present for the installation of buried wildlife exclusion fencing along the marked work area boundary intended to exclude GKR from the Project Footprint. Fence installation will be overseen by the Designated Biologist who does not need to be present during all installation activities, but should inspect fence locations prior to trenching. At the discretion of the Designated Biologist, temporary exclusion fencing that is not buried may be used to enclose areas targeted for trapping that are in the direct path of construction phase exclusion fence installation (e.g., from trenching).
   - E. Exclusion fencing will consist of smooth material (such as aluminum flashing or polyvinyl chloride [PVC] jacket material) or of a design that prevents wildlife from climbing. Construction-phase exclusion fence will be buried at least 24 inches deep with at least 36 inches above ground level. The buried wildlife exclusion fence will avoid all remaining covered species burrow entrances by a buffer of at least 50 feet.
   - F. If determined to be necessary to minimize impacts to GKR outside of the project perimeter, wildlife exclusion fencing will be installed along the project boundary adjacent to GKR precincts (either existing active or newly relocated) and for a distance extending for approximately 500 feet from the nearest active precinct (additional exclusion fencing may be required beyond GKR fencing to exclude other covered species).

G. If burrows potentially occupied by GKR or other listed species cannot be avoided by at least 50 feet, the following measures to remove GKR from such burrows prior to installation of wildlife exclusion fencing requiring trenching will be implemented.
    1. For GKR burrows/precincts, trapping following GKR trapping methods (below in Section II) will be conducted prior to exclusion fence installation requiring trenching. Such burrows will be excavated following excavation procedures detailed below.
    2. For other covered species, avoidance and minimization measures specific to that species will be implemented prior to fence installation requiring trenching.

H. All cross-country routes shall avoid GKR precincts to the maximum extent practicable. Where GKR precincts cannot be avoided by vehicles, temporary 1-inch plywood sheets (minimum size of 4 by 8 feet) or stronger material will be placed over the burrow to prevent burrow collapse. Seed caches or haystacks shall be avoided by vehicles or the Designated Biologist may temporarily relocate food (only during daytime, returning at night) or cover the seeds with plywood to allow temporary access. If other measures are proposed, CDFW must be contacted.

I. Release locations (receiver sites) will be identified subsequent to preconstruction surveys and prior to trapping and removal activities subject to the following criteria:
    1. Captured GKR will be relocated (translocated) in neighbor groups. A GKR will be considered within a “neighbor group” if they are within 100 feet (approximately 30m) of the nearest neighbor. Neighbor groups will consist of at least 30 animals.
    2. If fewer than 30 animals are translocated (isolated groups), release sites shall be located on the periphery of neighbor groups.
    3. Release locations must be able to accommodate all GKR potentially captured that are within each neighbor group.
    4. Release locations will be chosen based on the following, in order:
        a. The nearest high quality habitat in the VFCL that is unoccupied or has abandoned GKR precincts such that the relocated group will be at least 100 feet (approximately 30m) from the nearest suspected active precinct.
        b. Receiver sites will have been historically farmed and reverted to grassland.
        c. Receiver sites will be devoid of existing sign of GKR but will be demonstrated to have suitable substrate, landscape position (not susceptible to flooding), and vegetation to support GKR.
        d. If there are no candidate release locations on the VFCL within one mile of the capture location, unoccupied high quality habitat in former agricultural land within SCRCL will be utilized first, then lands within VRCL will be used as relocation sites.

e. Subject to approval by CDFW and USFWS, captured GKR may be used to further recovery efforts for this species at locations in the greater Panoche-Ciervo Core GKR area (USFWS 1998, Loew 2005). If individual GKR are relocated outside of PVS Conservation Lands, monitoring of relocation success would be the responsibility of the wildlife agencies.

II. GKR Detection and Removal

The following methods are intended to result in as close to 100% depletion rates as possible, with the goal of avoiding mortality of GKR.

A. The Designated Biologist, Biological Monitor under the direction of the Designated Biologist, or a supervised trapping crew will conduct six consecutive nights of trapping with live traps (e.g. Sherman live traps or similar live traps) to capture GKR at precincts/burrows identified during preconstruction surveys using 20% more traps then the number of identified precincts in the enclosed trapping area.

B. Data to be collected on all GKR captured will include: (1) the locations (Global Positioning System [GPS] coordinates and maps) and the time of capture and/or observation, as well as release; (2) sex; (3) approximate age (adult/juvenile); (4) weight; (5) general condition and health, noting all visible conditions including gait and behavior, diarrhea, emaciation, salivation, hair loss, ectoparasites, and injuries; and (6) ambient temperature when handled and released. Any non-listed small mammals that are captured will be documented and released outside of the Project Footprint boundary.

C. If a lactating female GKR is captured (potentially December – April), the following procedure will be followed: No precincts containing a pregnant or lactating female will be excavated. A 250 foot buffer between precincts containing lactating females and/or dependent young and all ground- or vegetation-disturbing activities will be observed until lactating has ceased.

    1. The precinct may be monitored by a remote camera to observe activity.
    2. Because the occupied precinct would be enclosed with fencing that would potentially inhibit or preclude foraging, a sufficient amount of seed to sustain a nursing female must be placed at the precinct opening.
    3. If the Designated Biologist can determine with certainty which precinct the lactating female is occupying, adjacent precincts may be excavated only if impacts to the precinct(s) occupied by the lactating female(s) are avoided.

D. In addition, from January 1 through August 31 to reduce the amount of time a lactating/nursing female may be in a trap, all traps set from January 1 through August 31 for the capture and relocation of GKR must be set no more than 1 hour prior to sunset and closed no more than 1 hour after sunrise. All traps set during this period when females may be lactating/nursing must also be checked for occupancy every 2 hours between sunset and sunrise and any captured lactating/nursing GKR released immediately at their trap location.

E. If the National Weather Service predicts a 40% or greater chance of rain, all traps for GKR will be closed.
F. If temperatures exceed 105 degrees Fahrenheit, all traps will be closed.
G. If the air temperature is predicted to drop below 50 degrees Fahrenheit, synthetic batting or other appropriate insulating material must be placed in each trap. The material will be changed (replaced) each time a capture is made in a given trap.
H. Project minimization and avoidance measures will be implemented during all GKR trapping and relocation activities.
I. Where temporary, low-impact activities would occur and GKR burrow systems can be left in place while ensuring the activities would not directly take GKR, any haystacks, seed caches, or other food stockpiled by GKR on the ground surface shall be left undisturbed in the greatest extent practicable. If avoidance of the food caches is not possible, the Designated Biologist shall implement measures to keep the food caches intact, including temporary relocation of the food (only in the daytime; seeds must be returned to the original location at night), cover the seeds with plywood to allow temporary vehicle or foot-traffic access, or implement other measures developed in consultation with CDFW.
J. Captured GKR will be released into pre-identified release locations (receiver sites) identified in Section I.H.3 above, following the procedure in Section IV, below. If new evidence of GKR (individuals/burrows) is found in an active construction area, construction will be halted within a 100-foot avoidance area or greater if deemed necessary. Procedures A through H (above) will then be implemented.

III. Burrow excavation

Upon completion of six consecutive nights of live trapping, the following will be implemented:

A. Small mammal burrows suitable for GKR that are present within the trapping grid will be excavated using hand tools, if possible. If soil conditions or burrow depths make manual excavation impractical or unsafe, hand-held power tools may be used to assist in direct excavation of burrows. At no time will the hand-held power tool be used without a protective barrier (such as PVC tube, or similar) to prevent injury/mortality to small mammals that may attempt to escape burrows during excavation procedures. With the Designated Biologist and/or Biological Monitor present, additional mechanized equipment (e.g., backhoe) may be used to expand, slope, and/or terrace excavations for safety; however, this type of equipment will not be used for direct burrow excavation.
B. If any GKR are detected during burrow excavation, they will be captured (either through additional trapping or by hand), and release procedures (see below in Section IV) shall be followed.
C. No GKR burrow excavation will occur within any BNLL buffer avoidance area.

D. The Designated Biologist will document all GKR rat burrows/precincts abandoned or destroyed (through excavation) and provide a written report to the County of San Benito, prior to final County inspection that allows operation of each project phase.

IV. GKR Release

A. Subject to the direction of a Designated Biologist or Biological Monitor, captured GKR will be released into the designated release location (receiver site).
B. Receiver sites with both high quality habitat and the presence of abandoned precincts (refugia) in the vicinity will be given higher priority than sites with no abandoned burrows (Tennant et.al. 2013). GKR will not be relocated to burrows that are occupied by other kangaroo rat species.
C. The high quality habitat for the relocation sites will typically lack dense, non-native grass cover, or will be managed to reduce dense, non-native grass cover that occurs during years when herbaceous growth is high.
D. If necessary due to weather, time, or site preparation at receiver sites, captured GKR will be held in captivity by a properly permitted small mammal trapping specialist. Captive GKR would be subject to holding for no more than 30 days.
E. GKR in captivity would be held in separate plastic, glass, or other rigid non-toxic container measuring at least five gallons in size in an on-site climate controlled room (between 60°F and 85°F). Individual GKR will be provided with non-tinted, unbleached paper towels and enough suitable substrate (soil, sand, or similar) to cover the bottom of the container. Each GKR will be provided with approximately one cup of bird seed mix (e.g., mixture of approximately 75% proso white millet and 25% oats groats) initially that will be maintained until release.
F. Individuals will be released into artificial burrows constructed within the designated receiver site location using the map created under Section I.B as a base map and actual arrangement of individuals captured during trapping. Spatial arrangement of released individuals will account for territoriality, appropriate neighbor spacing, and arrangement.
G. No GKR will be relocated within 50 feet of small mammal burrows that may be occupied by BNLL in BNLL buffer avoidance areas in the VFCL. GKR relocation in the VRCL and SCRCL will be located at least 50 feet from small mammal burrows that may be occupied by BNLL at all relocation sites, unless protocol BNLL surveys have been conducted with no detections of BNLL.
H. Artificial burrows will consist of an approximately three inch diameter burrow constructed with a soil auger. The augured hole will be at least three feet in length and extend at least two feet in depth.
I. Each artificial burrow relocation site in which a GKR is released will be provisioned with four cups of seed (e.g., mixture of approximately 75% proso white millet and 25% oats groats) upon release. The approximate precinct of each individual will be provisioned with four cups of seed once per week continuing until green-up of

vegetation or until provisioning is deemed to be unnecessary by the Designated Biologist.

J. Haystacks, seed caches, and seed stores found with live-trapped GKR or in excavated burrows will be relocated with the associated GKR, within the release cages and/or artificial burrows.

K. Each receiver site will be protected using covers (Figure 8) anchored to the ground. This predator exclusion fencing will be maintained for 30 days after the relocation in order to enable the animals to acclimate to their new location. Anchoring will be adequate to hold covers in place, depending on conditions (wind, cattle, etc.).

L. With the artificial burrows, unless evidence indicates that temporary covers anchored to the ground are not providing adequate protection, covers will be set on the ground surface (not buried). Dimensions will be at least 6 feet x 6 feet and will cover release burrows at a sufficient height to allow free movement of individuals within the shelter. Covers will be constructed of ½-inch by ½-inch mesh metal hardware cloth, or similar. The frame will be constructed of wood stakes, metal posts, or a combination. Seams will be held in place by plastic ties or similar. By installing at the surface of the ground, GKR will be allowed and expected to dig out of the shelters.

M. Candidate receiver sites will preferentially be selected on Panoche Valley Solar Conservation Lands within the Panoche Valley Floor and immediately adjacent lands.

N. Receiver sites will be pre-selected on loam or sandy loam soils, preferentially on slopes of less than 10% but in no case greater than 20%, on in locations that would not be susceptible to flooding.

O. Receiver sites will be selected that have evidence of historic farming, but which have reverted to annual grassland provided that the sites meet all other criteria.

P. Receiver sites for each GKR group capture will be selected at the nearest location within Conservation Lands that meets the previous three criteria and the following conditions:
    1. GKR should be located far enough away that individual GKR will be discouraged from moving back to the capture location;
    2. release sites should be located close enough such that environmental conditions (e.g., soils, aspect, rainfall, etc.) are not substantially different from the capture location (e.g., GKR captured on the eastern extreme of the Project Footprint should not be moved to Conservation Lands west of the Project Footprint);
    3. GKR could be released into other locations on the Conservation Lands upon approval of USFWS and CDFW, up to 5 miles away if it can be determined that smaller subpopulations would not be compromised by introducing additional genetic diversity.

V. Long Term Monitoring

A. Released individuals will be permanently marked with passive integrated transponder (PIT) tags to document survivorship. A Designated Biologist will monitor release locations and sufficient occupied control areas by conducting trapping approximately 30 to 60 days following release and an annual trapping program for five years after the release date. A minimum of 3 trapping sessions shall occur at each location in April and August in each of the first five years. The trapping program will include Control sites that are trapped in the same manner within the Panoche Valley.

B. Performance monitoring will measure abundance, apparent survival, reproduction by translocated individuals, and recruitment. Abundance and extent of GKR surface sign shall also be measured. Additional details of the monitoring/trapping program are part of the Habitat Mitigation and Monitoring Plan.

C. Data to be collected on all GKR recaptured will include: (1) the locations (GPS coordinates and maps) and the time of capture and/or observation, as well as release; (2) sex; (3) approximate age (adult/juvenile); (4) weight; (5) general condition and health, noting all visible conditions including gait and behavior, diarrhea, emaciation, salivation, hair loss, ectoparasites, and injuries; and (6) ambient temperature when handled and released.

D. The monitoring of apparent survival, abundance, reproduction by translocated individuals, and recruitment of the translocated individuals will be assessed for inclusion in annual reports. Abundance and extent of GKR surface sign associated with the receiver sites will also be measured. The results of the annual monitoring will be reported in a standalone report submitted to CDFW and USFWS as part of the performance monitoring.

E. The details of the monitoring program is part of the Habitat Mitigation and Monitoring Plan as stated in Section V.A.

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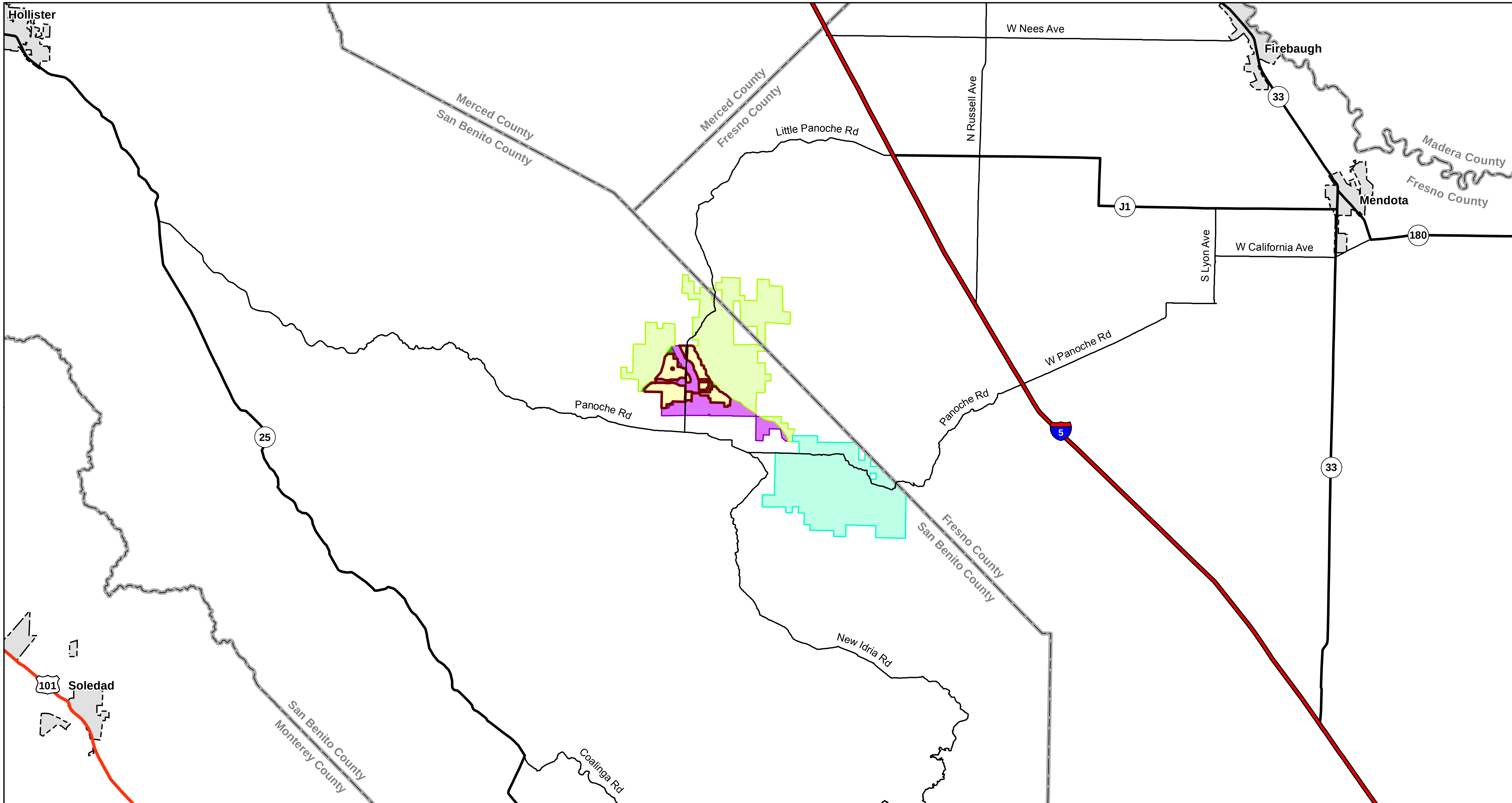
FIGURES



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Legend

- Project Footprint
- On-site Conservation Lands
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- City

Panoche Valley Solar Project

Project Location

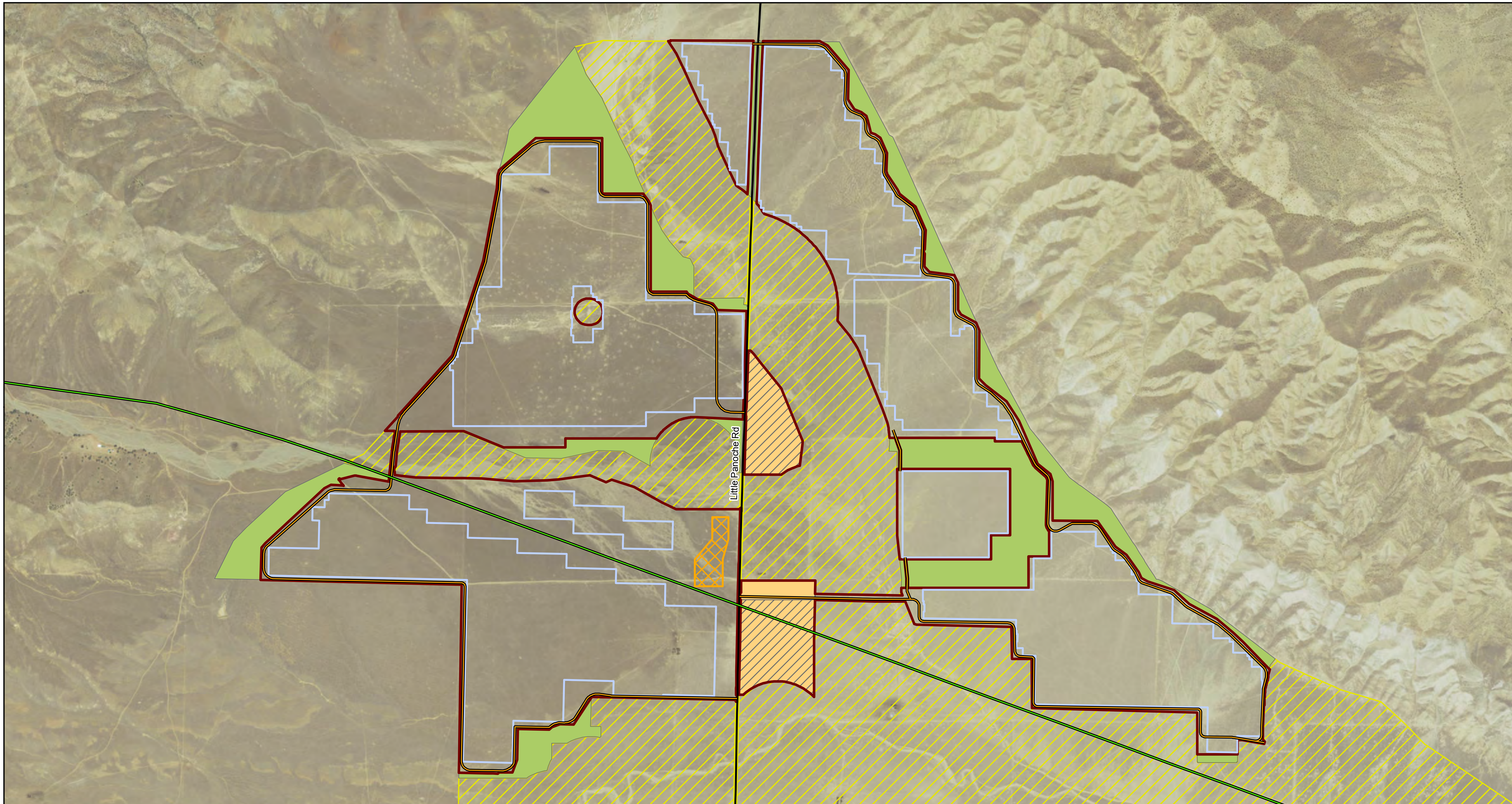
Project Location: San Benito County, California

N

0 2 4 Miles

FIGURE 1

Prepared by: J. Hobbs | Date: 2015-12-01



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Legend

- Project Footprint
- On-site Conservation Lands
- Valley Floor Conservation Lands
- Proposed Panel Block
- Existing Transmission Line
- Perimeter Road
- Substation, Switchyard, O&M Building
- Temporary Laydown Yard
- Temporary Laydown Yard *(converted to on-site conservation land after construction)*

Panoche Valley Solar Project

Proposed Layout

Project Location: San Benito County, California

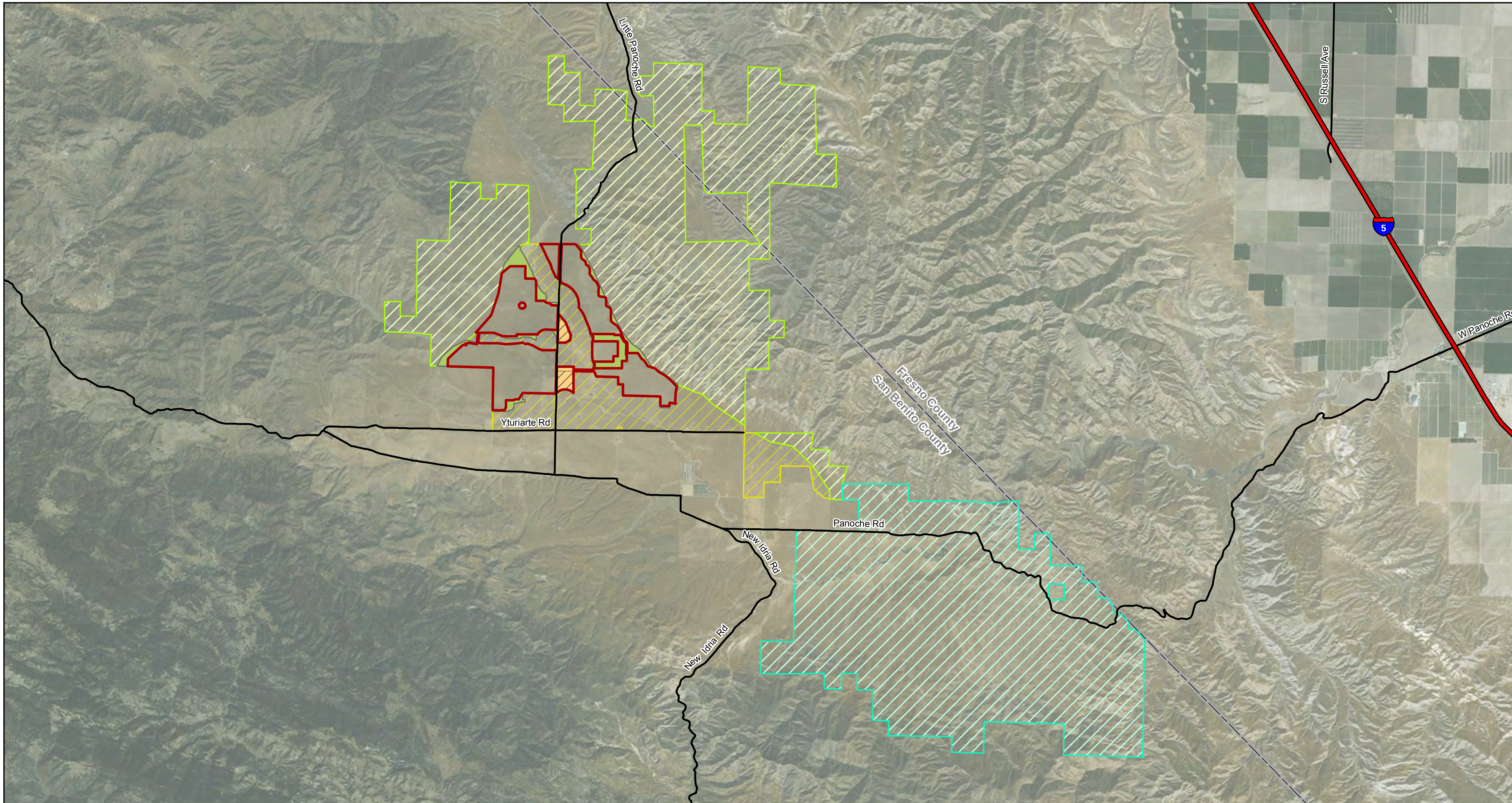
N

0 900 1,800 Feet

FIGURE 2

Prepared by: J. Hobbs

Date: 2015-12-01



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Legend

- Project Footprint
- On-site Conservation Lands
- Temporary Laydown Yard
- Temporary Laydown Yard *(To be converted to on-site conservation lands after construction)*
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

Panoche Valley Solar Project

Project Footprint and Conservation Lands

Project Location: San Benito County, California

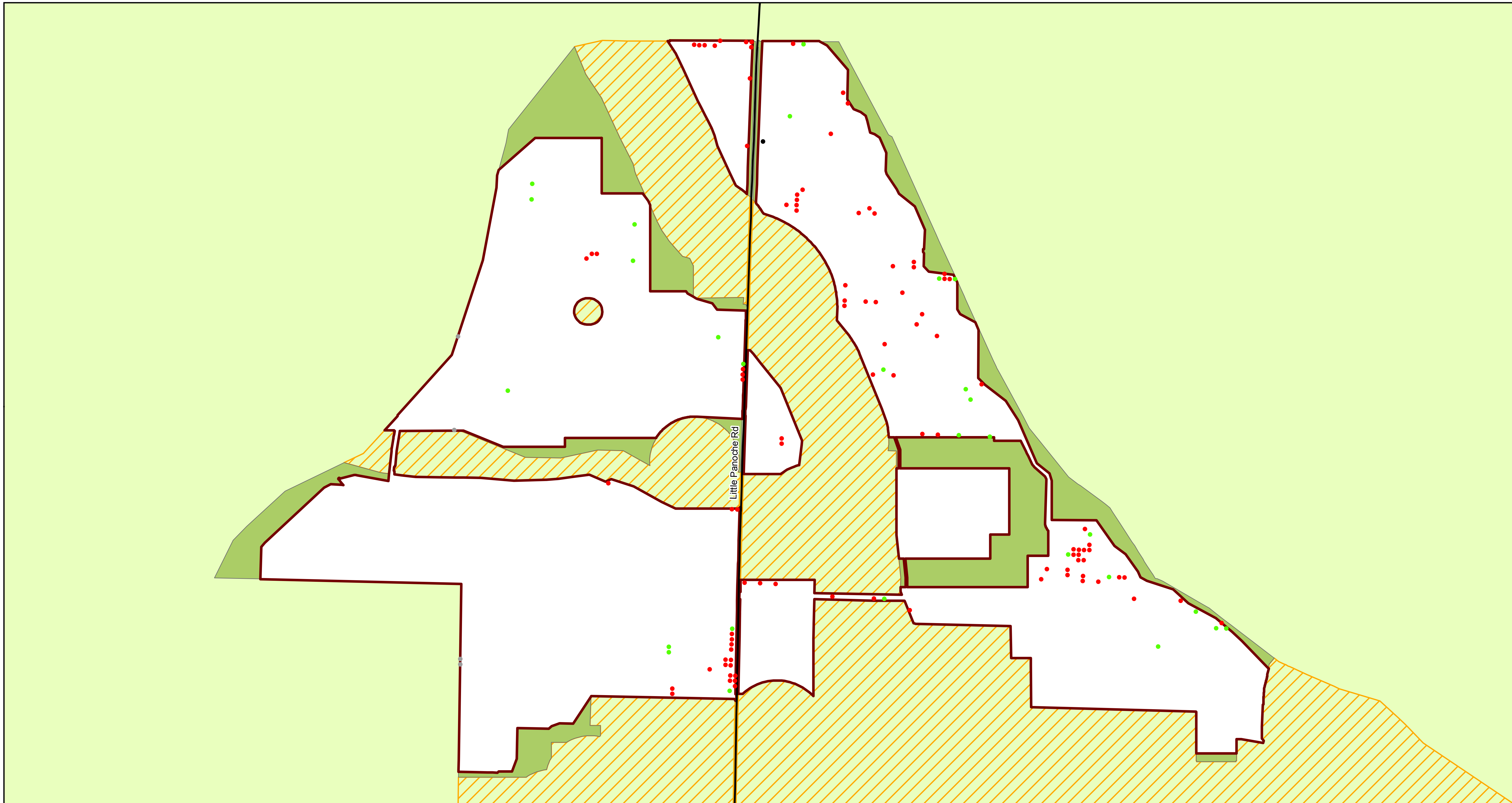
N

0 0.5 1 1.5 Miles

FIGURE 3

Prepared by: J. Hobbs

Date: 2015-12-01



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Legend

- Project Footprint
- On-site Conservation Lands
- Valley Floor Conservation Lands
- GKR Evidence, Active
- GKR Evidence, Inactive
- Relict GKR Sign Present
- No Data

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations

Project Footprint

Project Location: San Benito County, California

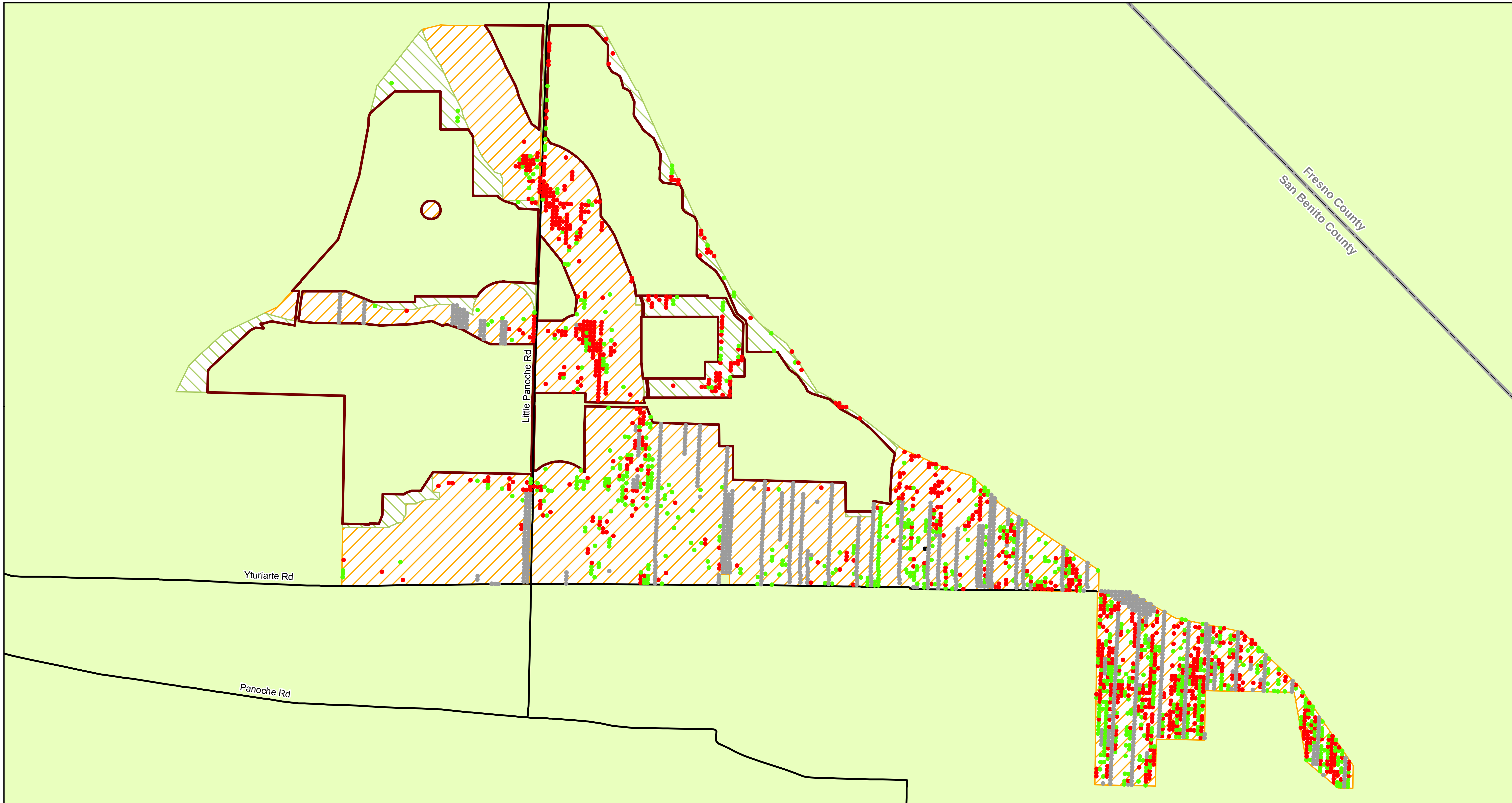
N

0 900 1,800 Feet

FIGURE 4

Prepared by: J. Hobbs

Date: 2015-12-01



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valley Floor Conservation Lands
- GKR Evidence, Active
- GKR Evidence, Inactive
- Relict GKR Sign Present
- No Data

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations

On-site Conservation Lands and Valley Floor Conservation Lands

Project Location: San Benito County, California

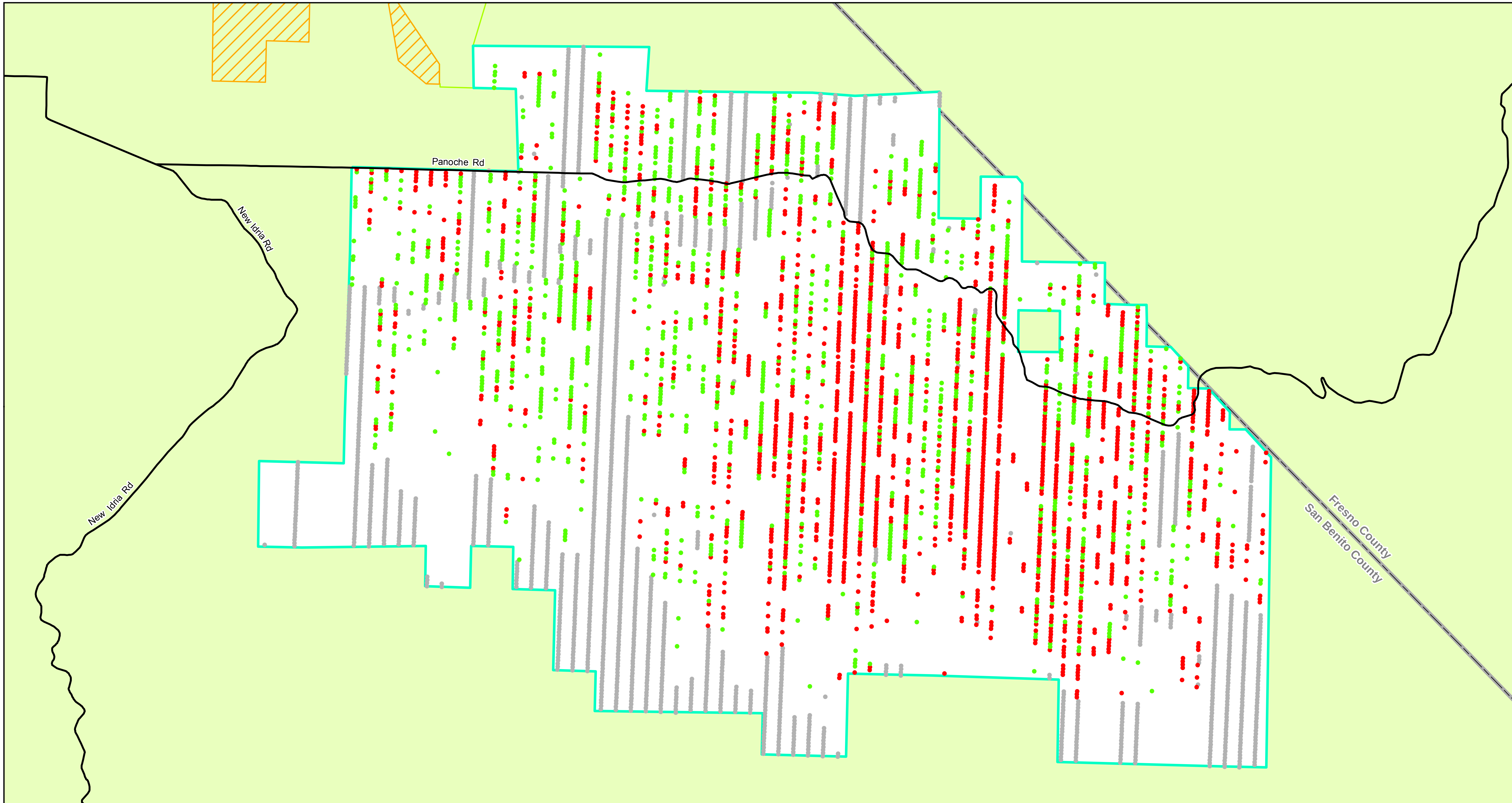
N

0 0.25 0.5 Mile

FIGURE 5

Prepared by: J. Hobbs

Date: 2015-12-01



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Legend

- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- GKR Evidence, Active
- GKR Evidence, Inactive
- No Data

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations

Silver Creek Ranch Conservation Lands

Project Location: San Benito County, California

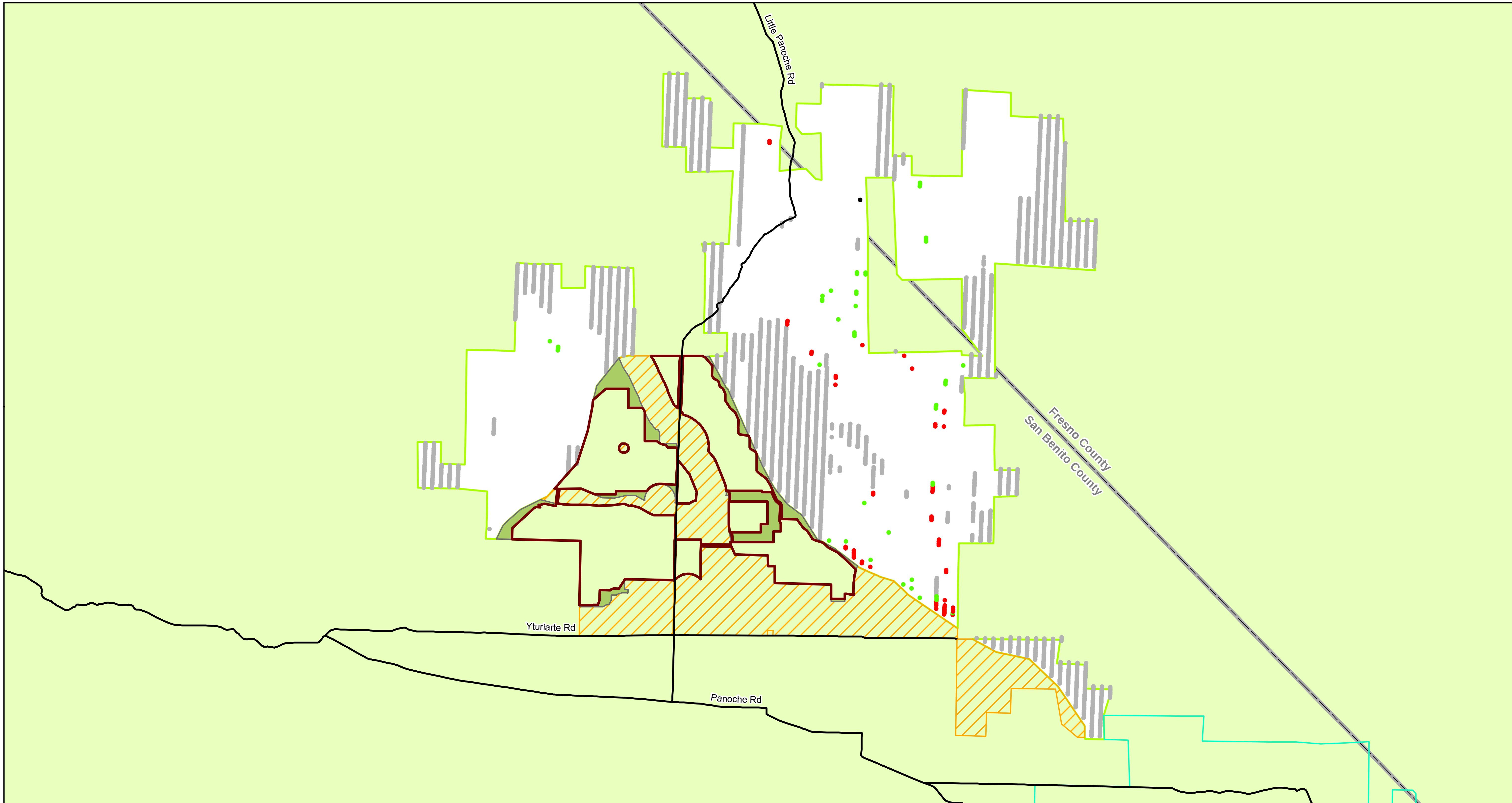
N

0 1,500 3,000 Feet

FIGURE 6

Prepared by: J. Hobbs

Date: 2015-12-01



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Legend

- Project Footprint
- On-site Conservation Lands
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- GKR Evidence, Active
- GKR Evidence, Inactive
- Relict GKR Sign Present
- No Data

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations

Valadeao Ranch Conservation Lands

Project Location: San Benito County, California

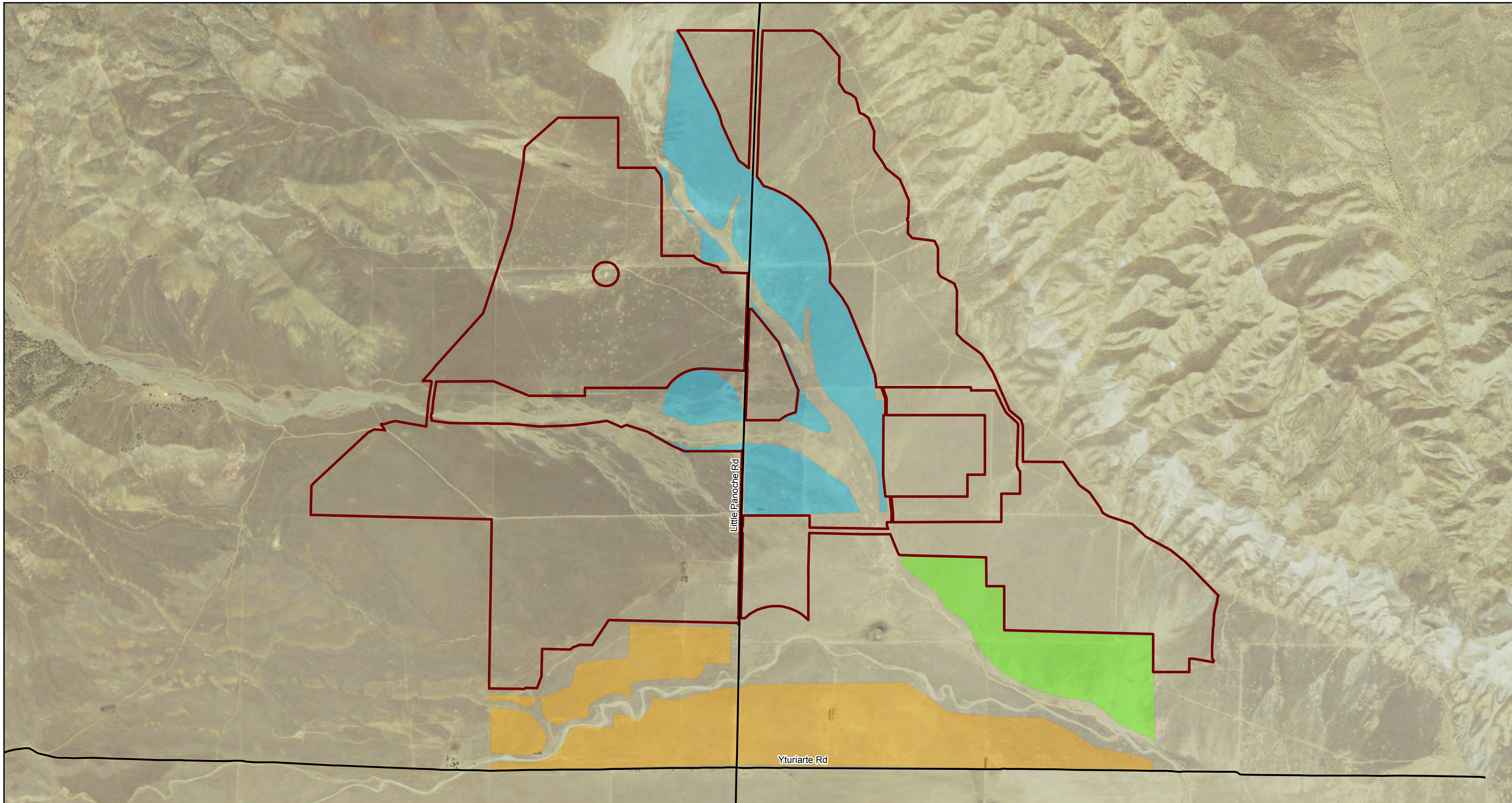
N

0 0.5 1 Mile

FIGURE 7

Prepared by: J. Hobbs

Date: 2015-12-01



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Legend

- Project Footprint
- GKR Relocation Area 1
- GKR Relocation Area 2
- GKR Relocation Area 3

Panoche Valley Solar Project

Proposed Footprint and GKR Relocation/Translocation Sites

Project Location: San Benito County, California

N

0 1,000 2,000 Feet

FIGURE 8

Prepared by: J. Hobbs | Date: 2015-12-01

Figure 9: GKR Relocation Cover Photos

GROUNDWATER MONITORING AND REPORTING PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO COUNTY, CALIFORNIA
KLEINFELDER PROJECT NO. 20154702.001A

MARCH 24, 2015

A Report Prepared for:

Mr. Ken Garthe
AMEC Kamtech, Inc
A division of Amec Foster Wheeler
1979 Lakeside Parkway, Suite 400
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GROUNDWATER MONITORING AND REPORTING PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO COUNTY, CALIFORNIA 95043

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Reviewed by:

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March 24, 2015
Kleinfelder Project No. 20154702.001A

TABLE OF CONTENTS

GROUNWATER MONITORING AND REPORTING PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO, CALIFORNIA 95043

1 INTRODUCTION

On behalf of AMEC Kamtech, Inc., a division of Amec Foster Wheeler (AMEC / Client), and at the request of the County of San Benito, California, Kleinfelder, Inc. (Kleinfelder) has prepared this *Draft Groundwater Monitoring and Reporting Plan* (Plan) for the Panoche Valley Solar Project (Site), located in the unincorporated community of Paicines, California (see Figure 1). The Site consists primarily of vacant land located in the Panoche Valley drainage basin, within the County of San Benito (see Figures 1 and 2). Kleinfelder understands that this work is being performed to satisfy permit requirements for the development of a solar photovoltaic power generation facility on the Site.

This Plan provides proposed procedures and methods for groundwater monitoring and reporting that will be used to establish pre- and post-construction groundwater conditions and conditions during construction for the Site. The Plan is subject to change depending on the results of a proposed aquifer pumping test and or observed groundwater data. This Plan was prepared in accordance with Kleinfelder's authorized scope of services described in its *Proposal for Groundwater Monitoring and Reporting, Panoche Valley Solar Project, Paicines, San Benito County, CA, d*ated January 14, 2015.

2 SITE BACKGROUND INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The Site is located within the northwest trending Panoche Valley drainage basin in the unincorporated community of Paicines, San Benito County, California (See Figures 1 and 2). The Valley is bounded to the northwest by the easternmost Diablo Range and to the northeast and southeast by Upper Cretaceous marine sedimentary rocks of the Great Valley sequence (Geologica, 2010). The Site is primarily comprised of vacant land that is being developed with a photovoltaic solar power generation facility. Based on client-provided information, approximately 26,677 acres of land have been purchased by Panoche Valley Solar of which approximately 2,492 acres will encompass the power generation facility.

A more comprehensive description of Site hydrogeology and geology is included in a 2010 hydrogeologic study (Geologica, 2010). The most recent groundwater data for the Site is included in a 2014 Technical Memorandum (Geologica, 2014). Based on review of the provided groundwater information, depth to groundwater is expected to range between 40 to 75 feet bgs and flow generally to the southeast. Available historical groundwater levels for 43 wells from 2004 through 2014 have been plotted and are included in Appendix A. These data indicate that groundwater levels have not consistently decreased or increased in basin wells, but exhibit either trend (or no trend) at different wells.

2.2 PREVIOUS SITE ASSESSMENTS

A Site hydrogeologic study was performed to evaluate the geologic and hydrogeological setting of the Site, its underlying aquifers, historical and existing groundwater levels, and the viability of existing groundwater wells within the project area (Geologica, 2010). The study described the Panoche Valley drainage basin as filled with coarse-grained sediments and interlayered fine-grained sediments deposited in streams and on terraces draining the rising Diablo Range mountains to the west. As a result deposits within the basin can be laterally discontinuous and variable. This study identified approximately 46 groundwater wells within the valley, for which a review of available data suggested that most of the wells produced water from one or more gravelly zones within 80 to 400 feet of valley fill and that these zones could vary between wells that were less than 100 feet apart (Geologica, 2010). A review of the available well location and construction data was used to create the groundwater well information table included in this Plan (see Table 1).

Since the 1970s through the early 2000s, water levels within the project area historically rose from approximately 100 feet below ground surface (bgs) to approximately 30 to 60 feet bgs due to a decrease in pumping for local agricultural irrigation since the early 1970s (Geologica, 2010). Development of the proposed solar power facility, which estimated a groundwater extraction rate of 25.5 acre-feet per year (AFY) during construction and 3.74 AFY during operation, is not expected to significantly impact the estimated annual groundwater recharge rate of 2,700 AFY in the valley (Geologica, 2010).

An assessment of potential hydrogeologic issues associated with the proposed groundwater extraction needs for the proposed Panoche Valley Solar Project evaluated the impact of water demands for the project during construction and operation and potential impacts to the aquifer and provided recommendations for additional investigation of the aquifer (Geologica, 2014). A maximum extraction rate of approximately 800,000 gallons per day (gpd) is projected to occur during the anticipated 18-month construction phase of the project (Geologica, 2014).

Based on a review of water level measurements collected on May 16, 2014, and Department of Water Resources (DWR) water level measurements available for a number of wells in the Panoche Valley, groundwater elevations in the Valley have decreased since the 2010 hydrogeologic study, presumably due to the drought conditions experienced in California over the last few years (Geologica, 2014). Based on numerical modeling, it was estimated that a maximum drawdown of 3 feet bgs near the edge of the southern project boundary would occur, with 1 to 2 feet of drawdown off-Site and 0.5 foot of drawdown or less close to the model boundaries (Geologica, 2014). Drawdown effects are expected to be transient and are expected to dissipate following the end of construction, in approximately the same amount of time as the construction phase. As a result, construction and long-term operation water use is not likely to significantly impair the existing water supply in the valley Geologica, 2014).

3 PROPOSED SCOPE OF WORK

This Plan has been prepared, at the request of the County of San Benito, to meet the following objectives:

- Document the location of project-related wells and well construction details (diameter, total depth, screen interval, and available construction details).
- Install a water meter, equipped with a flow totalizer, on each extraction well used for project purposes and monitor flow on a daily basis to document extraction volumes. Currently, wells #4 and #20 (Figure 2) are proposed to be used for project pumping.
- Document gradient and directional flow of groundwater in the project area
- Provide a detailed methodology for monitoring groundwater levels in the valley, based on readings collected on at least a monthly basis.
- Establish groundwater level trends that can be quantitatively compared against observed and calculated trends near the project groundwater extraction wells and near existing private wells that could be potentially impacted by the project groundwater extraction activities
- Monitor a minimum of three new or existing on- or off-Site down-gradient wells, near the southern end of the project boundary. Existing wells that have active pumping will be used for monitoring only if extraction records are provided, so drawdown from extraction can be distinguished from project effects.
- Submit monthly reports summarizing groundwater extraction volumes and water level monitoring data collected on a minimum monthly basis. The report shall include, at a minimum,
    - Daily water usage, monthly range of usage, and a 30-day (monthly) average water usage, reported in gpd;
    - Total water used on a monthly and annual basis in acre-feet, including a summary of all water level data; and
    - Trend analysis, to identify projected groundwater level drawdown in potentially impacted off-site wells.
- In the event that monthly trend analysis indicates a water level decline of 5 feet or more from the baseline water level trend at nearby private wells (and accounting for extraction from actively used private wells and data from other nearby monitoring wells, if

available), project use of the extraction well(s) shall be discontinued or extraction rates shall be reduced to allow for water levels to recover.

To meet the goals of the monitoring and reporting program, we propose the following scope:

- Systematically select the groundwater wells to be included in the groundwater monitoring and reporting program, based on their proximity to the extraction wells and/or identified "sensitive receptors," basin boundaries, and areas of interest. Wells 0, 3, 4, 5, 10, 12, 16, 17, 19, 20, 22, 24, 42, 43, 44, and 45 have initially been selected for the groundwater monitoring and reporting program (Figure 2). Accessible wells will be evaluated and measured for depth and screen interval, if possible, prior to finalizing the monitoring well list.
- Although location and elevation data appear to be available, if any inaccuracies become apparent during project preparation, optionally contract a surveyor to survey the location and top-of-casing reference point for each of the selected groundwater monitoring wells.
- Commence groundwater monitoring program two weeks prior to the start of construction activities.
- Install water meters for rate and flow totalizer on project extraction wells.
- Measure groundwater levels in the selected wells with a manual water level meter as follows (to be modified, if necessary, based on actual measurements):
    - Once a week for two weeks prior to commencing groundwater extraction;
    - Once a day through the end of the first two weeks of groundwater extraction;
    - Once a week for the following 4 weeks; and
    - Once a month for the remainder of the program.
- Optionally, install electronic pressure sensor transducers to monitor water levels in the selected wells. This will permit more frequent monitoring, especially during project startup, with data downloaded according to the above schedule.
- Once a day, record the extraction well(s) flow meter and totalizer readings.
- Adjust the data collection frequency and observation and extraction wells, if necessary, based on planned future aquifer test results.
- Tabulate collected water data, perform trend analysis, plot groundwater elevations and contour the potentiometric surface on a Site map to establish groundwater gradient, and create a monthly groundwater report for submittal to the County of San Benito.
    - Contouring frequency will be monthly for the first three months, including pre-pumping conditions, then at a less frequent interval based on basin conditions.

Construction water storage ponds are proposed adjacent to wells #4 / #19 and #44. Although the ponds are expected to be lined, groundwater elevations in these wells will also be evaluated for potential leakage.

3.1 PRE-FIELD ACTIVITIES

A Site-Specific Health and Safety Plan (HASP) will be prepared prior to implementing field activities to address the health and safety of Kleinfelder's workers and provide contingency plans for emergencies that may arise. The HASP will provide guidelines for personal protection equipment and safety procedures to be used by Kleinfelder's staff during field operations. Kleinfelder will review and comply with AMEC's project-specific Incident Prevention Plan.

3.2 GROUNDWATER MONITORING PROCEDURES

Well Head Inspection and Cleanup

1. Inspect well pad for damage and note condition in field log.
2. Depending on surface completion of the various wells to be monitored, the access point will be opened and the well inspected for damage and presence of debris or fluid. Note condition in field log.
3. Remove debris and fluids from well vault (or other access-point structures) if there is a risk of material entering the well during measurement.

Manual Well Measurements and Flow Totalizer Readings

1. Groundwater depth shall be recorded to the nearest 0.01 foot. Depths will be measured from a surveyed, permanent reference mark on the top of the well casing.
2. Using a manual water level meter (or optional transducer), measure depth to water and record the measurement.
3. Replace and lock well, if appropriate.
4. Record flow meter and totalizer readings directly from the meters.

3.3 REPORTING

Following completion of the monthly groundwater monitoring period, Kleinfelder will tabulate the collected groundwater data; create a groundwater contour map, using monthly average groundwater elevations to establish groundwater flow direction and gradient; evaluate draw-down using trend analysis graphs, and prepare a Monthly Groundwater Monitoring Report providing a summary of current and historical groundwater data collected from the start of the groundwater monitoring program. Contouring and trend analysis will be performed using all of the selected groundwater monitoring program wells, assuming that they are screened within the same aquifer. The report will also describe any changes or "data gaps" that occur during the reported monthly monitoring period. At a minimum, the report will contain the following:

- Monthly groundwater summary sheet(s)
- Monthly narrative summary
- Groundwater monitoring well construction details and location information
- Groundwater monitoring schedule
- Site plan(s) showing approximate groundwater well locations, and monthly average groundwater elevation contours, flow direction and gradient; contouring will be performed according to the schedule described above
- Monthly and historical groundwater elevation tables, including recorded flow meter and totalizer readings
- Trend graphs of extraction volumes and groundwater elevations
- Conclusions and recommendations for additional assessment activities if warranted based on the results of the monthly trend analyses and/or planned future aquifer test results.

Existing data for 43 basin wells for the period 2004 through 2014, as presented in Appendix A, will be incorporated into the trend analysis. This data set provides a robust long-term base against which to compare project pumping effects. The reports will be prepared under the supervision of a Professional Geologist and/or Civil Engineer licensed to practice in the State of California.

4 SCHEDULE

We anticipate commencing monitoring two weeks prior to the construction activity start date. We estimate that the data collected two weeks prior to the construction activities will give us sufficient information to establish pre-construction baseline water level data. Groundwater monitoring frequency will decrease, as detailed in the table below, as sufficient groundwater elevation data is gathered and evaluated to establish reliable groundwater elevation trends throughout the pre-, during, and post-construction phases of the project. Planned future aquifer test results may also warrant additional changes to the planned monitoring frequency and/or the selected groundwater monitoring wells. The following preliminary schedule outlines the anticipated sequence, frequency, and duration of the groundwater monitoring program tasks:

Task/Work Element		Frequency	Duration
Notice to Proceed		Once	N/A
Well Survey (optional)		Once	3 days
Installation of Transducers (optional)			TBD
Groundwater Monitoring Data Collection	Pre-construction	Weekly	2 weeks
	Construction	Daily	2 weeks
	Construction	Weekly	1 month
	Construction	Monthly	TBD
Download Transducer Data (optional)	Construction	Daily Weekly Monthly	Weeks 1 - 2 Weeks 3 - 4 Months 2 - 18
Record Flow Meter and Totalizer Readings	Construction	Daily	18 months
Report Preparation	Construction	Once/Month	End of each month

* A report will be submitted approximately one week following the end of each month and two weeks following the end of the months for which groundwater elevation contouring is performed.

5 LIMITATIONS

The preparation of this Plan was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

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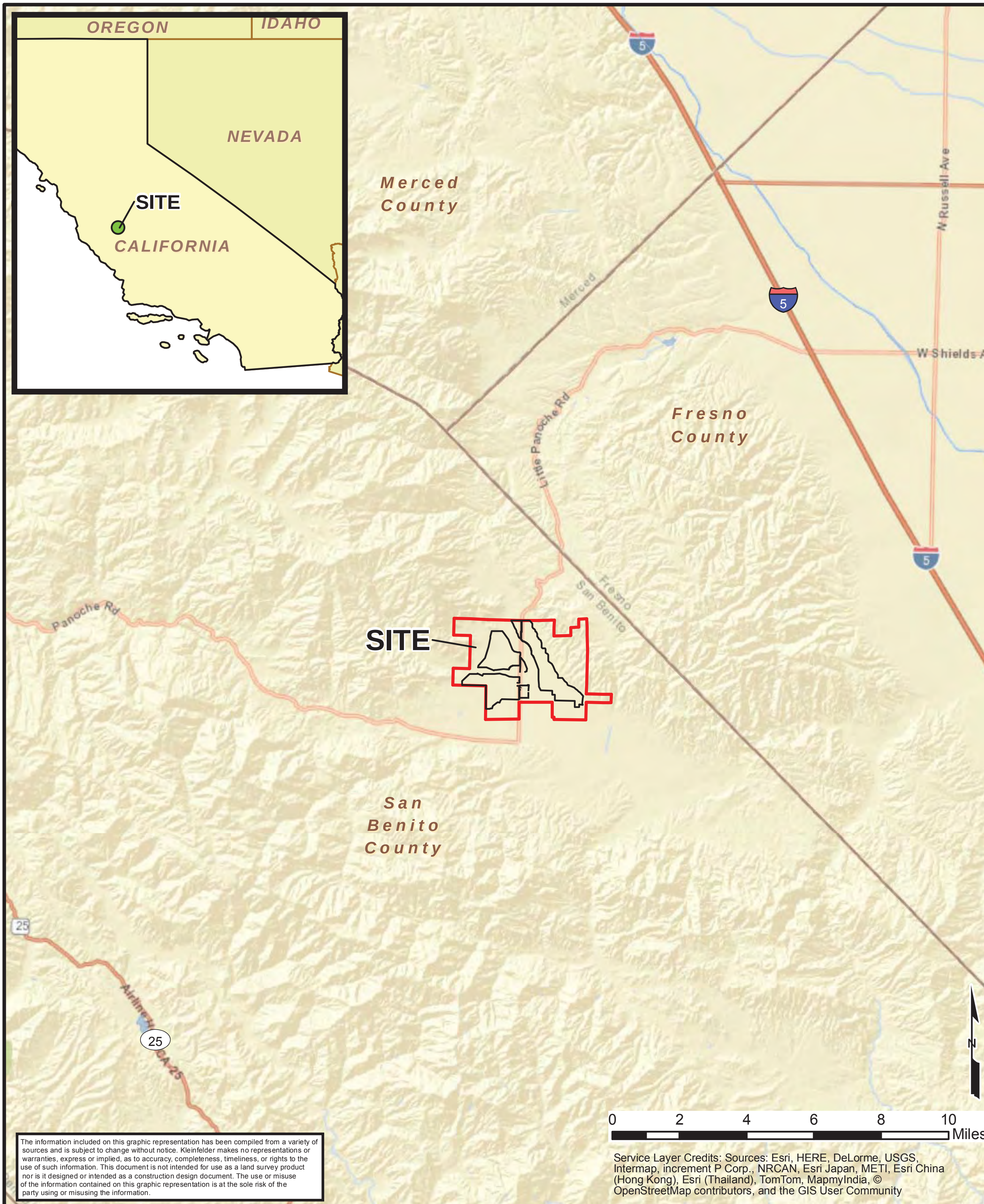
6 REFERENCES

Geologica, 2010, Panoche Valley Hydrogeologic Study, SolarGen Panoche Valley Solar Farm, Panoche Valley, California, June 1.

Geologica, 2014, Technical Memorandum, Panoche Valley Solar Project, Groundwater Extraction Impact Evaluation, Panoche Valley, California. December 15.

FIGURES



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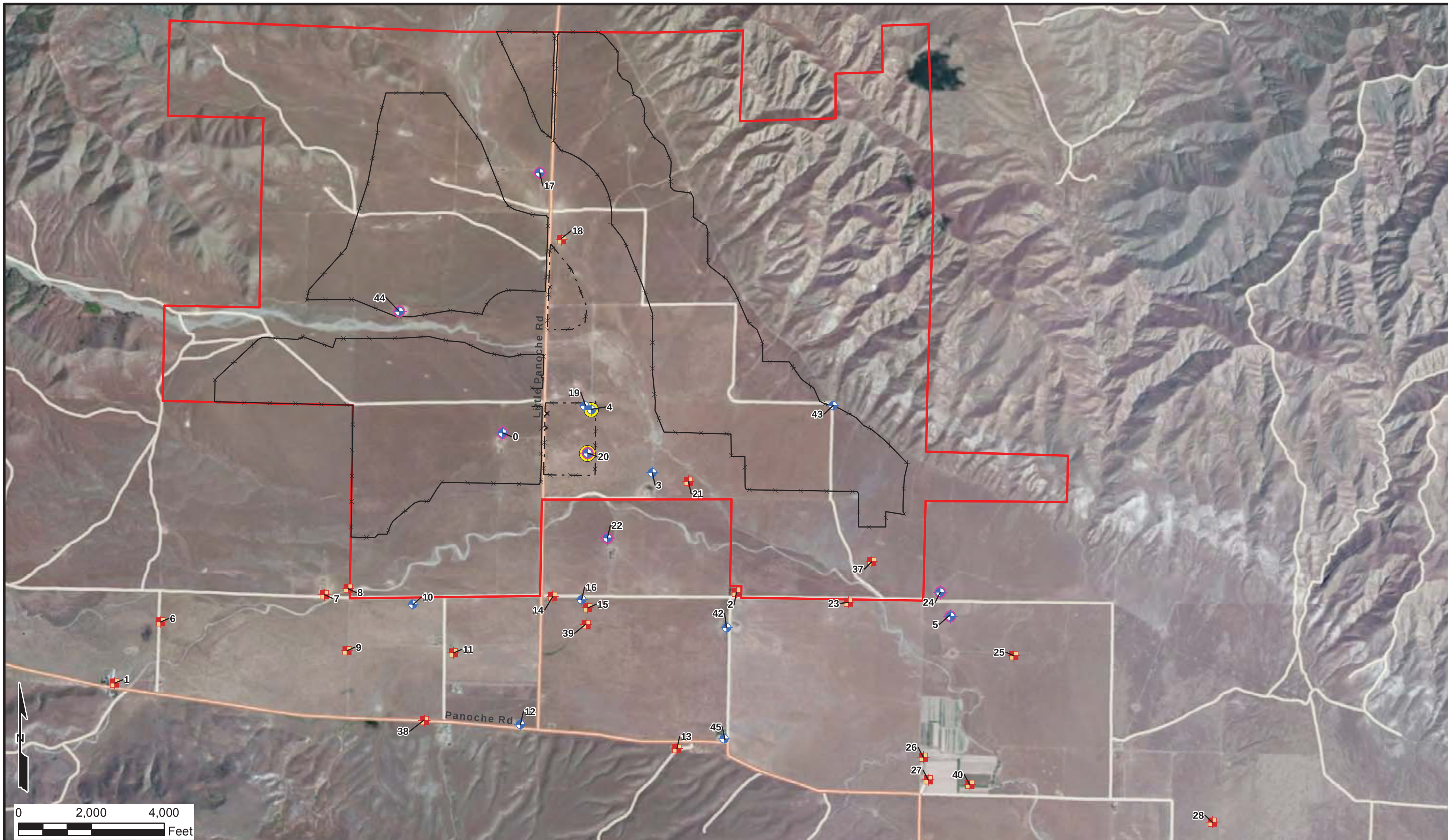
PROJECT NO.	20154702	**Site Location Map**	FIGURE
DRAWN:	03/2015		1
DRAWN BY:	RA		
CHECKED BY:	EM	GROUNDWATER MONITORING AND REPORTING PLAN PANOCHE VALLEY SOLAR PROJECT PAICINES, SAN BENITO COUNTY, CALIFORNIA 95053	
FILE NAME:	Fig_1.mxd		



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Explanation

- Groundwater Monitoring Program Well
- Known Operational Well
- Wells Proposed for Project Water Supply
- Well
- Property Boundary
- Perimeter Fence
- Temporary Fence

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PROJECT NO.	20154702
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Site Plan with Well Locations

GROUNDWATER MONITORING AND REPORTING PLAN
PANOCHE VALLEY SOLAR PROJECT
PAICINES, SAN BENITO COUNTY, CALIFORNIA 95053

FIGURE
2

TABLES

Table 1
Well Information

Panoche Valley Solar Project
Paicines, San Benito County, California

Geologica Well Number	State DWR Well ID Number	Latitude	Longitude	Easting (feet)	Northing (feet)	Ground Surface Elevation (ft AMSL)	Total Well Depth (ft bgs)	Screen Interval (ft bgs)	Casing Diameter (inches)	Comment
0	15S10E16A001M	36.629200000	-120.880400000	6009941.77	2117572.99	1323	n/a	58-300	n/a	Observation Well
1	15S10E19H001M	36.609700000	-120.916300000	5999268.16	2110683.55	1420	n/a	n/a	n/a	
2	15S10E14N001M	36.617500000	-120.858200000	6016372.21	2113187.57	1275	n/a	n/a	n/a	
3	15S10E15G001M	36.626400000	-120.866300000	6014058.50	2116473.13	1282	n/a	n/a	12	
4	15S10E10P002M	36.631900000	-120.871000000	6012718.60	2118501.89	1300	422	182-422	14	Extraction Well
5	15S10E13N001M	36.615977000	-120.838097195	6022260.10	2112519.70	1300	n/a	n/a	n/a	
6	15S10E20D001M	36.614400000	-120.912100000	6000534.68	2112369.70	1395	n/a	n/a	n/a	
7	15S10E17R001M	36.616700000	-120.896800000	6005040.62	2113117.82	1358	n/a	n/a	n/a	
8	15S10E17R002M	36.617200000	-120.894600000	6005689.73	2113287.07	1352	n/a	n/a	n/a	
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18	15S10E03N001M	36.646400000	-120.875700000	6011442.90	2123806.58	1320	n/a	n/a	12	
19	15S10E10P001M	36.632200000	-120.871600000	6012544.72	2118614.51	1300	168	90-168	12	Observation Well
20	15S10E15F001M	36.627800000	-120.872400000	6012278.80	2117017.55	1304	380	90-120/280-360	16	Observation Well
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22	15S10E15L001M	36.621400000	-120.870400000	6012820.18	2114676.61	1293	n/a	n/a	n/a	
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26	15S10E24N002M	36.605300000	-120.840400000	6021509.92	2108646.35	1240	n/a	n/a	n/a	
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44	DOODLEBUG	36.637261000	-120.891620846	6006707.70	2120571.72	1381	n/a	n/a	n/a	Observation Well
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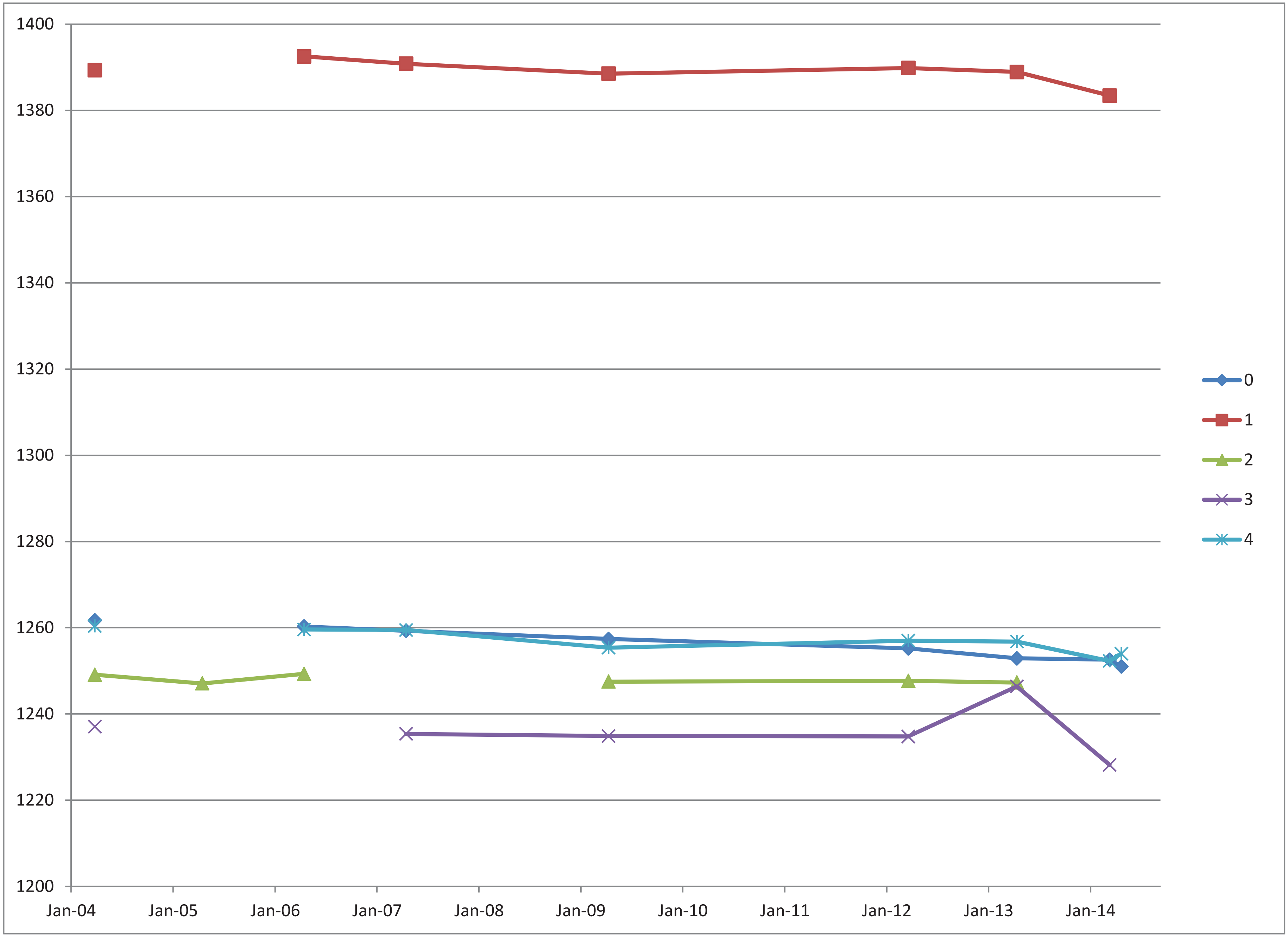
Notes:
Well location and construction information compiled from available information provded in the Geologica 2010 and 2014 reports
Northing and easting coordinates based on State Plane Zone IV coordinate grid, per the Site's American Land Title Association (ALTA) su
n/a = information not available

APPENDIX A

HYDROGRAPHS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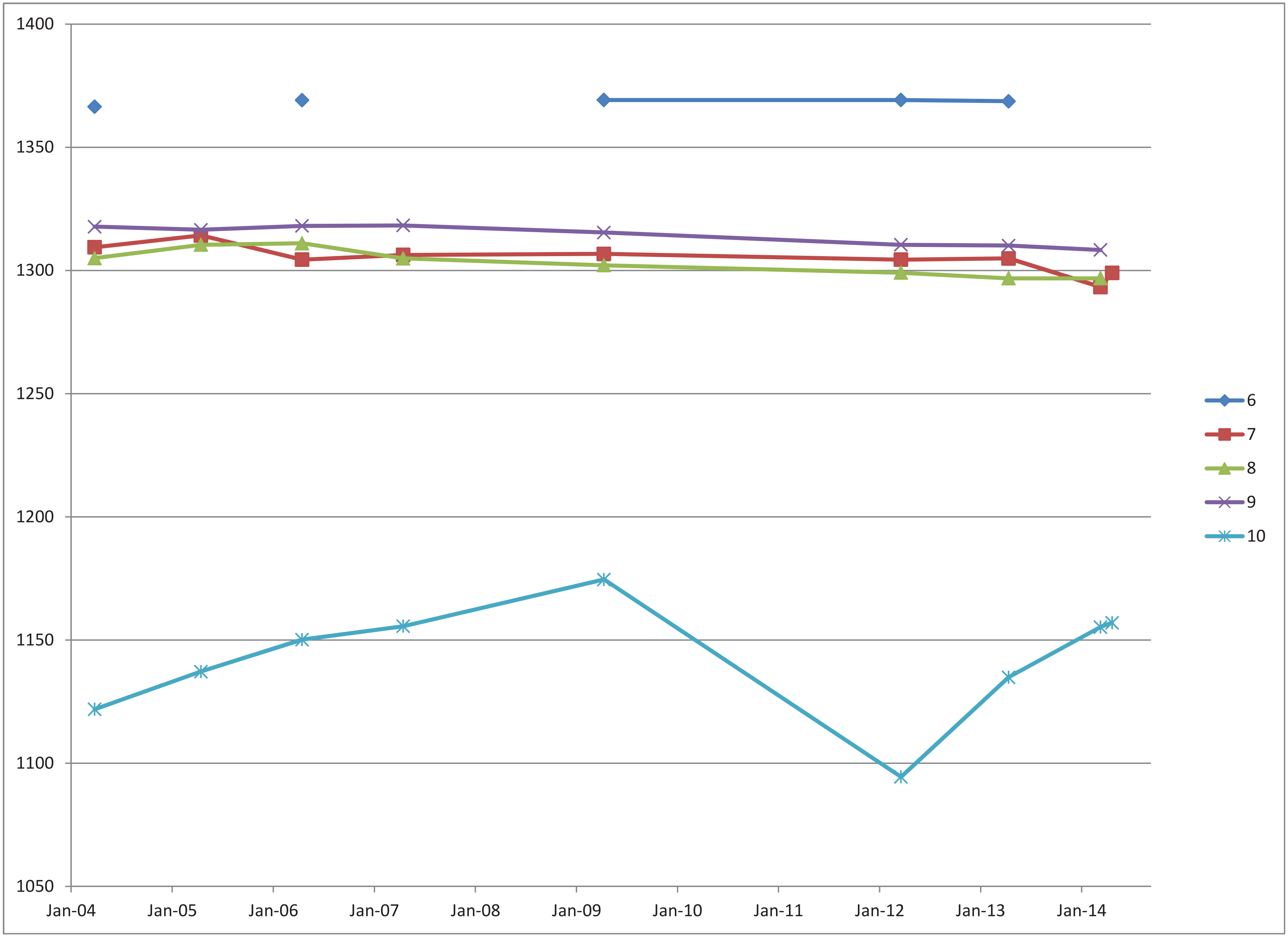
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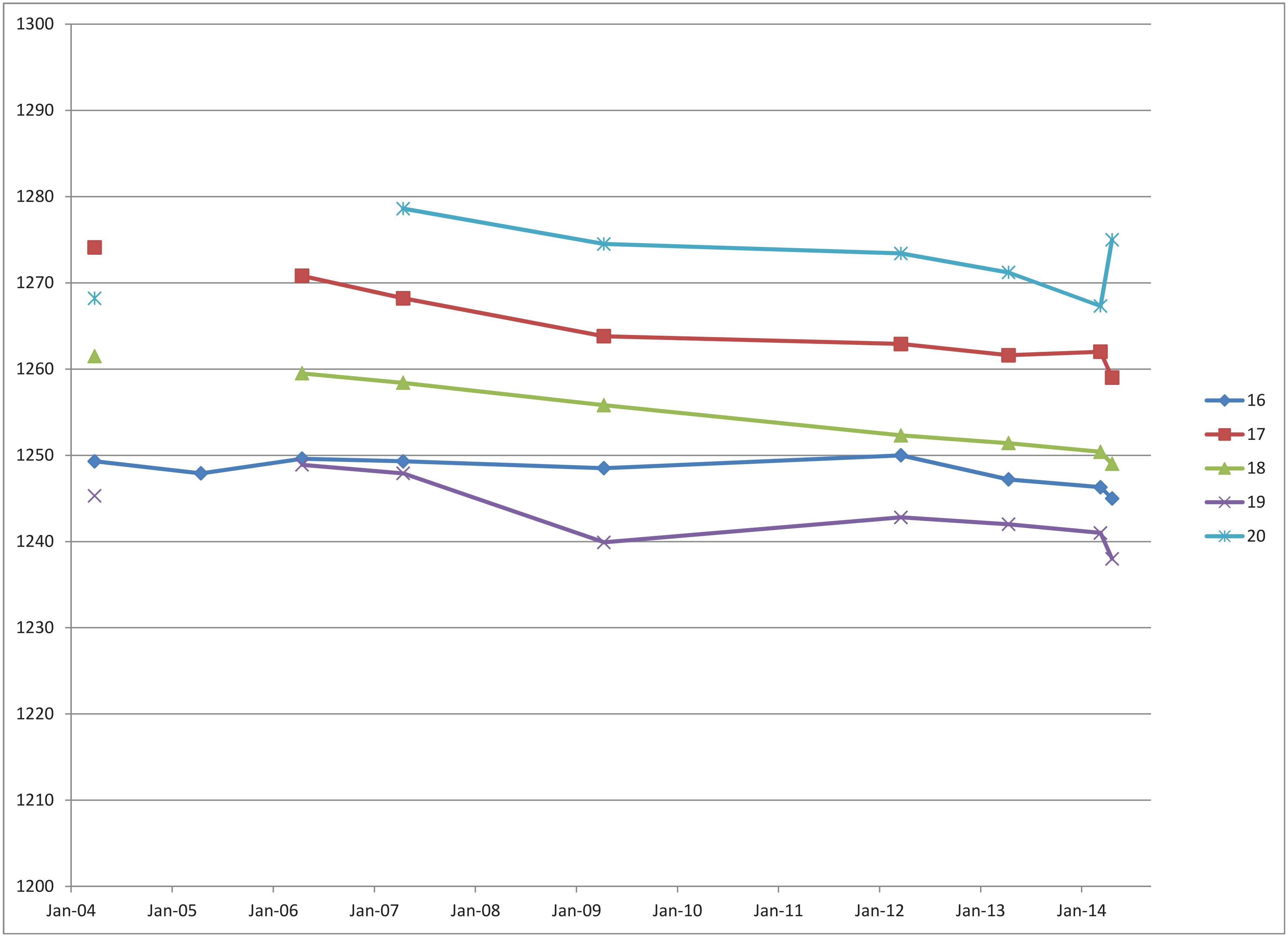
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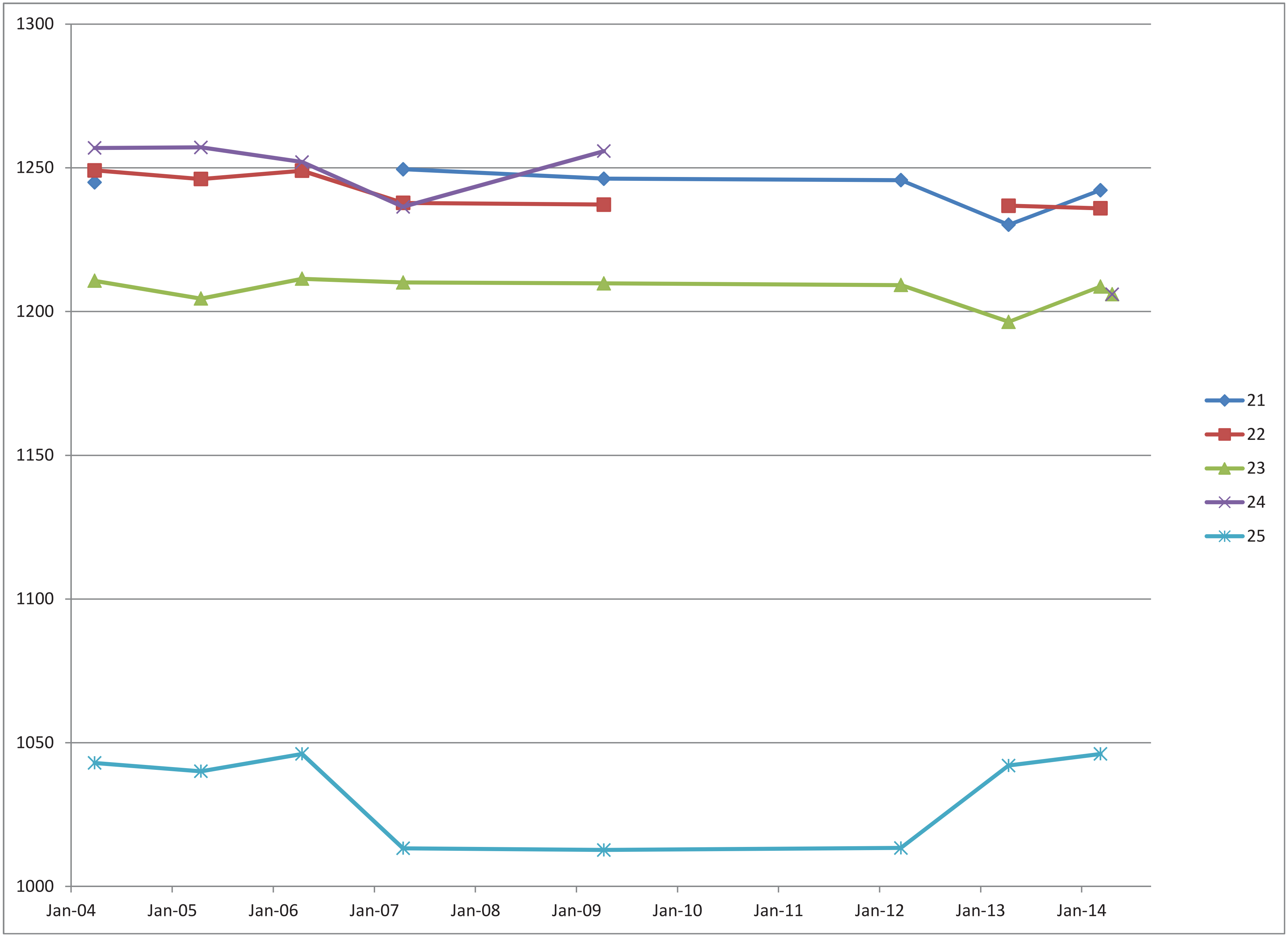
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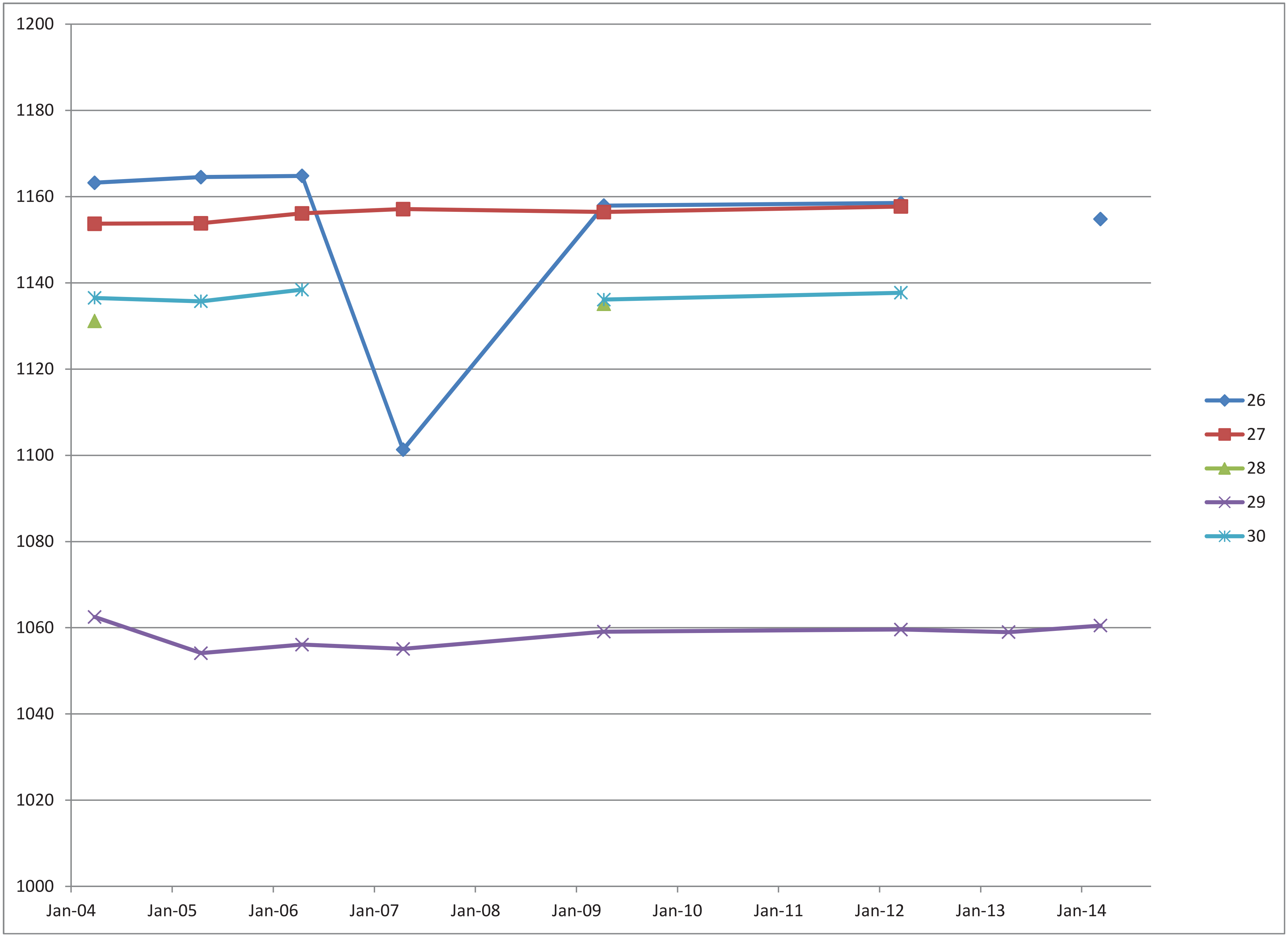
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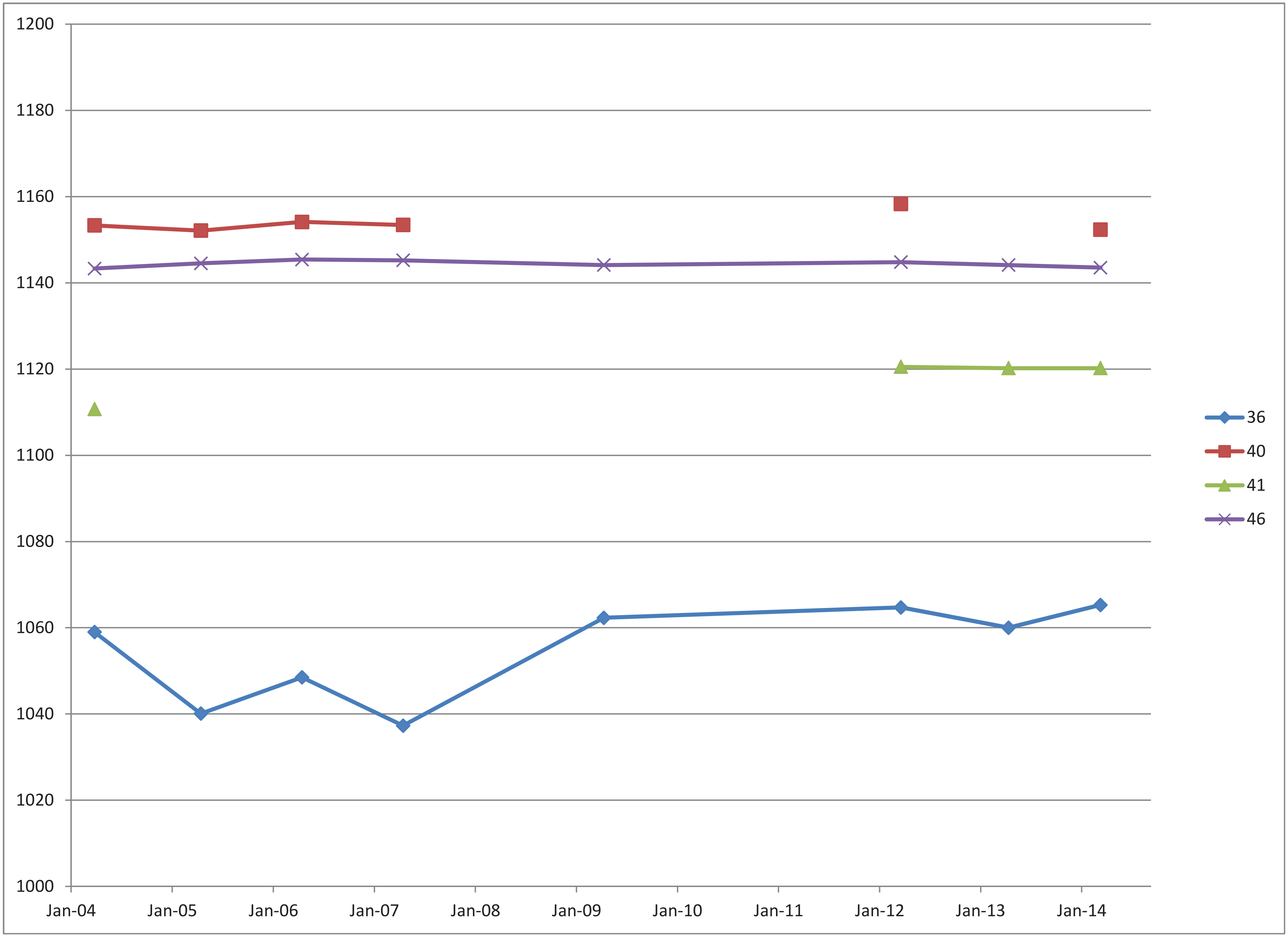
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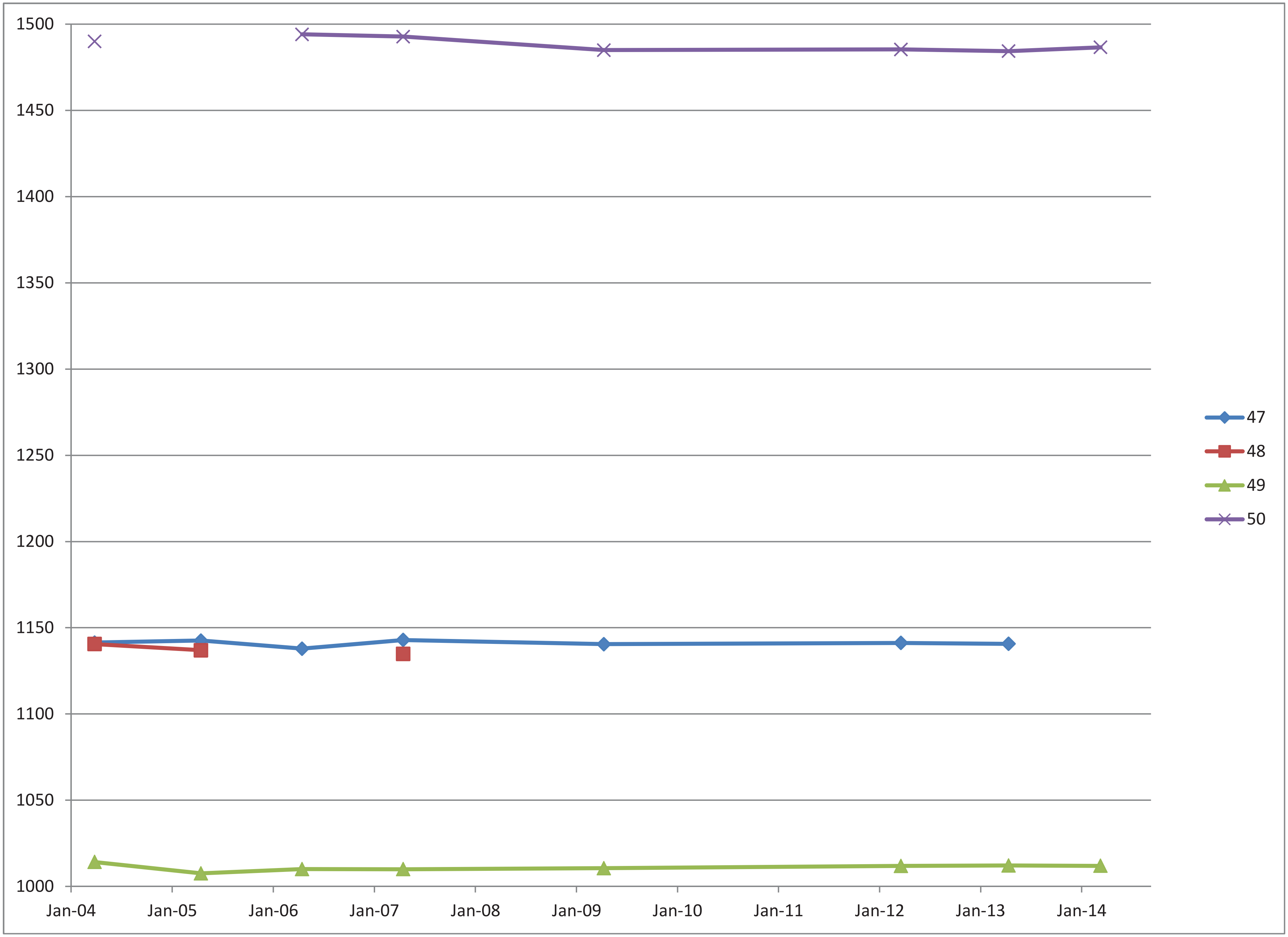
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Habitat Management Plan

V5 [10/9/15]

Panoche Valley Solar Project Conservation Lands

San Benito and Fresno Counties, California

Prepared for:

Panoche Valley Solar, LLC

Prepared by McCormick Biological, Inc.,
Burns & McDonnell Engineering Co. Inc.
and the Center for Natural Lands Management

McCORMICK
BIOLOGICAL INC.

Center for Natural Lands Management

[Inside cover]

Cover photographs:

Background photo: Silver Creek Ranch, December 2014 (©CNLM)

Counterclockwise from left:

San Joaquin antelope squirrel: CNLM Lokern Preserve, 2006 (©CNLM)

Atriplex polycarpa seedlings: Lokern Preserve, 2009 (©CNLM)

San Joaquin kit fox: Buena Vista Valley, 1990s (©G. Warrick)

Blunt-nosed leopard lizard: CNLM Lokern Preserve, 2006 (©CNLM)

Giant kangaroo rat: CNLM Lokern Preserve, 2006 (©CNLM)

TABLE OF CONTENTS

DEFINITIONS

Covered Species – Those animal species for which this Habitat Management Plan is designed to conserve and protect in perpetuity (i.e., no listed plant species were impacted by the Project).

Conservation Land Manager –The entity approved by the applicant, California Department of Fish and Wildlife and the US Fish and Wildlife Service that will implement the management actions described in the Habitat Management Plan on the Panoche Valley Solar Conservation Lands.

Conservation Lands – Three large parcels of land acquired to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels (Valley Floor Conservation Lands, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands).

Habitat Management Plan – The implementation document that defines specific actions that will be undertaken by the Conservation Land Manager to maintain and enhance habitat values for the Covered Species.

Project Footprint – The area including the solar arrays and associated roads and equipment, totaling 2,506 acres.

Restoration Biologist – Qualified entity or person to oversee restoration and enhancement implementation and fulfill short-term monitoring and reporting requirements.

Restoration Contractor – Qualified entity or person to implement and maintain restoration and enhancement actions.

ACRONYMS AND ABBREVIATIONS

ACEC	Areas of Critical Environmental Concern
AMSL	Above mean sea level
BA	Biological Assessment
BLM	Bureau of Land Management
BMP	Best management practices
BNLL	Blunt-nosed leopard lizard
BO	Biological Opinion
°C	(Degrees) Celsius
CACO	California condor
CalFire	California Department of Forestry and Fire Protection
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CFS	Conservancy Fairy Shrimp
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CTS	California tiger salamander
DEIR	Draft Environmental Impact Report
DNA	Deoxyribonucleic Acid
ESA	Endangered Species Act
FEIR	Final Environmental Impact Report

GKR	Giant kangaroo rat
HMP	Habitat Management Plan
HSM	Habitat suitability model
I-5	Interstate 5
ITP	Incidental Take Permit
km	Kilometer
kV	Kilovolt
LOA	Live Oak Associates, Inc.
LHFS	Longhorn Fairy Shrimp
m	Meter
mm	Millimeter
mph	Miles per hour
MW	Megawatt
PVS	Panoche Valley Solar
RDM	Residual Dry Matter
RWQCB	Regional Water Quality Control Board
SBCFD	San Benito County Fire Department
SCP	Scientific Collecting Permits
SCRCL	Silver Creek Ranch Conservation Lands
SJAS	San Joaquin antelope squirrel
SJKF	San Joaquin kit fox

USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFCL	Valley Floor Conservation Lands
VPFS	Vernal Pool Fairy Shrimp
VPTS	Vernal Pool Tadpole Shrimp
VRCL	Valadeao Ranch Conservation Lands

1.0 Introduction

1.1 Background and Purpose

1.1.1 Proposed Project

Panoche Valley Solar, LLC (PVS or Applicant) proposes to construct and operate the Panoche Valley Solar Facility (PVS Facility, Project, or the Action), an approximately 247 megawatt (MW) solar photovoltaic (PV) energy generating facility located in San Benito County, California (Figure 1). The Project Footprint consists of approximately 2,506 acres in the Panoche Valley of eastern San Benito County, California (Figure 2). The Project includes construction and operation of the solar array complexes, an operations and maintenance (O&M) building, perimeter roads that allow for emergency access and egress, electricity collection lines, DC-AC inverters, an electrical substation and switchyard, Pacific Gas & Electric (PG&E) telecommunication upgrades, and decommissioning of the Project. Construction of the PVS Facility is anticipated to commence in 2015 and will be completed over an approximately 18-month period and Project close-out activities continuing for approximately 4-6 months following energization.

The Project proposed by PVS incorporates important general and species-specific conservation measures to avoid and minimize impacts on biological and other natural resources. The Project will implement a conservation package consisting of the permanent preservation of approximately 24,176 acres of high quality Conservation Lands that are contiguous with the Project Footprint (Figure 2). Those Conservation Lands, in conjunction with the enhancement and management activities outlined in this plan, will provide a net species benefit and fully offset potential impacts to special-status species occurring on the 1,794 acres of impacted lands within the Project Footprint. The Conservation Lands will preserve core populations of special status species and permanently protect movement corridors to adjacent lands controlled by the U.S. Department of the Interior's Bureau of Land Management (BLM)[1].

1.1.2 Purpose of the Habitat Management Plan

The Valley Floor Conservation Lands (VFCL), Valadeao Ranch Conservation Lands (VRCL), and Silver Creek Ranch Conservation Lands (SCRCL) have been designated as compensatory mitigation for unavoidable impacts to federal- and state-listed species and associated habitat (Figure 2). The Habitat Management Plan (HMP) is intended to provide detailed guidance to the Restoration Contractor, Restoration Ecologist, Conservation Easement Holder, and Conservation Land Manager for implementing conservation measures on the approximately 24,176 acres of land held in the Conservation Easement(s). The HMP provides the conservation strategy elements and standards for protecting, maintaining, and enhancing Conservation Lands for federal and state-listed species and their associated habitats and defines the tasks and procedures to implement the conservation strategy. The HMP also provides an estimate of costs associated with this comprehensive stewardship program which will be carried out by the Conservation Land Management entity in perpetuity.

1.1.3 Legal and Regulatory Context

This HMP provides implementation methods that will meet the habitat mitigation and management requirements on the Conservation Lands as outlined in the Final and Supplemental Environmental Impact Reports (FEIR and SEIR, respectively). This plan will be in full effect when approved by the the Ventura Office of the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW), Central Region (together, regulatory agencies).

---

[1] This amount of land far exceeds the amount of land required to satisfy the mitigation ratios contained in the San Benito County Conditional Use Permit and Final Supplement Environmental Impact Report, Notice of Decision Filed on May 20, 2015.

The HMP addresses the following mitigation measures from the FEIR (http://www.cosb.us/Solargen/feir.htm) and SEIR (http://cosb.us/panoche-valley-solar-farm-project/#.VO9gcmc5BD_):

- BR-1.2: Develop and implement a Grazing Plan for the Project
- BR-G.5: Create permanent easements as compensation for impacts to biological resources
- BR-G.6: Develop and implement a Habitat Mitigation and Monitoring Plan

The monitoring objectives, performance criteria, and implementation methods contained in this HMP are also intended to be consistent with requirements which will be detailed in the Biological Opinion (BO) issued by the USFWS, and pursuant to Section 7(c)(1) of the Endangered Species Act (ESA) of 1973 and the 2081 Incidental Take Permit (ITP) which will be issued by the CDFW pursuant to the California Endangered Species Act (CESA).

The BO and ITP are anticipated to require the preservation of approximately 24,176 acres of land in the VFCL, VRCL, and SCRCL. The HMP addresses conservation measures applicable to the Conservation Lands as proposed by the Applicant and the Reasonable and Prudent Measures anticipated to be listed in the BO by the USFWS (once the BO is issued, this plan will be updated to include any additional or changes to measures as needed). In addition, the HMP will include minimization and avoidance measures required on the Conservation Lands once the ITP has been issued by CDFW.

1.2 Roles and Responsibilities

PVS is the Project Applicant and responsible for implementing mitigation for the Project. Other roles related to mitigation for this Project include:

- Implementing initial activities including habitat creation, restoration, and enhancement, as well as biological monitoring;
- Holding a conservation easement over the Conservation Lands;

- Managing an endowment for Conservation Land stewardship and easement responsibilities; and
- Managing the Conservation Lands in perpetuity.

Implementation of habitat enhancement, restoration, and creation activities: These activities, as described in this HMP, may be contracted by the Project Applicant to qualified consultants (Restoration Contractor) or may be conducted directly by the Conservation Land Manager.

Biological monitoring during performance period: This role could be provided by the Conservation Land Manager entity or contracted to a qualified consultant (Restoration Biologist).

Conservation Easement role: The owner of the Conservation Lands will grant Conservation Easement(s) to a qualified entity to protect and maintain their natural open space condition in perpetuity. The grantee of the Conservation Easement(s) will be responsible in perpetuity for monitoring the Conservation Lands for compliance with terms of the Conservation Easement(s), defending and enforcing the Conservation Easement(s), and providing annual reports. USFWS, USACE, CDFW, the Central Coast Regional Water Quality Control Board (RWQCB), and San Benito County, are anticipated third-party beneficiaries (TPBs) of the Conservation Easement(s). It is anticipated that the Conservation Land Manager would also hold the Conservation Easement(s), given the compatibility in objectives of these roles and the efficiency in use of financial resources.

Conservation Land Manager role: The Center for Natural Lands Management (CNLM) or another qualified and approved third-party entity would conduct activities for this role. CNLM is approved by CDFW to hold and manage mitigation lands in California (CDFW 2015). Management activities include long-term biological monitoring (and potentially the biological monitoring during the performance period), protection (e.g., such as fencing), reporting, grazing management, and other appropriate stewardship activities to maintain the conservation functions and values of the Conservation Lands in perpetuity.

2.0 Description of Conservation Lands

2.1 Location and Setting

The Conservation Lands (Figures 1 and 2) are located in Panoche Valley, in the Counties of San Benito and Fresno, in the State of California, within the following sections of the Federal Townships:

Valley Floor Conservation Lands – San Benito County

- Sections 4, 8-10, 13-16, and 19 of Township 15 south, Range 10 east

Valadeao Ranch Conservation Lands – San Benito and Fresno Counties

- Sections 19, 30, and 31 of Township 14 south, Range 11 east;
- Sections 21-27 and 32-36 of Township 14 south, Range 10 east;
- Sections 1-8 and 10-14 of Township 15 south, Range 10 east; and
- Sections 6, 7, 19, and 20 of Township 15 south, Range 11 east.

Silver Creek Ranch Conservation Lands – San Benito and Fresno Counties

- Sections 20-21, 26-36 of Township 15 south, Range 11 east
- Sections 1-6, and 8-12 of Township 16 south, Range 11 east

The Conservation Lands, approximately 24,176 acres in total, include 2,514 acres of the VFCL adjacent to the Project Footprint (Figures 2 and 3); 10,772 acres of the VRCL located contiguous with the Project site (Figures 2 and 4); and 10,890 acres of the SCRCL located immediately to the southeast of the Project Footprint (Figures 2 and 5).

The Conservation Lands are surrounded by private cattle ranches and BLM-administered lands. BLM lands are extensive in the Ciervo-Panoche Natural Area surrounding the site. BLM lands almost completely surround the SCRCL to the south, east, and north, and the VFCL and VRCL to the east. Areas of Critical Environmental Concern (ACECs)—a BLM designation—are also extensive throughout this region.

2.2 General Site Characteristics

2.2.1 Watershed

The Panoche/Silver Creek Watershed is located upstream and west of Mendota, California, and is approximately 50 miles west of Fresno, California (Figure 1). The watershed area, as defined for this HMP, encompasses approximately 300 square miles upstream of Interstate-5 (I-5) and ranges in elevation from approximately 500 feet at I-5 to 5,000 feet near the upper watershed boundary. The Panoche/Silver Creek Watershed is located in Fresno and San Benito Counties and lies on the western edge of the San Joaquin Valley in the Diablo Range. Soils in the watershed are derived predominantly from marine sediments (sandstones and shales) of the Moreno, Kreyenhagen, and Panoche Formations, and Franciscan Assemblage (as stated in County of San Benito FEIR 2010). These soils support a sparse vegetative cover on most hillsides, with more vegetative cover generally associated with flatter valley floor areas and hillslopes at higher elevations. Large areas of unvegetated soils exist where the soil is thin, particularly on steep slopes and near stream channels. Areas of thin soil also occur over rock containing relatively high concentrations of selenium. Within the watershed upstream of I-5, approximately 30 percent of the land is managed by the BLM, primarily for green-season grazing (Figure 6). Other lands are privately held and used for rangeland grazing or irrigated cropland (just upstream of I-5). Downstream of I-5, lands are used primarily for agricultural crops.

2.2.2 Climate

The Conservation Lands occur in a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing . Nearly all precipitation infiltrates into the site’s soils and flows in creeks and drainages when soil capacity has been reached.

2.2.3 Biotic Habitats

Approximately 73% of the Conservation Land is composed of annual grassland habitat, followed by ephedra shrubland (21%), barrens (2.4%), and saltbush shrublands (2%). Other habitat types (juniper woodlands, oak woodlands, riparian, ponds, and vernal pools) each make up less than one percent of the land area (Table 1; Figures 3 through 5). Further details of vegetation communities can be found in Appendix B.

Table 1. Biotic Habitat Alliances on the Conservation Lands

Biotic Habitat Alliances	Valley Floor Conservation Lands (Acres)	Valadeao Ranch Conservation Lands (Acres)	Silver Creek Ranch Conservation Lands (Acres)	Total (Acres)
Annual Grassland	2,357	6,727	8,314	17,407
Ephedra Shrublands	--	2,705	2,259	4,964
Barrens	--	575	--	575
Saltbush Shrublands	--	476	--	476
Juniper Woodlands	--	68	--	68
Oak Woodlands	--	16	--	16
Wetlands and Associated Habitats	--	2.1	233	235.1
Mechanically Disturbed & Devegetated	--	3	--	3
Ponds	1.6	2.4	--	4.0
Vernal Pools	2.9	0.2	--	3.1
Wash/Drainage/ Stream	88	--	--	88
No data*	65	197	84	346
TOTAL	**2,514**	**10,772**	**10,890**	**24,176**

*No GIS data was available for these acreages.

2.2.4 Rare Plant Populations

No federal- or state-listed plant species were located during Project-level surveys conducted for the Project. In addition, no federal- or state-listed plant species were located during reconnaissance-level surveys of the VFCL, VRCL and SCRCL. Six non-listed rare or sensitive plant species were observed during the survey of plant associations on VFCL, VRCL, and SCRCL. Additional details are included in Appendix B.

2.2.5 Invasive Plant Species

Numerous invasive plants common to central and southern California are found on the Conservation Lands. Grasses such as red brome are dominant in the annual grasslands as well as being a component of the shrub communities in many other habitat types on the Conservation Lands. Other invasives, such as *Erodium cicutarium*, are commonly found but are not as disruptive to the historic natural landscape as invasive bromes because thatch buildup seldom occurs with this species.

Invasive plants can out-compete native species leading to decreased biological diversity in the habitat, extirpation of some natives, and lower quality foraging opportunities. Prevalence of invasives may also increase the risk of range fires which can further damage shrub habitats that recover slowly from fire effects. Many invasive plants also are early successional plants, giving them an advantage on disturbed habitats where remediation may be desirable.

2.2.6 Covered Species

Covered Species are those species which this HMP is designed to conserve and protect in perpetuity on the Conservation Lands. These species are considered extant, or have the potential to occur, on the Conservation Lands. Several studies have been completed to identify the suitable habitat for each species for each of the conservation areas (Table 2; Figures 7-11). The acreage required as mitigation in accordance with the FEIR and SEIR will be the focus for management and monitoring for specific Covered Species while preserving the entirety of the Conservation Lands for all Covered Species. Future non-preservation mitigation (e.g., additional enhancement, restoration, management, and monitoring) activities on the Conservation Lands may be as part of future mitigation of other development Projects or by other organizations to continue the recovery of threatened and endangers species, vegetation communities or habitat. Upon coordination with the land owner and manager and with guidance and approval from CDFW, USFWS, USACE, and RWQCB; other entities may utilize the Conservation Lands as long as these efforts do not conflict with this HMP. Appendix B describes surveys that have been conducted to date that establish the presence and distribution of Covered Species on the Conservation Lands. Appendix C contains detailed species descriptions and Appendix D provides a summary of survey results.

Table 2 describes the mitigation required in the CEQA documents in relation to the actual acres preserved.

Table 2. Covered Species Requiring Mitigation Per CEQA

Species	Species Code	Listed Status		Permanent Impacts to Suitable Habitat (acres)	Mitigation Ratios (as per CEQA)	Mitigation Acres Required	Total Acres Preserved
		State	Federal				
San Joaquin Kit Fox	SJKF	Endangered	Threatened	1,794	4:1	7,176	14,863
Giant Kangaroo Rat	GKR	Endangered	Endangered	1,794	3:1	5,382	16,576
San Joaquin Antelope Squirrel	SJAS	None	Threatened	1,794	1:1	1,794	24,176[1]
California Tiger Salamander	CTS	Threatened	Threatened	NA	Various[3]	NA	4,028[2]

1. Entire Conservation Lands acreage is suitable foraging habitat for this species.
2. Suitable estivation habitat on VFCL and VRCL
3. CTS suitable breeding habitats and suitable upland habitat impacted within 2,100 feet of a known or potential breeding pond will be mitigated at a 3:1 acreage ratio, suitable upland habitat located between 2,100 feet and 2,640 feet (0.5 mile) of a breeding pond will be mitigated at a 2:1 acreage ratio, and suitable upland habitat located between 2,640 feet and 6,636 feet (1.2 miles) of a breeding pond will be mitigated at a 1:1 acreage ratio. Temporary impacts will be mitigated at a 0.5:1 acreage ratio. Preserved habitat shall be the same quality or better quality than the habitat disturbed.

2.2.7 Historical and Recent Land Use

The land in the general area of the Conservation Lands has been grazed for over 150 years. The earliest non-native settlers of the San Benito County mountain ranges, foothills, and valleys were Mexican citizens. In 1844, Mexican Governor Manuel Micheltorena granted a 22,000-acre tract of land in this region, but not in the Project Footprint or Conservation Lands, called “Panoche de San Juan y los Carrisalitos” to Julian Ursua and Pedro Romero . Panoche Valley has always been sparsely inhabited with very few buildings. Since the mid-1800s, the land has been used exclusively for cattle, sheep, and horse grazing and associated cultivation of forage crops (primarily alfalfa). According to evidence gleaned from historic maps and aerial photographs of the area from the twentieth century, early landowners established clusters of buildings and structures related to their ranching or farming operations. Each cluster (there were fewer than 10 in the valley) typically had a stand of trees, and may have included residences, barns, sheds, water tanks, wells, shelters, corrals, troughs, and related outbuildings. A number of these clusters of buildings and structures have been demolished over the years and, in some cases, replaced with new structures. Evidence suggests that few, if any, new clusters of buildings have been built since the early 1900s (JRP 2010).

2.2.8 Livestock Grazing/Agriculture

As stated above, cattle, sheep, and horse grazing has been the primary agricultural use and land use on the VFCL, VRCL, and SCRCL. Rotational grazing, which was subject to individual landowner/lessee management, has been the common practice. Ranchers and grazing operators have managed livestock grazing on these lands for decades, presumably profitably, and have accumulated consider grazing management experience. Although the Conservation Lands primarily have been used for cattle grazing for the past 100 years, portions of the VFCL have been used to grow crops. From the 1940s through early 1970s, various irrigated crops were grown on this land including cotton, watermelon, potatoes, turnips, cucumbers, sugar beets, and lettuce. At least some irrigated and dryland crop production extended into the 1990s (San Benito County 2010).

2.2.9 Fire

In rangeland areas such as those on the Conservation Lands, causes of wildland fire include equipment and vehicles, lightning strikes, and downed powerlines. Although documented fire history specific to the Conservation Lands is not available, it is likely that the lands have been subject to wildland fires on a fairly regular basis in some locations. There appears to have been a large fire on the VRCL within the last decade, as evidenced by the presence of numerous burned ephedra (*Ephedra* sp.) stumps. Maintenance of a disked fire break along public roads has been implemented as a fire prevention measure. Other than San Benito County ordinances and California Department of Forestry and Fire Protection (CalFire) guidelines, no formal fire prevention or management plan exists for the Conservation Lands.

The primary biotic habitats and ecosystems of the Conservation Lands habitats and ecosystems are somewhat resilient to infrequent fires, but changes in the fire regime that result in shorter fire intervals can damage the habitat for some animal species. In the types of shrublands, riparian areas, and grasslands found throughout the Project Footprint and Conservation Lands, fire can have a long-lasting and potentially negative impact on the vegetation. Ephedra and common saltbush (*Atriplex polycarpa*) do not readily recover from fire and unmanaged fire in the region would tend to favor establishment and maintenance of non-native grasses over native grasses, forbs, and shrubs (Sawyer et al. 2009).

CalFire functions as the San Benito County Fire Department (SBCFD)/ Hollister Fire Department under a contract with the County of San Benito in the vicinity of the Conservation Lands. The SBCFD located in Hollister, would be the nearest responder to the Conservation Lands with a response time to the Project site of approximately 45 minutes to one hour (San Benito County 2010). No other year-round responders from Fresno County or any other nearby jurisdictions are closer to the Conservation Lands.

2.2.10 Security/Trespass/Trash

Generally there is limited public use of the lands and public roads in the area of the Conservation Lands. Current security measures on the Conservation Lands consists of fences and locked gates along public roads and the presence of ranch operators and staff on-site. On adjacent BLM lands, motorized vehicles are typically not allowed between mid-April to mid-October due to fire season restrictions. Therefore, public access is further limited during roughly half the year. Public use of the surrounding BLM lands likely increases significantly between October and March as well as some holiday weekends and, with the increased traffic, the potential for trespass is increased. The primary forms of trespassing could include off-highway vehicle use and trespassing on foot over gates and fences.

Although public access has been restricted on the Conservation Lands, past land use practices have resulted in the abandonment and/or discarding of items such as tanks, vehicles, equipment, tires, and trash. These items are scattered throughout the Conservation Lands and in some places they may be a hazard to wildlife.

2.2.11 Research, Recreation, and Educational Uses

There are currently no authorized research, recreation, or educational uses on the Conservation Lands other than private access by landowners and their guests. Based on distributional records for various Covered Species, it appears that in the past some of the Conservation Lands were accessed for research activities associated with these species (USFWS 1998).

The Panoche Valley is a recognized "Important Bird Area" by the Audubon Society. The designation includes approximately 36,000 acres of private and public lands in the Panoche Valley and surrounding hills. BLM lands in the surrounding area and CDFW lands on Little Panoche Creek, northeast of the VRCL are frequently visited by birders. Birders also frequent the public roads in the Panoche Valley area.

The western boundary of the BLM-administered Panoche Hills Management Area is located immediately adjacent to portions of the Conservation Lands (Figure 6). Two

Wilderness Study Areas and two ACECs are located in the Panoche Hills BLM-managed properties. These lands are primarily accessed from the north along Little Panoche Road and are managed as a Special Recreation Management Area by the BLM, providing specific, structured recreation opportunities. Recreation opportunities include hiking, nature study, hunting, star-gazing, rockhounding, and camping (BLM 2009). The Panoche Hills are open all year, with peak use in the winter and spring of approximately 5 to 10 people per day during weekdays and approximately 20 to 25 people per day during the weekends (San Benito County 2010).

Additional organized recreation activities occur throughout the Panoche Valley, such as the Panoche Valley Road Race. This event is an annual cycling race which can host hundreds of racers along Panoche Road and Little Panoche Road. The 2013 race reported approximately 130 participants (USA Cycling 2013). Mercey Hot Springs, a private recreation area and retreat with hot mineral baths, is located along Little Panoche Road near the northern boundary of the VRCL in the Panoche Hills. This private campground is often visited by birders who use the cabins, campsites, and recreation vehicle facilities.

2.2.12 Existing Easements

One 230 kilovolt (kV) transmission corridor runs from northwest to southeast through the Project Footprint and VFCL with an associated easement. In addition, two pipeline easements cross Conservation Lands: one natural gas pipeline crosses VFCL and SCRCL; and one petroleum pipeline crosses SCRCL.

2.2.13 Adjacent Land Uses

The adjacent land uses are primarily cattle ranching and open space. BLM lands almost completely surround the SCRCL to the south, east, and north, and the VFCL and VRCL to the east (Figure 6). The Panoche and Llanada communities are within two miles of the Project Footprint. The nearest rural community is Firebaugh, which is approximately 15 miles from the perimeter of the Project Footprint. There are relatively small areas of agricultural development south of VFCL and west of SCRCL consisting of approximately 160 acres of irrigated crops and a small dairy along Panoche Road. There is no urban development on the Conservation Lands or surrounding area.

2.3 Site-Specific Conservation Land Descriptions

2.3.1 Valadeao Conservation Lands

General Description

The VRCL are contiguous with the Project Footprint directly to the west, east, and northeast of the site. These lands are also contiguous with the Valley Floor and SCRCL. VRCL include several seasonal drainages. The property is dominated by introduced annual grasslands (approximately 6,700 acres) and ephedra shrubland (approximately 2,700 acres), and also supports atriplex shrubland and juniper and oak woodlands.

Soils

Soils on this site range from sandy to sandy loam to clay loam to badlands. There are 10 major soil units that make up the VRCL. These soils are Panhill loam, Panoche loam, Nodhill-Wisflat-Rock outcrop complex, Los Banos clay loam, Kettleman loam, Kettleman soils, Shedd loam, Vallecitos rocky loam, Yolo gravelly loam and Yolo loam.

Panhill loam and Panoche loam are formed on the alluvial fan surfaces at the base of the Panoche Hills. The Nodhill-Wisflat-Rock outcrop complex is found on escarpments on mountain slopes while Los Banos clay loam has slopes from 2 to 15 percent and is found on alluvium terraces. Kettleman loam and Kettleman soils are strongly sloping to steep and occur in hilly to mountainous uplands. Shedd loam and Vallecitos rocky loam are made of weathered sandstone and shale and are found on hills and mountains. Lastly, Yolo gravelly loam and Yolo loam are found in close proximity to Las Aguilas Creek and was formed on the alluvial fan deposits derived from the Las Aguilas Mountains (NRCS 2015).

Topography

The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent—preferred slopes for several of the Covered Species discussed in this document.. Elevations on the VRCL range from approximately 1,400 feet to 2,100 feet above mean sea level (AMSL). The lower slopes and flats are typically grazed by cattle, whereas some of the higher elevation area is grazed by sheep.

Hydrology

The VRCL support seasonal streams, washes, and drainages, all of which are only seasonally wet or wet only during rain events. Las Aguilas and South Fork Creek are two of the largest drainages found within the VRCL. Smaller washes and drainages feed these larger creeks. Habitat for aquatic species and amphibians within these creeks includes man-made stock ponds and ephemeral pools.

Distribution of Biotic Habitats

The VRCL are contiguous with the Project Footprint directly to the west, east, and northeast of the site. These lands are also contiguous with the VFCL and SCRCL. The VRCL is the most diverse in terms of biotic habitats found on the Conservation Lands. The property is dominated by Annual Grassland (approximately 6,700 acres) and ephedra shrubland (approximately 2,700 acres), and also supports Saltbush Shrubland, and Juniper and Oak Woodlands. ephedra shrublands occur in Las Aguilas Creek, an arroyo-like wash at the southwestern edge of the VRCL, in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, along other ephemeral drainages, and steep rocky and thin-soiled south-facing slopes. There is evidence that it was more widespread on the western face of the Panoche Hills prior to a widespread fire that swept this area within the last decade, leaving many large *E. californica* stumps.

Covered Species observed (either directly or by their sign) on the VRCL include CTS, GKR, San Joaquin antelope squirrel (SJAS), and SJKF. Portions of the VRCL were found to be suitable for BNLL, GKR, CTS, SJAS, and SJKF in differing acreage amounts. The VRCL also support one known CTS breeding pond and estivation habitat for an additional known CTS breeding pond located on private land. This breeding pond and estivation habitat for both ponds will be preserved in perpetuity and will increase the mitigation value for CTS.

2.3.2 Valley Floor Conservation Lands

General Description

The VFCL are contiguous with the Project Footprint, and are primarily non-native annual grassland habitat, with some seasonal ponds and vernal and ephemeral pools, as well as segments of seasonally dry Panoche and Las Aguilas Creeks. The VFCL include the entire 100-year floodplain within the previously larger Project Footprint boundary on the valley floor as well as an additional SJKF movement corridor, GKR avoidance areas, and BNLL avoidance buffers. These lands are currently grazed, which may enhance the habitat for special-status species, and this site will continue to be grazed under adaptive management as a tool for further enhancement of habitat for Covered Species.

Soils

There are five main soil units identified by the National Resource Conservation Service within the VFCL (NRCS, 2015). The soil units include the Panhill loam and Panoche loam formed on the alluvial fan surfaces at the base of the Panoche Hills; the Panoche sandy loam and Panoche loam in the central Panoche Valley; and the Yolo gravelly loam and Yolo loam found in close proximity with Las Aguilas Creek and was formed on the fan deposits derived from Las Aguilas Mountains (NRCS 2015).

The Panhill loam soil unit consists primarily of an equal mixture of sand-silt-clay with moderate high shrink-swell potential, moderate corrosion potential against unprotected steel, and high corrosion potential for concrete (AEG, 2010). The Panoche soil complex consists primarily of loam and sandy loam with a moderate shrink-swell potential, moderate corrosion potential against unprotected steel, and low corrosion potential for concrete (AEG, 2010). The Yolo soils located on the west side of the valley consist of a an even mixture of sand-silt-clay loam and gravelly loam with a low to moderate shrink-swell potential, low corrosion potential against unprotected steel, and low corrosion potential for concrete (AEG, 2010).

Topography

The VFCL is found within the Panoche Valley, a gently southeast sloping plain. Drainage from the surrounding hills is directed to a few incised channels that connect to Panoche and Las Aguilas Creeks which cross the VFCL. The VFCL is generally flat to gently sloping (generally less than one percent) toward the two aforementioned creeks.

Hydrology

The VFCL support seasonal streams, washes, and drainages, all of which are seasonally wet or wet only during rain events. Panoche Creek and Las Aguilas Creek are the largest drainages within the VFCL. Smaller washes and drainages feed these larger creeks.

Panoche Creek traverses the southern portion of the VFCL for approximately 18,700 feet. The main stem of the drainage is crossed by a bridge on Little Panoche Road, which runs north/south through the Study Area. Panoche Creek flows out of the Panoche Valley between the Panoche Hills and Tumey Hills, and northeast into the San Joaquin Valley.

Las Aguilas Creek flows into the VFCL from the west and then turns south/southeast until its confluence with Panoche Creek. In the central portion of the VFCL, Las Aguilas Creek appears to be sheetflow due to the loss of any definable channel. This drainage exhibits a bed and bank channel just prior to the confluence with Panoche Creek.

In addition to Panoche and Las Aguilas Creeks, there is an unnamed tributary of Las Aguilas Creek located within the VFCL. This unnamed drainage flows into the VFCL from the north and flows south to its confluence with Las Aguilas Creek. As with Panoche and Las Aguilas Creeks, smaller washes and drainages feed this unnamed drainage feature.

Distribution of Biotic Habitats

The VFCL are contiguous with the Project Footprint and are primarily non-native annual grassland habitat with some seasonal ponds and vernal and ephemeral pools, as well as seasonally dry Panoche and Las Aguilas Creeks. The VFCL include the entire 100-year floodplain within the Project boundary on the valley floor.

The VFCL supports several seasonally flooded pools and stock ponds, predominantly in the northern portion of the VFCL in the unnamed tributary of Las Aguilas Creek. Habitat for aquatic species and amphibians within the VFCL is limited to the few stock ponds and ephemeral pools.

Covered Species observed (either directly or by their sign) on the VFCL include GKR, SJAS, and SJKF.

2.3.3 Silver Creek Ranch Conservation Lands

General Description

During the DEIR public comment period, the Applicant consulted with the County, CDFW, USFWS, and various experts regarding additional possible mitigation for unavoidable impacts to sensitive biological resources. The Applicant then identified and secured the rights to permanently preserve and manage additional Conservation Lands in the Panoche Valley known as the Silver Creek Ranch.

The SCRCL are southeast of the Project Footprint (Figures 2 and 6). The northwestern-most corner of the SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet AMSL. Annual Grassland comprises the majority of ground cover on the site (approximately 8,400 acres) and is dominated by non-native species distributed sparsely over the landscape; the site also supports ephedra shrubland (approximately 2,260 acres), riparian areas, seeps, springs, and barrens. An area of tamarisk shrubland occurs along Silver Creek and small areas of emergent wetlands and marsh occur along Panoche Creek. These lands include several seasonal drainages and upland habitat as well. A full description of the biotic habitats of the Project and associated Conservation Lands is provided in Section 2.1.1. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well-drained and moderately permeable. SCRCL contain approximately 5,765 acres with slopes between 0 and 11 percent. While these lands are currently grazed, overutilization of range has been identified as a threat as well as a potential management tool that reduces cover of non-native annual grasses and other vegetation (USFWS 1998). If not controlled, dense annual vegetation can result in a reduction of habitat quality for many of the Covered Species. Grazing will continue as a management tool to maintain and enhance habitat for Covered Species.

Covered Species observed (either directly or by their sign) on the SCRCL include GKR, BNLL, SJAS, and SJKF. While no CTS have been observed on the SCRCL, no protocol-level CTS surveys have taken place to date on this property. Dr. Mark Jennings (herpetologist and fisheries ecologist) identified several ephemeral ponds on the SCRCL that could serve as suitable CTS breeding habitat.

Soils

There are five main soil units identified by the National Resource Conservation Service within the VFCL. The soil units include Kettleman loam, Kettleman soils, Panhill loam, Panoche loam, and Panoche sandy loam (NRCS 2015).

Panhill loam and Panoche loam formed on the alluvial fan surfaces at the base of hills; the Panoche sandy loam and Panoche loam in the central valley areas; Kettleman loam, and Kettleman soils are strongly sloping to steep and occur in hilly to mountainous uplands (NRCS 2015).

Topography

Elevations on the SCRCL range from 900 to 2,200 feet AMSL. The SCRCL contains approximately 5,765 acres of land with slopes between 0 and 11 percent. In addition, there are areas within SCRCL that have slopes up to 50%. In the northwestern portion of the SCRCL there is a sloping plain with drainage from the surrounding hills directed to the incised channel of Panoche Creek.

Hydrology

The SCRCL contain a large network of ephemeral creeks that are dry in the summer. These smaller washes and drainages feed larger creeks located within the SCRCL. Habitat for aquatic species and amphibians within these creeks includes some man-made stock ponds, ephemeral pools, and Panoche and Silver Creeks.

Panoche Creek traverses the northern portion of the SCRCL. This main stem drainage maintains a perennial flow as it flows across Panoche Road and then outside the northern boundary of the SCRCL toward the San Joaquin Valley. Silver Creek flows into the SCRCL from the south flowing north along the southeastern boundary of the SCRCL for approximately 8,000 feet.

Distribution of Biotic Habitats

On the SCRCL, Annual Grassland is the predominant habitat (Figure 5). On the SCRCL, Annual Grassland occurs primarily on the lower slopes of the Griswold and Panoche Hills and valley bottoms, and are largely composed of non-native annuals. Grassy cover was seldom observed to exceed 20 percent, giving the area a sparsely vegetated, somewhat desert-like, appearance. In years where precipitation is not as plentiful as it was in 2010, much of the area classified as Annual Grassland may appear to be relatively barren of plants.

On the SCRCL, plant associations that were noted to occur within the ephedra shrublands include *Eriogonum fasciculatum – Ephedra californica* scrub, *Eastwoodia elegans – Ephedra californica* scrub, *Gutierrezia californica – Ephedra californica* scrub, *Ericameria linearifolia – Ephedra californica* scrub, and *Eriogonum fasciculatum – Hesperoyucca whipplei* scrub. Typically, the upland shrub assemblage at the SCRCL is neither dense nor diverse.

On the SCRCL, areas classifiable as true "Barrens" are commonly embedded within Annual Grassland on south-facing slopes and ridge areas, in both the Griswold and Panoche Hills.

On the SCRCL, riparian stands associated with seasonally or perennially moist substrates, including seeps and springs, appear to be very rare and unevenly distributed within the area. Riparian habitats occur along Panoche and Silver Creek. The riparian habitat community on Silver Creek where it briefly intersects the SCRCL indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. An extensive portion of the riparian corridor, including on the SCRCL, has become dominated by invasive tamarisk (*Tamarix* sp.), and is classified as Tamarisk Semi-Natural Shrubland. Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot-wide corridor. The population extends well off-site both upstream and downstream. In this area, saltgrass appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

The small area of riparian woodland located south of Panoche Road is confined to the first terrace outside the saturated zone. The woodland canopy is degraded *Populus fremontii* Woodland/Forest Alliance and includes a significant presence of red willow (*Salix laevigata*) where it is most dense. The stand consists of many mature trees and snags but there is no understory and no recruitment of native saplings has occurred, presumably because of intense livestock activity.

Habitats at springs and seeps typically support plant species that are dependent on a reliable source of shallow groundwater to survive the annual dry period (typically May-October), and the vegetation extent would be expected to narrowly adhere to the physical characteristics of the wetted zone. Plant associations adjacent to these resources would be subject to continuation of livestock grazing utilized to manage the SCRCL to benefit Covered Species. No flowing springs were found in upland areas during the September 2010 survey. Evidence of seep zones that provide ephemeral flows and sustained root zone moisture in an upland setting was found only within one relatively deeply incised canyon near the southern survey edge. At the floor of this canyon, a small area of well-developed episalic crust was found at a clear shift from shrublands to dominance by saltgrass (*Distichlis spicata*).

Panoche Creek was observed to be completely dry and largely devoid of plants for at least three miles upstream of the site. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent Typha marsh (*Typha* Herbaceous Alliance) centrally, and *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge.

Two constructed ponds were identified on the SCRCL. Constructed water tanks and troughs for livestock are more common on the SCRCL, as the area appears to be largely devoid of naturally occurring, fresh surface water during the normal dry season.

2.3.4 Regional Conservation Importance

The Conservation Lands were specifically selected due to the presence of threatened and endangered species and their proximity to large, contiguous blocks of lands administered by the BLM. This natural area is known to support substantial populations of state and/or federally-listed species including SJKF, GKR, BNLL, and SJAS; four species that will benefit from the implementation of this plan. Additional state- and federal-listed species that are present in the region in lower numbers and that will benefit from management of these Conservation Lands include California tiger salamander (CTS; *Ambystoma californiense*), California condor (CACO; *Gymnogyps californianus*), and several branchiopods species such as Vernal Pool Fairy Shrimp (VPFS; *Branchinecta lynchi*), and possibly Longhorn Fairy Shrimp (LHFS; *Branchinecta longiantenna*), Conservancy Fairy Shrimp (CFS; *Branchinecta conservatio*) and Vernal Pool Tadpole Shrimp (VPTS; *Lepidurus packardi*).

The Project and the Conservation Lands are located within a portion of the Ciervo-Panoche Natural Area, an area that has long been a focus of conservation for several of the regionally listed species. Unlike the two remaining core habitat areas for the listed desert species (Carrizo Plain and western Kern County), the Panoche Valley lies relatively far to the north (approximately 200 km). This results in different environmental conditions (e.g. rainfall patterns). Therefore, having much of the Panoche area permanently protected would buffer populations against stochastic events that could cause extinction in the southern core areas.

The Panoche Valley area is also critical for maintaining connectivity between habitat areas to the north and south. This connectivity is particularly crucial for San Joaquin kit foxes. Lands to the west of the region are generally too rugged with unsuitable vegetation communities and that cannot serve as effective movement corridors. Lands to the east have almost all been converted to agriculture and are not conducive to migration by foxes and other sensitive species. Thus, it is important to maintain a viable north-south linkage for San Joaquin kit fox in the Panoche Valley region.

The Silver Creek Ranch is specifically identified in the Recovery Plan for Upland Species of the San Joaquin Valley (Recovery Plan, USFWS 1998) and the Recovery Plan 5-year Reviews (USFWS 2010a, 2010b, 2010c) as an area with high habitat value for Threatened and Endangered (T&E) Species. The Recovery Plan also identifies BLM's program of acquisition in which the Silver Creek Ranch is one of the two main ranches targeted for purchase. The Recovery Plan, in reference to GKR, also has a goal to "protect all existing natural land on the Silver Creek Ranch…" (Page 95). In reference to BNLL, the Recovery Plan aims to "protect additional habitat for them in key portions of their range; areas of highest priority to target for protection are: … Natural lands in the Panoche Valley area of Silver Creek Ranch, San Benito County" (Page 122). By preserving the SCRCL, the Action will preserve a "highest priority" area identified in the Recovery Plan for these listed species that is currently unprotected.

The proposed management activities on the Conservation Lands will contribute to recovery goals established by the USFWS for some of the Covered Species. Specifically, protection, enhancement, establishment, management, and monitoring of these Conservation Lands will contribute towards the following Recovery Tasks in the Recovery Plan (USFWS 1998):

- Protect natural lands in the Ciervo-Panoche Natural Area (Priority 1; Tier 2 – Task 2.1.14);
- Protect grass and shrubland communities on western Valley edge, Santa Nella to Panoche Creek (Priority 2; Tier 4 – Task 5.3.4).

The permanent conservation and subsequent enhancement, management, and monitoring of these Conservation Lands will include gathering of data that could additionally contribute toward several broad tasks related to species conservation, including the following:

- Conduct censuses for SJKF and monitoring for multiple animal species in the Ciervo-Panoche area (Priority 2; Tier 4 – Task 4.38);
- Access for survey, census, demographic, and other studies (Multiple species; various tasks).

2.3.4.1 Habitat Corridors

Management actions that protect, maintain, and enhance the Conservation Lands and corridors between habitat areas on and between the VFCL, SCRCL, and VRCL will create a network of Conservation Lands that complements and provides important linkages to other protected lands (e.g., adjacent BLM lands), lands supporting Covered Species, and regional conservation efforts (Figure 8). These corridors include:

A north-south corridor of natural habitat that passes through the project will be protected from disturbance (with the exception of the existing road, emergency access crossing, and the planned project perimeter road) during project construction,operations and maintenance.

A 500 meter- (1,640.4 feet) wide and approximately 2,484 meter- (8,000 linear feet) long east-west corridor associated with the existing Las Aguilas Creek /VFCL corridor has been included in the Project and will be beneficial in providing additional undisturbed connectivity. The corridor will promote movement through the site and provide access to the Panoche Hills and BLM lands to the north. The undisturbed VFCL along Las Aguilas Creek will be widened to accommodate this SJKF corridor enhancement.

The Panoche Creek Corridor and associated VFCL intersects the southern portion of the VFCL in a west to southeast direction. This corridor provides connectivity to the large block and high quality habitats (e.g., grassland flats) to the west of the project including the Gabilan Range and eventually through to the SCRCL and the BLM lands beyond. The southern portion of the VFCL also provides unimpeded west-to-east travel corridors from the Panoche Creek wash (and adjacent flats) to the VRCL and adjacent Tumey Hills/Panoche Hills BLM landholdings including the Las Aguilas Creek drainage.

The Moss-Panoche 230kV Transmission Line Corridor bisects the southwestern portion of the project footprint and associated VFCL in a northwest to southeast direction. This 22.48-meter (75 feet) corridor provides connectivity to the habitats (e.g., grassland flats, Panoche Creek wash) to the west of the project including the Gabilan Range and eventually through to SCRCL and adjacent BLM landholdings.

3.0 Activities To Be Completed Prior to Long-term Management

All Conservation Lands protection, restoration, enhancement, relocation, and monitoring activities will be subject to the stipulations contained in permits issued for the project including the BO and the ITP.

The Conservation Easement(s) will be granted and recorded on the Conservation Lands consistent with BO and ITP requirements. The purpose of the Conservation Easement(s) is to preserve and protect the Conservation Lands in perpetuity consistent with the requirements and prohibited activities contained in the easements. The responsibilities held by the grantee of the easements will be funded through the establishment of an endowment. The Conservation Easement grantee will be an entity approved by CDFW and USFWS. Conservation Lands will be managed for the benefit of the various habitats and species according to this HMP and the best available science.

The remainder of this section describes the general methods for implementation of mitigation activities that are to be completed prior to start of the Long-Term Management, or that are not part of long-term management activities described later in this document. These activities will be directed by the Restoration Biologist and implemented by a contracted entity, the Restoration Contractor. A portion of this restoration and enhancement work was originally described in the Wetland Mitigation Monitoring Plan (WMMP) attached as Appendix E. These immediate mitigation activities include trash and debris removal, CTS pond creation, vernal pool enhancement, and riparian restoration through cattle exclusionary fencing (Figure 12). All mitigation activities will be designed to avoid impacts to nesting birds and listed species.

3.1 Removal and Enhancement of Seven Debris Dump Sites

3.1.1 Action

PVS has identified seven areas on the Conservation Lands where debris (trash) dumping has occurred. Debris in these areas includes scrap metal, tires, appliances, and other large debris. As part of the WMMP, the Applicant will remove debris from these areas allowing the natural environment to restabilize. Once the debris is removed, the Restoration Contractor will seed the area as deemed necessary by the Restoration Biologist, with a locally sourced native seed mix. The planting methodologies and plant palettes that will be implemented are described in detail in the Habitat Restoration and Revegetation Plan prepared by AMEC Foster Wheeler in May 2015. The seed mix that is to be used for debris removal areas within disturbed channel areas can be seen in Table 3 below. Seeding the area will decrease soil erosion and siltation, which will ultimately enhance the upstream and downstream drainages of the debris dump sites. Using local seed sources will increase likelihood that the plants will be well adapted, thus increasing restoration success and supporting the health and sustainability of local populations of these species. Removal of the debris will enhance the area associated with approximately 19,386 square feet (0.44 acre or approximately 652 linear feet) of aquatic habitat by removing debris and reseeding where it is deemed necessary. At the discretion of the Restoration Biologist in areas where seeding occurs, a temporary exclusion fence to deter cattle grazing may be installed for a minimum of six months, or until the Restoration Biologist determines successful growth of seeded plants.

Table 3. Seed Mix for Channel and Sloped Areas

Botanical Name	Common Name	Life Cycle	Mature Height (feet)
Distichlis spicata	Saltgrass	Perennial	1.1
Heliotropium curassivicum	Salt heliotrope	Perennial	0.5
Nassella pulchra	Purple needlegrass	Perennial	3

Poa secunda	One sided bluegrass	Perennial	1.5
Croton setigerus	Dove weed	Annual	1.5
Deschampsia danthonioides	Annual hairgrass	Annual	1.5
Eschscholzia caespitosa	Tufted poppy	Annual	1
Lasthenia californica	Goldfields	Annual	0.5
Lotus wrangelianus	California lotus	Annual	1.5
Lupinus succulentis	Arroyo lupine	Annual	2
Triclostema lanceolata	Vinegarweed	Annual	1.5
Vulpia microstachys	Annual fescue	Annual	1.5
Substitute Species	**Common Name**	**Life Cycle**	**Mature Height (feet)**
Bromus carinatus	California brome	Perennial	3
*Cynadon dactylon***	Bermuda grass	Perennial	1
*Lolium multiflorum***	Italian rye grass	Annual	2

**denotes non-native species

All debris will be removed by hand or by mechanical equipment (e.g.,track hoe) to a truck-mounted container using pre-existing roadways. Once removed, the debris will be disposed of according to federal, state, and local regulations and taken to an approved permitted landfill or recycling center. Any debris deemed potentially hazardous will be dealt with in an approved manner so as not to further harm the environment. Any heavy equipment (e.g., backhoe, crane) utilized to remove the debris will be operated outside the top of banks to preserve bank stability and decrease erosion potential. If it is determined during implementation that removing the debris would cause instability in the drainage or displace sensitive species that have created artificial habitat in the debris, the material will be left in place. While complete removal may not be feasible, any removal of potentially harmful debris material from these areas will be an overall benefit for the identified stream channels and to the wildlife which occupy the riparian areas.

3.1.2 Rationale

Seven areas have been identified on the Conservation Lands where unpermitted landfill dumping has occurred (Figure 16). These areas are laden with scrap metal, tires, appliances, and other large debris. As part of this HMP (and described in detail in the WMMP), the debris from these areas will be removed and the area reseeded with locally sourced native plants to decrease soil erosion and siltation and ultimately enhance the drainages and channels downstream of the removal sites. Reseeding will also enhance native plant populations and create potentially suitable high quality habitat for native animal species. Removal of the debris and potential reseeding will result in the enhancement of approximately 0.44 acres of aquatic habitat and help restore the natural stability of the channel.

3.1.3 Risks/Challenges

Due to the amount of time the debris has been situated within each respective stream channel, slight erosion along the stream channel may occur as a result of debris removal. If during the removal process the designated biologist is concerned that the removal of certain debris will lead to greater issues within the channel (i.e., increased erosion or bank instability), these items may be left within the channel to protect stream stability.

Debris removalsites will be monitored after large rain events (defined as greater than 0.5 inches of precipitation in a 24-hour period) for the first two years, than annually during the wet season for the next three years to document any changes to bank stability (i.e., erosion concerns). Observations from monitoring shall be provided to the Land Manager and CDFW in the annual report.

3.1.4 Implementation Details

All debris will be removed by hand or mechanical equipment (e.g., track hoe) to a truck-mounted container using pre-existing roadways. Once removed, the debris will be disposed of according to federal, state, and local regulations and taken to an approved, permitted landfill or recycling center. Any debris categorized as hazardous waste will be dealt with in an appropriate manner so as to not cause further harm to the environment. During implementation, if it is determined that removing the debris would cause instability in the creek, then the material will remain in place.

Prior to the debris removal process, a pre-disturbance survey will be conducted by an agency-approved biologist or their representative. The biologist(s) shall identify and clearly mark the location of special-status species and their dens, burrows, or habitats for the purpose of avoiding those areas. If necessary, buffers will be established with highly visible markers. Furthermore, the Restoration Biologist or their representative shall be present while ground-disturbing activities are occurring. In addition to conducting preconstruction surveys, the biologist(s) shall aid debris removal crews in satisfying take avoidance criteria and implementing mitigation measures; document all pertinent information concerning effects on special-status species; and assist in minimizing the adverse effects of the debris removal on special status species.

Debris Removal Areas #1a and 1b are located on the VRCL east of the Project Footprint and are comprised of two smaller areas of debris at 36°38'54.98"North and 120°49'43.47"West. The Applicant will remove the debris and enhance approximately 537 ft^2 (0.012 acre) of land. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance the area associated with approximately 73 linear feet of stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal areas.

Debris Removal Area #2 is located on the SCRCL southeast of the Project Footprint at 36°33'50.93"North and 120°45'10.83"West. This debris pile is comprised of an old metal water tank that has been discarded within an ephemeral drainage and appears to be blocking the natural flow. The Applicant will remove debris and enhance approximately 0.008 acre of land. Removal of this debris pile coupled with bank stabilization, if necessary, will enhance the health and integrity of drainage downstream of the debris removal location. This debris dumpsite is located within an incised stream channel.

Removal of this debris will enhance approximately 23 linear feet of stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal area.

Debris Removal Area #3 is located on the VRCL east of the Project Footprint at 36°39'12.66"North and 120°49'24.39"West. This debris pile is located directly within an ephemeral drainage and is comprised of discarded water tanks. The applicant will remove debris and enhance approximately 67 ft^2 (0.002 acre) of the drainage. Removal of the debris within the drainage will enhance the health and integrity of the drainage. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 17 linear feet of stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal area.

Debris Removal Area #4 is located on the SCRCL southeast of the Project Footprint. This large debris pile sits directly south and adjacent to Panoche Creek at 36°35'7.57"North and 120°47'12.04"West. This debris pile is comprised of old tires, appliances, household debris, abandoned automobiles, etc. The Applicant will remove debris and enhance approximately 12,416 ft^2 (0.28 acre) of land. Removal of this debris pile coupled with bank stabilization will enhance the health and integrity of Panoche Creek both upstream and downstream of the debris pile. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance the area associated with approximately 328 linear feet of stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal area.

Debris Removal Area #5 is located on the VRCL north/northeast of the Project Footprint at 36°40'55.64"North and 120°51'23.55"West. This debris pile is comprised of old tires and other ranch-related debris and is located within an ephemeral drainage. Removal of the debris will enhance approximately 5,096 ft^2 (0.116 acre) of the ephemeral drainage. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance the area associated with approximately 164 linear feet of stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal area.

Debris Removal Area #6a is located on the VRCL southeast of the Project Footprint at 36°36'30.11" North and 120°48'12.97" West. This debris pile is comprised of old tires, appliances, household debris, etc. The Applicant will remove debris and enhance approximately 734 ft^2 (0.017 acre) of land. Removal of this debris pile coupled with bank stabilization will enhance the health and integrity of the ephemeral channel both upstream and downstream of the debris pile. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance the area associated with approximately 22 linear feet of the stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal area.

Debris Removal Area #6b is located approximately 120 feet northeast of Debris Removal Area #6a on the VRCL southeast of the Project Footprint at 36°36'31.09" North and 120°48'11.94" West. This debris pile is comprised of old household appliances, fencing material debris, metal scraps, old water troughs, etc. The Applicant will remove debris and enhance approximately 66 ft^2 (0.001 acre) of land. Removal of this debris pile coupled with bank stabilization will enhance the health and integrity of the ephemeral drainage both upstream and downstream of the debris pile. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance the area associated with approximately 10 linear feet of stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal area.

Debris Removal Area #7 is located on the VRCL north-northeast of the Project Footprint at 36°36'51.76"North and 120°48'18.91"West. This debris pile is comprised of old tires and other ranch-related debris and is located within an ephemeral drainage. Removal of the debris will enhance approximately 130 ft^2 (0.003 acre) of the ephemeral drainage. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance the area associated with approximately 15 linear feet of stream channel. If practicable, reseeding with native seed will further enhance the habitat in the trash removal area.

3.1.5 Monitoring Objectives, Performance Criteria, and Methods

Monitoring Objective

To monitor conditions during and after the removal of debris from dumping sites on the Conservation Lands.

Performance Criteria

A biologist will indicate all debris has been removed (unless specifically left in the creek channel to maintain stability). Annual qualitative assessments will be conducted to determine whether the erosion potential is similar to other areas within the channel. This qualitative assessment will also determine whether the post-removal contours, elevations, and the slope and the stability of the stream channel(s) are consistent with the areas directly upstream and downstream of the debris removal areas. The final portion of the assessment will confirm that no significant post-removal contours exist that could potentially obstruct stream flow.

Additional performance standards for the debris removal areas include:

- The acreage of ephemeral drainages enhanced must equal 0.39 acres (17,173 ft^2);
- The elevation of the streambed of the ephemeral drainages where the debris is removed must be lower than the upstream streambed and must be higher than the downstream streambed such that when water is flowing there is no obvious impediment to or obstruction;
- All debris shall be removed from within the enhanced federally jurisdictional ephemeral drainages, unless the USACE provides written approval that some debris may be retained to maintain stability of the drainage.
- The performance standard for the vegetation in the debris removal areas includes:
    1. By year 3, the enhanced ephemeral drainages will have an absolute cover of plant species equal to a minimum of 50% of the absolute cover of reference sites upstream and downstream of the enhanced area within the same ephemeral drainage, reference sites are available immediately downstream or upstream that have the same characteristics as the debris removal site;
    2. By year 5, the enhanced ephemeral drainages will have an absolute cover of plant species equal to a minimum of 85% of reference sites upstream and downstream of the enhanced area within the same ephemeral drainage if reference sites are available immediately downstream that have the same characteristics as the debris removal site.
- The number and relative cover of invasive plants, which are not considered common and abundant by the Project's Weed Control Plan plants, in the enhanced ephemeral drainage must be equal to or less than the number and relative cover of invasive plants in the reference sites within the same ephemeral drainage upstream and downstream of the enhanced area.

- The number and relative cover of hydrophytic plants (i.e. FAC, FACW, OBL) in the enhancement areas must meet or exceed the number and relative cover in the reference sites in the upstream and downstream portion of the same drainage if reference sites are available immediately downstream or upstream that have the same characteristics as the debris removal site.

Methods

Prior to the removal of the debris, photo points will be established in appropriate locations and photos taken to provide baseline conditions. During the removal process, a monitor will observe the process to document all debris that is removed. Once the debris is removed, the Restoration Contractor will reseed with a locally sourced native seed mix in the debris removal area as deemed necessary by the Restoration Biologist in coordination with CDFW to prevent erosion and help re-establish the native vegetation structure. At that time, additional photographs will be taken from the photo points to be included in the annual report. Photos taken at the pre-established photo-point locations will document success of debris removal at each of the debris areas. If significant erosion is observed and/or no revegetation is observed, additional seeding or other stabilization methods (e.g., non-toxic chemical stabilizers, straw mulch) may be employed as deemed necessary by the Restoration Biologist. In addition, during the photo-point assessments, any observations of non-native, invasive plant species in the enhancement areas will be noted and mapped for inclusion in the annual report.

3.2 Partial Livestock Exclusion to Restore Native Vegetation and Riparian Areas to Portions of Panoche Creek

3.2.1 Action

The Restoration Contractor will install approximately 0.35 mile of fencing in addition to the existing 0.47 mile of fence to exclude cattle from grazing in approximately 11.16 acres of waters of the State for a majority of the year. Approximately 5.81 acres of the 11.16 acres of waters of the State that are present within this area of Panoche Creekare also categorized as federally jurisdictional waters. Livestock exclusion will allow for revegetation of riparian areas along the banks and slopes while also decreasing erosion and siltation. This exclusion of livestock is expected to improve the health and integrity of Panoche Creek and downstream functions and values by directly enhancing approximately 1,748 linear feet of the stream channel.

3.2.2 Rationale

Certain areas along creeks and drainages within the Conservation Lands are experiencing erosion due to heavy livestock grazing, which is adding to the siltation of these features. Vegetation within these grazed areas has been reduced to remnants of riparian habitat with little understory development or recruitment of native species.

3.2.3 Risks/Challenges

The removal of grazing pressure could lead to an increase in invasive species density and cover that have the ability to thrive in disturbed habitats.

3.2.4 Implementation Details

Through an adaptive management program, grazing livestock (cattle, sheep, horses) and feral animals (e.g., feral pigs) will be strategically kept out of the exclusion areas for the majority of the year. Transect assessments will be conducted to evaluate the success of the livestock exclusion. If the results of the transect assessments do not meet success criteria, locally sourced native vegetation will be planted to enhance these natural features andincrease the biotic value for local species. Livestock will be allowed to graze on the remainder of the Conservation Lands outside the exclusion area, but will be managed and monitored in order to maximize benefits to the special-status species that inhabit the Conservation Lands. To properly manage grazing practices, the applicable standards and guidelines included in the BLM's Central California Standards for Rangeland Health and Guidelines for Livestock Grazing (1999) are incorporated into the Grazing Management portions of this plan.

The effectiveness of the required activities will be evaluated by the Land Manager, qualified biologists, or appropriate personnel when reporting on the aforementioned mitigation plans. Any requirements found to be inadequate will be subject to adaptive management strategies and recommendations made in the annual report.

3.2.5 Monitoring Objectives, Performance Criteria, and Methods

Monitoring Objectives

The purpose of monitoring the exclusion areas is to improve and evaluate the exclusionary actions and their improvementsto the wetland and riparian habitat within the grazing exclusion area.

Performance Criteria

Efforts will be made to find a potential reference site for the livestock exclusion area that is within the vicinity of the exclusion area (4 mile radius). If a reference site is located, the woody stem, shrub and tree species will be assessed for the number of species from each group. From the assessment of the reference site, the livestock exclusion area will seek to have at least 20-30 percent of the total number of wood stem, shrubs, and tree species from the reference site. However, if an appropriate reference site cannot be located or accessed (landowner permission), the performance standard for the livestock exclusion area will seek to increase woody stem density or cover by at least 10 percent over baseline conditions within the exclusion area, which must equal 5.81 acres, as required by the mitigation plan, with the species available within the Panoche Creek riparian area within Silver Creek Ranch.

Cover of woody stem species including *Populus fremontii, Salix sp., Baccharis salicifolia, Atriplex lentiformis*, and other shrubs and trees found in the Panoche Creek riparian area within Silver Creek Ranch shall be increased by at least 10% over existing conditions. Non-native, invasive plant species populations will be managed per the Weed Control Plan so they do not impact the enhancement process within the exclusion area. Aerial cover estimates for trees and shrubs provide a reasonable gauge of plant community development five to 10 years after initial plant establishment. There will be a quantitative assessment to indicate that woody cover has exceeded 10 percent by the end of the five to 10 year time period.

Methods

The methods for the monitoring of the livestock exclusion area on a portion of Panoche Creek in the SCRCL (Figure 12) include:

- Measuring either woody stem density or cover of woody species within 15-m belt transect(s) on both sides of the stream, measuring from the outer edge of the cattails out onto the lower bench of the wash (i.e., where the cut bank is closer than 15 m, and only including the area up to the bottom of the bank).
- Counting either woody stems (to obtain density within the belt) or estimate cover within the area covered by the belt in year 1 (Note: advisable to compile both density and cover).
- Establishing photo points within the livestock exclusion area and in the grazed area adjacent to the exclusion area (either upstream or downstream in riparian habitat with similar existing structure) at 100-m intervals from both sides of the streambed, preferably at a distance of approximately 30 m from the stream edge. The same number of photo points should be established on both the grazed and exclusion areas. The purpose of photo points is to assess observable qualitative changes.
- Follow up by repeating 10-m belt transects in years 2 through 5.
- If the performance criteria has not been met:
    - by year 3, conduct a qualitative assessment to determine whether there are variables that are preventing the desired rate of establishment (e.g., hydrologic conditions and precipitation, invasive plant abundance, slower than expected growth and establishment of woody plant species)
    - by year 5, and the cover measurements are not increasing across years, consider other options such as active restoration by planting cuttings of woody species (*Salix* spp., *Populus fremontii*, *Baccharis salicifolia*, *Atriplex lentiformis*, etc.) collected from within Panoche Creek on Silver Creek Ranch using a planting plan prepared by a qualified botanist, restoration ecologist, or wetland specialist. A plan for implementation of remedial measures would be provided in the annual report.

- At the discretion of the specialist who prepares the planting plan, the width of the belt may be increased to accommodate a more extensive restoration area.
- During the belt surveys and the photo point assessments, any observations of non-native, invasive plant species in the enhancement area will be noted and mapped for inclusion in the annual report.

3.3 Creation of CTS Breeding Ponds

3.3.1 Action

PVS will construct up to three CTS breeding ponds meeting the following criteria in accordance with the attached *Panoche Valley Solar Farm California Tiger Salamander Mitigation Pond Proposal* (Appendix G).

3.3.2 Rationale

The CTS ponds will be created as compensatory mitigation requirements set forth by CDFW and USFWS to offset potential impacts to CTS during the construction of the Project.

3.3.3 Risks/Challenges

Created ponds are dependent on precipitation for inundation. It is uncertain as to whether there will be sufficient rainfall and appropriate retention of water needed for CTS breeding. The CTS mitigation ponds may require the construction of shallow diversion canals perpendicular to the slope to capture sheet flow and direct it to the ponds to allow the ponds to remain inundated for a sufficient length of time. Exfiltration rates are the ruling factor in sizing the pond(s), as these are many times higher than the evaporation rates during winter and spring. To reduce the amount of exfiltration, the *in-situ* native soil may be amended with a Bentomat 200R Geosynthetic clay liner that improves retention rates.

3.3.4 Implementation Details

As stated in the FEIR, impacts to the CTS shall be mitigated by providing habitat preservation, enhancement, and management in perpetuity at graduated ratios for upland estivation habitat.

Breeding habitats and suitable upland estivation habitat impacted within 640 meters (2,100 feet) of a known or potential breeding pond will be mitigated at a ratio of 3:1, suitable upland habitat located between 2,100 feet and 804.6 meters (2,640 feet) of a breeding pond will be mitigated at a ratio of 2:1, and suitable upland habitat located between 804.6 meters (2,640 feet) and 2,023 meters (6,636 feet) of a breeding pond will be mitigated at a ratio of 1:1. Preserved and permanently protected CTS estivation habitat shall be the same quality or better quality than the habitat disturbed and will be located on the VFCL, VRCL, and SCRCL. In addition, PVS will be creating new breeding habitat on the VRCL, which will be preserved and managed in perpetuity. The three potential ponds are discussed in greater detail below.

CTS Pond 1 is located on VRCL approximately 701 meters (2,300 feet) west-northwest of Pond #12, has a drainage area of approximately 0.44 square miles, and has 70 percent of the surface area of Pond #12. However, a higher rainfall as runoff capture ratio is expected for Pond 1 than for Pond #12 and it is expected to fill to 0.14 acre with a bypass spillway required for excess water to leave the pond and continue downhill. CTS Pond 1 is not expected to divert water that flows to the known CTS breeding pond (Pond #12). This is the preferred pond location, as this location will help to facilitate a breeding complex which may support genetic diversity and provide multiple breeding pond options for CTS in the vicinity.

CTS Pond 2 is located on VRCL approximately 610 meters (2,000 feet) south-southwest of Pond #12 andhas a drainage area approximately half the size of Pond #12. This site would support a pond of approximately 0.1 acre, with a maximum depth of just over one foot occurring in February. This pond would potentially need either an incised channel or diversion dam(s) in order to collect enough sheetflow into the pond. Currently, a piped spring fills a water trough here, and this piped spring may potentially be used to fill the pond in dry years and would return to watering the trough after the breeding season so it dries out. Pond 2 is not expected to capture water on its way downhill to the known CTS breeding pond (Pond #12). This would be a secondary location for a pond on the VRCL.

*CTS Pond 3*is approximately 270 meters (885 feet) away from Pond #12. This site is located approximately 120 feet from where an incised channel transitions into sheet flow. The Pond is fed by an ephemeral drainage to the northwest and has a watershed drainage area of 0.65 mi^2 (416 acres). The water budget analysis found that the drainage would support a pond of approximately 0.11 acre, with a maximum depth of 2.1 feet occurring during the month of February. Based on topographic information and aerial imagery the sheet flow contributing to Pond 3 won't have any negative impact on the flows contributing to existing Pond 12, despite their proximity.

A relocation program for individuals detected during preconstruction surveys and construction monitoring will be implemented during Project build-out, and with the conditional approval of the regulatory agencies, could potentially be used to help populate the areas of newly created CTS breeding habitat.

The objectives of potential CTS mitigation pond locations are listed below:

- Mitigation ponds will be no more than 3 feet deep.
- The ideal footprint for each of the mitigation ponds will be similar to that of Pond #12 (the known breeding pond located on the VRCL).
- Mitigation ponds will be ephemeral, filling in late fall, winter, and spring, and drying out by early June. Critical months of inundation are March–May.
- Mitigation ponds are desired to be inundated for five out of every ten years, with a minimum of three out of every ten years. Inundation will be determined by the extent of annual rainfall.

Total CTS pool creation will be approximately 0.50 acre. These ponds will be preserved and managed in perpetuity. CTS ponds will be monitored twice a year to determine inundation and depth and to remove potentially harmful plants and wildlife (i.e., non-native invasive plant species and bullfrogs; non-native naturalized grasses would not be removed). Please see Section 6.0 for additional information on monitoring details. Removal of potentially harmful plants and animals will be at the discretion of the Restoration Biologist. Non-native naturalized grasses would not be removed.

3.3.5 Monitoring Objectives, Performance Criteria, and Methods

Monitoring Objectives

Evaluate constructed CTS breeding pool(s) during the wet season and during drawdown period.

Performance Criteria

The construction of the three CTS breeding ponds will capture sufficient surface water runoff to fill the constructed ponds to approximately 3 feet (36 inches) during the wet season and will have continuous inundation for sufficient time for CTS larval development and metamorphosis (at least 10 weeks) for a minimum of 3 years of the 10 year monitoring period. Information regarding the duration and depth of inundation shall be documented with data loggers or continuous monitoring. Additional performance standards for the construction of the CTS breeding ponds include:

- The depth of the ponds shall be designed such that the ponds are inundated no more than 3 feet and will naturally dry-down no later than September of each year to preclude bullfrogs from colonizing the ponds and to successfully recruit metamorphs.

- Under average rainfall conditions the ponds will be inundated a minimum of 3 out of every 10 years.

- For all years in which ponds are not inundated for at least 10 weeks, average depth and duration of water in the mitigation ponds must be within the range of the reference Breeding Pond 12. Information regarding the duration and depth of inundation shall be documented with data loggers or continuous monitoring.

- Hydrologically, the performance standards are designed so that the three constructed breeding ponds will replicate the conditions observed in the reference pond (Pond 12, an existing CTS breeding pond). The approximate volume of the reference pond (Pond 12) will be estimated when dry or inundated depending upon the amount of annual rainfall for the study year and used a reference volume against the three created mitigation ponds. Success of the mitigation pond will be found sufficiently inundated if water volume and depth in created ponds is within 10-30% of the volume to size ratio for Pond 12 and within 10-20% of the of the planned 3 feet of planned inundation depth.

- Qualitative assessments will also be performed to determine whether the vegetation communities of the constructed ponds match those of the reference pond on the Conservation Lands. This includes percent cover of vegetation as well as species composition in terms of the distribution of native and invasive species within 30 meters of the reference pond.

- The performance standard for the vegetation of the constructed CTS also includes that:

    1. By year 3, the constructed ponds will have an absolute cover of plant species equal to a minimum of 50% of the absolute cover of the reference pond;

    2. By year 7, the ponds will have an absolute cover of plant species equal to a minimum of 75% of the absolute cover of the reference pond;

    3. By year 10, the ponds will have an absolute cover of plant species equal to a minimum of 95% of the absolute cover of the reference pond.

- The number and relative cover of invasive plants, which are not considered common and abundant by the Project's Weed Control Plan, in the mitigation ponds must be equal to or be less than the number and relative cover of invasive plants in the reference pond.

- The total number and relative cover of hydrophytic plants (i.e. FAC, FACW, OBL) in the constructed CTS breeding ponds must meet or exceed the number and relative cover in the reference pond.

- The constructed CTS breeding ponds shall meet the requirements of a wetland or other water as identified by the USACE in the 1987 Wetland Delineation Manual, Regional Supplement. A delineation of waters of the U.S. shall be completed by a qualified biologist and submitted to the USACE in years 5 and 10 of the monitoring period. The acreage of wetlands or other waters shall equal 0.5 acre, as required in the mitigation plan.

Methods

The methods for monitoring the constructed CTS breeding pond(s) include:

- Monitoring the structural components of the pond and associated structures. Due to the presence of livestock, which will be allowed to graze in the area of the pond, there is a possibility that the livestock could damage the pond which could impact the effectiveness of the pond to retain water. However, livestock grazing has also been associated with increased vernal pond water retention (Marty 2005). Temporary fencing to exclude livestock from grazing may be used to protect the pond. Any damage will be repaired outside the rainy season to avoid impacts to CTS.
- Tracking of rainfall during the rainy season (November through March) within the Project area to determine the rainfall amount for the five-year monitoring period and how it compares to the long-term average.
- Establishing photo points preferably at a distance of approximately 30 m from the pond edge and taking photographs during the rainy season and at the end of the rainy season to document proper seasonal dry-down of the pond. The purpose of photo points would be to assess observable qualitative and quantitative changes.
- Following-up with repeat surveys during a typical rainfall year to assess the pond's ability to hold water for at least 10 weeks, which is the minimum amount of time to successfully recruit metamorphs from the pond(s). In addition, there

will be a survey during the dry season to document if the pond(s) are ephemeral, filling in late fall, winter, and spring, and drying out by early June to determine adequate dry-down and confirm that no colonization by bullfrogs (a predator of CTS) has occurred.

- Sampling for the presence of CTS eggs and/or larvae.

3.4 Vernal and Ephemeral Pool Enhancement

3.4.1 Action

PVS will enhance approximately 0.05 acre of vernal pools within the VFCL to offset the impacts to two vernal pools (0.05 acre) from the Project. Enhancement of vernal pools will consist of seeding existing pools within the VFCL with a local seed source. A minimum of two pools (each with an enhancement area of approximately 0.025 acre [1,089 ft^2]) will be enhanced to offset impacts to pools within the Project Footprint. Enhancement activities will be conducted on pools that have been degraded by livestock grazing, rangeland activity, and other sources of environmental stress. The seed collection should be conducted to not substantially impact the existing pools on-site. Source pools should not be in the same locations as the reference pools used for monitoring.

3.4.2 Rationale

The vernal and ephemeral pool enhancement will be completed to comply with compensatory mitigation requirements that will be set forth in the Central Valley Regional Water Quality Control Board Waste Discharge Requirements issued for the construction of the Project.

3.4.3 Risks/Challenges

Temporary disturbance to existing resources are expected to be outweighed by long-term gains in function. Drought conditions may delay the ability to meet performance criteria.

3.4.4 Implementation Details

Prior to the pool enhancement, the Restoration Biologist will estimate absolute vegetation cover and relative vegetation cover using transects with point intercepts and photo-documentation on four existing reference pools in the VFCL. Additionally, the Restoration Biologist will determine if vernal pool indicator plant species are present in each identified reference pool. Soil type, presence/absence of sensitive species and indicator species, pool complex size, depth, and watershed hydrology will also be documented to determine biological viability for the enhanced pools. This data will be documented and recorded during the reference pools investigations. It is recommended that the reference pools continue to be monitored for comparative purposes during the monitoring period. The data collected on reference pools will provide baseline information that will be used as a comparative tool to determine the success of the pool enhancements.

These pools will be preserved and managed in perpetuity. Total vernal pool enhancement will be 0.05 acre.

3.4.5 Monitoring Objectives, Performance Criteria, and Methods

Monitoring Objectives

To evaluate the success of the vernal pool enhancement during the wet season monitoring period.

Performance Criteria

The performance standards for absolute cover and relative cover by vernal pool indicator plant species in each enhanced pool shall be within 15 percent of the reference pools.

Methods

The methods for monitoring the enhanced vernal pools include:

- Monitoring the structural components of the pool and associated structures. Due to the presence of livestock, which will be allowed to graze in the area of the pool, there is a possibility that the livestock could damage the pool which may determine the effectiveness of the pool to retain water. Temporary fencing to exclude livestock from grazing may be used to protect the pools at the discretion of the Restoration Biologist. Any damage will have to be repaired outside the rainy season to avoid impacts to plant and animal species. Timing of cattle exclusion will be at the discretion of a qualified biologist and will be focused on protecting the physical integrity of the pools. Grazing may be used within individual pools during the dry period to manage non-native vegetation cover if deemed necessary by a qualified biologist.

- Estimating absolute vegetation cover and relative vegetation cover using transects with point intercepts and photo-documentation at enhanced pools and four existing reference pools in the VFCL annually throughout the five-year monitoring period.
- Tracking rainfall during the rainy season (November through March) within the Project area to determine the rainfall amount for the five-year monitoring period and how this compares to the long-term average.
- Establishing photo points preferably at a distance of approximately 30 m from the pool edge and taking photographs during the rainy season and at the end of the rainy season to document proper seasonal dry-down of the pool. The purpose of photo points would be to assess observable qualitative changes.
- If performance criteria are not met, the biologist will determine if reseeding the same pool or reseeding another pool within the VFCL would be most beneficial for the vernal pool enhancement to ensure thatthe establishment criteria of 0.05 acre will be met).

3.5 GKR Relocation

GKR will be relocated from the Project Footprint in accordance with the attached *Giant Kangaroo Rat Relocation Plan For The Panoche Valley Solar Project* (Appendix F).

4.0 Management Strategy for the Panoche Valley Solar Facility Conservation Lands

This section focuses on the management strategy, including goals and objectives for the Conservation Lands. Conservation Lands are expected to meet the stated conservation goals and objectives through the implementation of appropriate land management, monitoring, and adaptive management measures as described in this HMP.

4.1 General Management Principles

The specific conservation goals and objectives for the Conservation Lands are discussed in Section 4.2 and were developed based on the general management principles described in this section. These principles emphasize sustainability while recognizing larger-scale influences such as climate change. These principles are: (1) Selection, development, and use of appropriate information; (2) Integration of ecosystem- as well as species-focused management; (3) Adaptive management; (4) Threat reduction; and (5) Risk management.

Principles

1. Selection, development, and use of appropriate information: It is insufficient to indicate that "science-based information" will be used to inform management decisions. The determination of what information is relevant and how it applies to management decisions is a nontrivial and ongoing process. In general, management will be informed by principles from all relevant scientific disciplines. This forms the strongest basis for science-based management—using principles that are well-tested and supported by decades of scientific query. Examples of such principles include the importance of genetic diversity for adaptation, addressing negative edge effects, the concept of minimum viable populations, managing for appropriate diversity at all levels (populations, species, etc.), minimization of habitat fragmentation, etc. The scientific literature will be regularly queried for specific additions to the knowledge on species, communities, and processes that comprise the Conservation Lands, but this information will require interpretation and application. The grey literature (generally defined as

unpublished science-based information) may also provide management support but because it is less accessible, it will be important for the Conservation Lands Manager to stay involved with appropriate science and conservation communities so as to be aware of this literature. This connectivity will also assist in acquiring beneficial experience and expertise from others. Finally, management will also be informed by the prior experience of the Conservation Land Manager with similar natural resources and the experience gained over time on-site.

2. Integration of ecosystem- and species-focused management: Management will need to address levels of biodiversity from individuals to ecosystem to achieve long-term conservation goals. Although conservation of particular species is a goal, this unit will not always be the management focus because: (1) the functional units are typically populations (e.g., adaptation), (2) the ecosystem context and processes must be healthy to support the species (e.g., pollinators, prey base, mycorrhizae, seed dispersers, etc.), and situations will occur in which there is competition for biological and/or financial resources by different high-value species. For example, maintenance or enhancement of certain wetland habitats for some species may be at the expense of grassland habitats that are favored by others. However, exclusive focus on maintaining diversity and resilience at the ecosystem level may result in the loss of rare or high-value species. Attention will be directed to populations, species, and ecosystem levels.
3. Adaptive management: This term has been popularized and widely interpreted. Its intended meaning as applied to management of the Conservation Lands is 'the systematic acquisition and application of reliable information to improve management over time' (Wilhere 2002). In general, adaptive management will be best served by practicing management within an experimental frame where possible (i.e., able to parse influences and determine cause and effect). It will involve incorporating new information (whether from experience, literature, new on-site conditions, or regulations) and will require monitoring as a primary information source.

The following excerpt from a Center for Natural Lands Management white paper on this topic (Rogers 2008) provides a general description of the conditions that will support the practice of adaptive management on the Conservation Lands:

(1) Appropriate management structure: Management plans will be updated periodically. This provides both a prompt and an opportunity to revisit the management trajectory and review relevant information as it becomes available.
(2) Management personnel: Conservation Lands management staff will be selected who have a strong background in biological sciences, are comfortable in searching scientific literature and conducting scientifically rigorous field studies, and who have the ability to interact appropriately with the research community for management support.
(3) Sound record-keeping: Just as adaptation in the evolutionary sense depends on inheritance from one generation to another of the trait of interest, so too adaptive management relies on a strong institutional memory that transcends individual managers. Records of management activities, monitoring, and other pertinent information will be maintained in perpetuity and securely on digital media within a securely administered information management system.
(4) Developing long-term relationships with researchers: The expertise needed to guide conservation-directed management is multi-disciplinary and thus management will be well-served by a creating a network of expertise. The Manager will review requests from researchers to use the preserves for on-site research projects using filters that include risks to native species and conservation value of the proposed research. The Manager will also invest in relationships with the research community as an ongoing source of support for decision-making.
(5) Appropriate analysis and interpretation of information gathered from site: Data acquired from monitoring will be framed appropriately such that meaningful information is gained on resident species. For example, the spatial scale of the species' range relative to the species occurrence on the Conservation Lands is an important reference. Similarly, the time scales of the species—lifespan, breeding cycles, etc.—help to determine how long information must be collected before it is biologically meaningful and can be interpreted for management purposes.

(6) Management stability: One of the preconditions identified by Lee (1993) for genuine adaptive management is sufficient (institutional) stability to measure long-term outcomes. Agreements pertaining to responsibility for managing and protecting the Conservation Lands—whether relating to management, or conservation easement compliance (or a combination)—should be in effect in perpetuity. This will provide the necessary stability and timeframe for effective adaptive management.

4. Threat reduction: In general, threats to the Conservation Lands are those actions or influences that could degrade or undermine the conservation values and are generally expected to be those of anthropogenic origin. Such threats could be either direct (e.g., trespass and damage) or indirect (e.g., pollution from an offsite source, human-vectored pathogen transmission). The most appropriate means (physical, educational, regulatory outreach, etc.) will be used to reduce each threat, with resources allocated according to the anticipated threat impact. A preventative approach will be taken where threats can be anticipated anywhere possible. Although threats to individual focal species may sometimes be natural processes (e.g., predation by other native species), the determination of whether this constitutes a threat that requires management action will take into account the estimated scale of impact as well as the interests in maintaining natural processes (e.g., predation as natural selection) and species diversity. Some threats are gradual or cumulative—such as the spread of exotic invasive species—and detection and assessment through long-term monitoring will be critical. Some events or changes—such as wildfire, extreme weather events, or rapid climate change—while possibly posing a threat to conservation values, may also represent 'the new normal' and be best addressed by management actions that generally support natural resilience and adaptation, as they are mostly beyond control by direct management.
5. Risk management: The sensitivity of the conservation values requires that management actions involve little to no risk. Any untested management actions (e.g., first application of pesticides within potential impact zone of listed or sensitive species) will be gradually introduced over time and/or applied initially in

test plots of small areas. As needed, alternative management approaches (e.g., mechanical or chemical weed control) will be compared in test plots for both efficacy as well as safety relative to the conservation values. The safety of the Management staff and public will be high priority. Both the natural and financial resources will be managed with a low-risk approach.

4.2 Specific Conservation Goals and Objectives

The following sections outline the management goals and objectives that will guide the activities undertaken on the Conservation Lands. The conservation goals are the specific guiding principles for the HMP. The objectives provide direction in management in order to meet conservation goals. The purpose of the standards are to guide implementation measures of the HMP such that an adequate and effective conservation program results in long-term benefits to the Covered Species. All Conservation Lands management and monitoring activities will be subject to the stipulations contained in the ESA BO and CESA ITP issued for the Project.

The Conservation Land Manager selected will meet minimum criteria established by CDFW and USFWS for such management entities. The Conservation Land Manager will be equipped and qualified to fulfill or cause to be fulfilled all habitat management and enhancement, species monitoring, reporting and adaptive management tasks associated with management and protection of the Conservation Lands. All management decisions, including those that are not specifically called out in this or other implementation documents, will be made with Covered Species and habitat value as the first priority. Reasoning and decisions will be documented in a way to provide justification for all actions being based on the best available science regarding the Covered Species. If published information is not available regarding a certain action, species and subject matter experts will be consulted if available.

The overall management goal of the Conservation Lands is to maintain viable, self-sustaining populations of the Covered Species within the identified Conservation Lands and, where feasible, enhance the habitat values within the Conservation Lands for SJKF, SJAS, BNLL, GKR, CTS, and other listed species. The standards discussed in the following sections will be used to determine whether implementation measures contained in the HMP are meeting the management goals and objectives.

Management activities and associated standards that will be implemented on the Conservation Lands are intended to benefit the Covered Species by maintaining and improving habitat values.

There are three main management objectives:

<u>Objective A:</u> Maintain viable, self-sustaining populations of the Covered Species within the identified Conservation Lands.
<u>Objective B:</u> Maintain and increase the habitat value in targeted areas of the Conservation Lands.
<u>Objective C</u>: Provide for measurable means to determine Covered Species status on the Conservation Lands.

4.3 Covered Species Conservation Strategies

The following species-specific conservation strategies are designed to protect existing populations of Covered Species. Most of the Covered Species (GKR, SJKF, SJAS, BNLL) live almost exclusively in upland arid areas (Germano et al. 2011). With the exception of California condor, the remaining Covered Species (CTS, VPFS, LFS, CFS, VPTS) are associated with wetland habitats. The following sections briefly describe the habitat and ecology of each Covered Species and present the conservation strategy for long-term management. Appendix C provides additional information on Covered Species.

4.3.1 Giant kangaroo rat (*Dipodomys ingens*) (GKR) – Federally Endangered, CESA Endangered

GKR can occur in relatively high densities and are relatively easy to monitor using mark-recapture methods. They are also sensitive to changes in habitat structure and are therefore a good gauge of habitat condition and management effectiveness.

The combination of their importance to the community, endangered status, ease of monitoring, and sensitivity to management treatments provide a compelling reason for monitoring GKR populations as part of the long-term management of natural lands. Therefore GKR will be a focal species with respect to management and monitoring in this plan.

Where giant kangaroo rats occur (especially at high density) they often dominate the small mammal community and exclude or reduce populations of other small mammal species (Grinnell 1932; Hawbecker 1944; Hawbecker 1951; Tappe 1941), presumably because of their large size and aggression towards other small mammals (Shaw 1934).

The space encompassing an individual GKR's burrow system is known as a precinct, which is an area of intense use by the animal. A typical precinct has three burrows that are independent of one another and not interconnected (Williams & Kilburn 1991). Precincts are easily spotted in spring due to the denser, lush vegetation compared to the intervening areas (Grinnell 1932, Hawbecker 1944). Plants on a precinct are the first to turn green after autumn rains and the last to ripen and turn brown in the spring (Grinnell 1932; USFWS 1998). Vegetative productivity can be two to five times greater on precincts than on adjacent areas (Hawbecker 1944; Williams et al., 1993). This increased productivity on GKR precincts may be due to their digging and caching activity which reduces soil compaction and increases rain percolation (Hawbecker 1944). Vegetative composition on the precincts can also differ from surrounding areas with a higher proportion of non-natives (Schiffman 1994) as well as an increased density of at least one endangered plant (Cypher 1994). After the annual vegetation dies, the opposite effect occurs as GKR actively clear the vegetation within 2–4 meters of their main burrow so that their precincts are often distinctive circles of short vegetation or bare ground (Bean et al., 2012). When at high densities, GKR can dramatically reduce the amount of herbaceous production (by 1,000 pounds/acre or more) during the late spring and summer through their clipping and burying activities (Carrizo Plain Ecosystem Project 2014; CNLM 2011).

Although the soil disturbance associated with GKR on precincts appears to promote exotic grass cover, their foraging largely limits these grasses to their disturbed mounds and, on a landscape level, actually reduces their abundance and spread (Carrizo Plain Ecosystem Project 2014). This, in turn, may benefit native bunchgrasses. However, other native species (e.g., *Lotus* spp.) and native species cover overall were found to be more abundant in GKR exclusion areas than in areas with abundant GKR (Carrizo Plain Ecosystem Project 2014).

GKR burrows also provide important cover for a myriad of other animals species including reptiles (e.g., BNLL), SJAS, and various invertebrates (Prugh et al. 2012, Tollestrup 1979).

GKR also are prey for numerous predators, including SJKF, barn owl, great horned owl, burrowing owl, short-eared owl, coyote, and American badger (Grinnell 1932, Hawbecker 1943, 1944, 1945; Morell 1972). Snakes that might prey on GKR include coachwhip, gopher snake, common king snake, and western rattlesnake (Williams and Kilburn 1991).

GKR are rightly considered keystone species because of their profound influence on the community (Goldingay et al., 1997; Prugh & Brashares 2012). As mentioned above, they provide an important food source for various predators including kit foxes, owls, snakes, badgers, and weasels. They extensively modify the above-ground habitat by removing a considerable volume of plant biomass each year, creating open space and influencing plant composition. Underground habitat modification is also extensive, providing thermal and hiding cover for various invertebrates, reptiles, and other small animals. With respect to other Covered Species, GKR are thought to benefit kit foxes because they are important prey and leopard lizards because of the creation of burrows used for thermal regulation, cover, and the creation of open space.

Current Distribution on Conservation Lands

GKR are currently found on all three of the Conservation Lands but at varying densities. Recent ground surveys indicate that the proportion of surveyed cells with GKR burrows was highest for SCRCL (0.40) followed by VFCL (0.16) and VRCL (0.02). Distribution on the Conservation Lands also differs. GKR appear to be widely distributed through most of SCRCL and VFCL, but found in only isolated pockets of VRCL.

Habitat and Life History Traits

GKR inhabit areas of low relief with slopes generally less than 6º (Hawbecker 1951; Williams & Kilburn 1991). Soils associated with GKR colonies are usually sandy loams (Grinnell 1932; Shaw 1934), but they do make use of a variety of soils including heavier clay-based soils in some areas (Williams & Kilburn 1991).

GKR are generally found in heavily grazed areas with limited herbaceous cover (Grinnell 1932, Shaw 1934, Williams 1992). These barren landscapes that often characterize GKR habitat are likely due to heavy grazing pressure from livestock as well as from the digging and clipping activities of GKR.

Early naturalists noted that GKR were found almost exclusively in areas without shrubs (Grinnell 1932; Shaw 1934). However, open areas are not an absolute habitat requirement for GKR (Williams & Kilburn 1991) and GKR have been captured on monitoring plots with up to 18% shrub cover (CNLM unpublished data). However, higher densities are often found in areas with few or no shrubs when compared to nearby shrublands (Williams et al., 1995; CNLM unpublished data). A behavior study by Braun (1985) indicated that GKR spent little or no time foraging under shrubs.

The GKR is primarily a seed eater, but occasionally consumes green plants and insects (Shaw 1934; Grinnell 1932). Foraging takes place year round in all types of weather and can occur anytime from around sunset to near sunrise, and most activity takes place within two hours of sunset. Shortly after the green season, ripening heads of grasses and forbs are cut off and placed in surface piles or haystacks on small surface pits located near the GKR's burrow system. Later, the seeds are moved into underground caches for consumption at a later date. Reported volumes of haystacks generally range from three to five liters, although one exceptionally large haystack was approximately 226 liters in size (Williams 1992; Hawbecker 1944). Less is known of underground caches, but they can range in size from 0.25–4 liters in size (Shaw 1934; Bill Vanherweg personal communication). Curing the seeds is thought to prevent mold growth after the seeds are moved below ground (Shaw 1934). Thus, sun exposure may be important to ensure that seeds are fully cured. The ability to transport large quantities of seeds in cheek pouches, coupled with the highly developed seed curing and caching behaviors, probably allows GKR to endure prolonged droughts of one or two years without major regional population effects (Williams et al. 1993).

What is known of GKR diet is based largely on descriptive or anecdotal information gathered over a relatively short time period. Shaw (1932) analyzed seed contents within 875 pit caches and found that peppergrass (*Lepidium nitidum*) formed the bulk of the content of pit caches, followed by filaree (*Erodium* sp.). Williams (1992) analyzed eighteen surface piles or *haystacks* and found that the predominant seeds were Arabian grass, red brome, wild annual barley, and peppergrass. Hawbecker (1944) reported that haystacks consisted almost entirely of red brome. In a preference trial on the Carrizo Plain, Olney (2008) found that GKR showed a strong preference for filaree, goldfields (*Lasthenia californica*), and peppergrass during one year. Thus, GKR clearly harvest and consume a variety of non-native and native annual plants. However, food plant preference is difficult to determine because although there are descriptions and anecdotal observations of diet, there is no accompanying information on availability of these plants. Long-term analyses of diet of GKR in relation to vegetation availability would provide important data on food plant preferences which could enable more effective management and conservation of this species.

Optimal habitat – Flat or gently sloping terrain, friable soils, no or sparse shrub cover, limited herbaceous cover. Food plants: Lotus, pepper grass, goldfields, filaree, red brome.

Conservation Strategy

The objective of the conservation strategy for GKR is to permanently protect and enhance habitat for GKR on the Conservation Lands and to relocate GKR displaced as a result of the solar energy facility construction to suitable but unoccupied habitat.

This includes the following measures:

- Permanently protect approximately 24,176 acres from trespass, illegal dumping and rodenticide use, of which 16,576 acres are high conservation value habitat for GKR.
- Maintain much of the currently occupied habitat in a generally open state with few or no shrubs.
- Use livestock grazing to meet herbaceous cover goals.
- Reintroduce GKR displaced as a result of the solar energy facility construction to suitable but unoccupied or historically occupied habitat.
- Monitor abundance of this species in relation to grazing intensity, vegetation (woody and herbaceous cover), and precipitation. Also, where feasible, initiate long-term studies of diet in relation to availability of food plants to determine food plant preferences.

4.3.2 San Joaquin kit fox (*Vulpes macrotis mutica*) Federally Endangered, CESA Threatened

Current Distribution on Conservation Lands

SJKF occur on the Project Footprint, and portions of VFCL and VRCL. SJKF scats located by scat-sniffing dogs and later genetically analyzed indicated that there were at least 22 separate individual SJKF in the area encompassing the Project Footprint, VFCL, and VRCL (11 male and 11 female). Nine individuals were located on both the Project Footprint and Conservation Lands, and 13 individuals were located exclusively on the Conservation Lands. Spotlighting surveys and camera stations were used to detect kit fox on the SCRCL. As on VRCL, SJKF were recorded in variable terrain on SCRCL including flats, hill slopes and ridges.

Habitat and Life History Traits

SJKF tend to be more general with respect to diet and habitat requirements than many of the other Covered Species. This is perhaps best represented by their ability to occupy heavily modified systems such as cities, landfills, military training bases, and heavily developed oilfields (Cypher & Frost 1999; Cypher and Brown 2006 O'Farrell et al., 1987; Spiegel and Small 1996; Zoellick et al., 2002). However, some preferences have been noted, especially in natural systems. Although they can occupy and den in areas with clay soils (Reese et al., 1992) they are thought to prefer loose-textured soils (Grinnell et al., 1937; Morrell 1972). Dens provide vital escape cover, places for rearing pups, and thermoregulatory and water conservation benefits for SJKF (Grinnell et al., 1937; Golightly 1981; Ralls & White 1995; Seton 1925). This may explain the general preference for friable soils where they can dig their own burrows. However they can enlarge burrows of California ground squirrel and other species and use these as dens (Orloff et al., 1986). SJKF can inhabit fairly steep terrain (Orloff et al., 1986) but they are more consistently found within areas of low relief (Grinnell et al., 1937; Egoscue 1962; Daneke et al., 1984; Warrick & Cypher 1998). There is also evidence that SJKF generally favor open grasslands over shrublands (Nelson et al., 2007; Warrick & Cypher 1998; White et al., 1995). Since SJKF are desert species, it is thought that habitat suitability is highest in areas with relatively low herbaceous cover (Cypher et al., 2013).

SJKF are fairly general and opportunistic in their feeding habits and thus foxes have different prey items depending on location and time period. Primary prey items have included Heteromyid rodents (Cypher et al., 2000; Hawbecker 1943; Morrell 1972; Laughrin 1970; White et al., 1996), lagomorphs (Scrivner et al., 1987), and ground squirrels (Cypher & Warrick 1993; Logan et al., 1992). Insects (especially Orthopterans and Coleopterans) also appear to be an important source of food in some areas and time periods (Briden et al., 1987). SJKF shifted their diet from primarily lagomorphs to primarily kangaroo rats during a 16–year study on the Naval Petroleum Reserves (Cypher et al., 2000). SJKF have also been known to shift their normal activity patterns when diurnal prey (e.g., California ground squirrels) are abundant (O'Farrell et al., 1987). Despite this generally opportunistic and plastic nature regarding diet, there are times when SJKF appear unable to switch to alternate prey when their primary prey declines (White et al., 1996).

Food availability is thought to be the primary factor affecting fluctuations in SJKF abundance (Cypher et al., 2000; White & Garrott 1997). Food resources (especially rodents) in natural areas of the San Joaquin Valley fluctuate greatly (CNLM 2014; Cypher et al. 2000; Williams et al. 1993;Single et al. 1996) and therefore SJKF populations mirror this dynamic pattern through time (Cypher et al., 2000;White et al., 1996).

Coyotes are a potent source of SJKF mortality in virtually all natural areas where they have been studied (Ralls & White 1995; Cypher et al., 2000; Orloff et al., 1986; Standley et al., 1992). Although coyotes are not thought to be as important a factor in population regulation as food supply, they may dampen population increases and accentuate population declines of SJKF (Cypher & Spencer 1998; White & Garrott 1997). Larger predators also likely affect the spatial distribution of SJKF and may drive the habitat preferences noted above. For example, coyotes have been found to use shrublands proportionately more than open grasslands (Nelson et al., 2007; White et al., 1995) probably due to the cover provided and abundance of their preferred prey (lagomorphs). Bobcats also generally need areas with shrub or topographic cover for shelter and for concealment while stalking and ambushing prey (Lancia et al., 1982; Anderson 1990). In contrast, SJKF have been found to use shrublands less than open grasslands (Nelson et al., 2007; White et al. 1995). Nelson et al., (2007) also found that mortality rates of SJKF were directly related to the amount of shrub habitat in their home ranges. The apparent preference for low relief areas by SJKF, may also be due to abundance of larger predators. SJKF occupied the more rugged topography of the Naval Petroleum Reserves when coyote numbers were unusually low, but virtually disappeared from these areas as coyote numbers increased (Warrick & Cypher 1998). Thus, SJKF abundance and distribution appear to be affected by significant bottom-up and top-down pressures in natural systems. The larger predators in particular may largely drive their apparent preference for relatively flat, open habitats with little structure while prey abundance primarily influences population size within this preferred habitat

Non-native red foxes have been known to kill SJKF and may compete or displace the sensitive species in some areas (Clark et al., 2005; Lewis et al., 1993; Ralls & White 1995). However, because red foxes are not adapted to desert areas and may be limited by free water sources (Clark et al., 2005), they may not be able to colonize much of the occupied range of SJKF and thus may not pose a widespread threat.

Optimal habitat – Generally flat or gently sloping terrain, occasionally on steeper slopes, friable soils, no or sparse shrub cover, limited herbaceous cover, with abundant kangaroo rats or other prey. SJKF tend to be more general with respect to diet and habitat requirements than many of the other Covered Species.

Conservation Strategy

The objective of the conservation strategy for SJKF is to permanently protect and enhance habitat for SJKF on the Conservation Lands. This includes the following measures:

- Permanently protect approximately 24,176 acres of habitat from trespass, illegal dumping and rodenticide use, of which 24,000 acres are high conservation value for SJKF.
- Maintain much of the currently occupied habitat in a generally open state with few or no shrubs.
- Use livestock grazing to meet herbaceous cover objectives for SJKF and their prey.
- Monitor relative abundance of this species through time.

4.3.3 Blunt-nosed leopard lizard (*Gambelia sila*) Federally Endangered, CESA Endangered with Fully Protected Status

Current Distribution on Conservation Lands

A total of 61 observations of BNLL were recorded during surveys of SCRCL in 2012. Observations were widely distributed on the SCRCL and although washes were specifically targeted, numerous observations outside of wash habitats were made incidentally. BNLL were also documented on the VFCL (27 observations) in 2013 and 2014, mostly associated with wash habitat along Panoche Creek. No BNLL have been documented on VRCL.

Habitat and Life History Traits

BNLL are found in relatively flat, sparsely vegetated grassland and shrubland habitat within the San Joaquin Valley and arid valleys of the interior coast ranges (Montanucci 1965). Shrub cover is thought to provide shelter and escape cover but this species was not found in areas with dense shrub cover (Montanucci 1965). Small mammal burrows are often used for shelter from predators and for thermoregulation (Tollestrup 1979). However, they are known to construct shallow burrows at times (Montanucci 1965). BNLL preferentially use open habitat including washes and dirt roads (Warrick et al., 1998). BNLL preference for open habitat may be because dense or tall herbaceous vegetation reduces this species ability to forage and to escape predators (Montanucci 1965). Soil types varies from gravel to hardpan or sandy loam (Montanucci 1965).

BNLL are thought to be opportunistic predators capturing whatever prey is most abundant (Germano et al. 2007). Orthopterans (grasshoppers, crickets), Coleopterans (beetles) and hymenopterans (bees, wasps) are frequent items in their diet with a variety of other arthropods and lizards occasionally taken (Kato et al., 1987; Montanucci 1965; Germano et al 2007; Tollestrup 1979).

Rodent burrows (e.g., kangaroo rat or ground squirrel) may be especially important to BNLL in that they provide important thermal and escape cover. In addition, GKR—through their clipping and digging activities—can dramatically reduce the amount of herbaceous vegetation and thus make the habitat more suitable for species like BNLL that require a relatively open habitat. Prugh and Brashares (2011) found that activity by GKR also increased the abundance of othopterans and coloeopteans, which could in turn benefit BNLL by increasing the density of frequently-consumed prey species.

Known predators of BNLL include San Joaquin coachwhip (*Masticophis flagellum ruddocki*), northern Pacific rattlesnake (*Crotalus viridis oreganus*), gopher snake (*Pituophis catenifer*), prairie falcon (*Falco mexicanus*), American kestrel (*Falco sparverius*), loggerhead shrike (*Lanius ludovicianus*), burrowing owl (*Athene cunicularia*), red-tailed hawk (*Buteo jamaicensis*), and roadrunner (*Geococcyx californianus*) (Germano 2003; Montanucci 1965; Tollestrup 1979). Other predators thought to prey on BNLL include SJKF, badgers, coyotes, skunks, and other species of snakes and raptors (Montanucci 1965; Tollestrup 1979). Based on the current literature, snakes and raptors may be the most common predators of BNLL. Raptor predation on BNLL may be reduced by limiting the opportunities for nesting and perching sites for these species.

Optimal habitat: flat or gently sloping terrain, low shrub cover, limited herbaceous cover, abundant kangaroo rat burrows, areas of permanently open habitat (e.g., washes, dirt roads) and an abundant and diverse insect prey base.

Conservation Strategy

The objective of the conservation strategy for BNLL is to permanently protect and enhance habitat for BNLL on the Conservation Lands. This includes the following measures:

- Permanently protect approximately 24,176 acres of habitat from trespass, illegal dumping and rodenticide use, of which 11,883 acres are considered high conservation value for BNLL.
- Restore shrub cover in some areas to provide additional thermal and escape cover and to enhance prey diversity for BNLL.
- Use livestock grazing to meet herbaceous cover objectives for BNLL.
- Monitor relative abundance of this species through time.

4.3.4 San Joaquin antelope squirrel (*Ammospermophilus nelsoni*)

Current Distribution on Conservation Lands

During GKR surveys conducted in February 2013, one observation of SJAS was recorded on VRCL and 13 observations were recorded on SCRCL. These observations each represented individual SJAS as they were recorded during a single survey effort. During the BNLL protocol surveys in 2013, five and 15 SJAS observations were recorded on VFCL and VRCL, respectively. Many of these observations were likely the same individual observed multiple times over the survey period.

SJAS were regularly observed on VRCL and SCRCL during surveys conducted in 2009, 2010, and 2012 by Live Oak Associates, Inc. The entire area of the Conservation Lands is considered suitable mitigation for this species. Population density of this species is considered relatively low on the VFCL and the VRCL compared to SCRCL. SJAS were widely distributed at SCRCL and hundreds of observations were recorded during 2010 reconnaissance surveys. Similarly, during a two-week period in September 2012, 119 observations were recorded on SCRCL.

Habitat and Life History Traits

SJAS live in relatively arid grassland and shrubland communities (e.g, *Atriplex* and *Ephedra*) (USFWS 1998). Areas with relatively dense populations of SJAS including the Panoche Area and Carrizo Plain are often described as being heavily grazed with low herbaceous cover (Hawbecker 1947, USFWS 1998). However, it is thought that some areas may not be able to support viable populations of SJAS in the face of continued overgrazing on moderately to severely degraded rangelands (USFWS 1998). SJAS may be most numerous in areas of sparse to moderate cover of shrubs (USFSW 1998). However they can have dense populations in shrubless areas especially in association with kangaroo rats (Harris and Stearns 1991). In the Project Area they are associated with plants such as red brome, red-stemmed filaree, and California ephedra (USFWS 1998). SJAS are predominantly confined to loam and sandy loam soils and they require areas where their burrows are free from flooding (Hawbecker 1947).

SJAS live in burrows that vary in complexity and length, but generally have two to six openings and are between roughly 30 and 50 centimeters (12 to 20 inches) deep. They may live in burrows of their own construction or take over and enlarge those dug by kangaroo rats.

The diet of the SJAS is highly dependent on availability. The SJAS eat green vegetation, fungi, insects and seeds. Vegetation and seeds of filaree and red brome and seeds of shrubs such as ephedra and saltbush are staples. available, grasshoppers are the primary insects consumed. In the absence of seeds and grasshoppers, SJAS will eat harvester ants (Hawbecker 1975). During spring, especially during severe drought, SJAS will eat large quantities of ovaries and developing seeds of ephedra (D.F. Williams unpublished observation as cited in Recovery Plan (USFWS 1998)).

Predators of the SJAS include hawks, falcons, eagles, snakes, SJKF, coyotes, badgers, and probably other predators (Williams and Tordoff 1988).

Optimal habitat – Gently sloping or rolling terrain, some shrub cover especially *Ephedra* or *Atriplex*, limited herbaceous cover. Food items include *Ephedra*, red brome, filaree, grasshoppers and other arthropods.

Conservation Strategy

The objective of the conservation strategy for SJAS is to permanently protect and enhance habitat for SJAS on the Conservation Lands. This includes the following measures:

- Permanently protect approximately 24,176 acres of habitat from trespass, illegal dumping and rodenticide use.
- Restore shrub cover in some areas to provide additional thermal and escape cover and to enhance prey diversity for antelope squirrels.
- Use livestock grazing to meet herbaceous cover objectives for SJAS.
- Monitor relative abundance of this species through time.

4.3.5 California Tiger Salamander (*Ambystoma californiense*)

Current Distribution on Conservation Lands

There are a total of 12 ponds present on the VFCL and the VRCL and just outside these areas (Figures 12 through 14). Three ponds are offsite, five are within the VRCL, and four are within VFCL. CTS were documented in one offsite pond (Pond #3), one pond on VRCL (Pond #12), and historically documented in two ponds on the VFCL (Ponds #8 and #9). No larvae or adult CTS were detected within the Project Footprint but historically CTS have been documented in the major drainages within the VFCL.

Habitat and Life History Traits

The use of vernal pools and other temporary bodies of water for breeding limits the CTS to areas of low elevation and low topographic relief throughout their range (Stokes et al., 2008). Ephemeral vernal pools which refill with water on a yearly basis are 40 – 80 cm in depth, and have a surface area of 0.2 hectares or more are optimal for breeding CTS, although small, shallower pools will also house breeding CTS (Stokes et al., 2008). Depth of the breeding pool was highly correlated with breeding CTS. Stokes et al., (2008) found no CTS larvae in pools with an average depth of less than 22 cm. Deep pools with permanent water may not be optimal for breeding populations of CTS because they often house predatory fish, crayfish, or bullfrogs that prey upon larval CTS. This creates a narrow range of pool depths where the pool will not completely dry out before CTS have metamorphosed, but also not contain water year-round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005).

Activity patterns of adult CTS are not well understood. Adult CTS live their entire lives in the burrows of small mammals such as the California ground squirrel. Adults begin moving toward breeding pools when the first fall rains begin to inundate pools. Breeding adults will continue moving to pools through the winter and spring. Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al., 2001; Trenham and Shaffer 2005). Adult CTS leave the breeding pools in late spring and return to upland habitats. Trenham and Shaffer (2005) used pitfall traps at various intervals away from a pool to determine the extent of upland use. They found that the numbers of adult CTS declined as distance from the pool increased out to 620 meters. Subadults also moved up to 600 meters away from the pools, but most were concentrated between 200 and 600 meters from the pool. This has led managers to suggest preserving upland habitats with suitable small mammal burrows out to 600 meters from breeding pools (Trenham and Shaffer 2005).

Optimal habitat – Areas of low relief with emphemeral vernal pools (≥0.2 ha in size) that fill to 40-80 cm annually. Surrounding upland habitat with numerous rodent burrows.

Conservation Strategy

The objective of the conservation strategy for CTS is to permanently protect and increase habitat for CTS on the Conservation Lands. This includes the following measures:

- Permanently protect at least four potential breeding ponds on the Conservation Lands.
- Permanently protect approximately 4,028 acres of potential estivation habitat on the VRCL and VFCL.
- Permanently protect any potential breeding ponds or estivation habitat on the SCRCL. The current status of CTS on the SCRCL is unknown. No surveys occurred on the SCRCL for CTS; however, at least two manmade ponds support potential habitat.
- Create three breeding ponds on the Conservation Lands. These ponds will be maintained in perpetuity.
- Monitor created CTS pond(s) and surrounding estivation habitat.
- Perpetually preserve created CTS pond(s) and surrounding estivation habitat.

4.3.6 Vernal Pool Fairy Shrimp Federally Threatened

Current Distribution on Conservation Lands

There are no records of VPFS on the Conservation Lands. VPFS were detected in one pond within the former Project Footprint. The pond is now protected as part of VFCL and will not be disturbed during construction.

Habitat and Life History Traits

VPFS were found by Helm (1998) in 21 different types of habitat, including vernal pools, vernal swales, alkaline pools, and road-side ditches. Optimal pools tend to be a neutral to slightly alkaline pH, have low dissolved salts, and are dominated by native vernal pool plants. VPFS can occur in pools as large as 10 hectares (25 acres), but most occur in much smaller pools measuring less than 0.02 hectares (0.05 acres; Gallagher 1996, Helm 1998). Helms (1998) found the average depth of pools containing VPFS to be 15 cm, with an average maximum depth of 22 cm. The common thread among all types of habitat is that they dry out during the summer and fall. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst.

VPFS forage on bacteria, protozoan, algae, rotifers, and bits of detritus. Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard (*Anas platyrhynchos*), green-winged teal (*A. crecca*), bufflehead (*Bucephala lbeola*), greater yellowlegs (*Tringa melanoleuca*), and killdeer (*Charadrius vociferus*) all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot (*Spea hammondii*) bullfrog (*Lithobates catesbeianus*), mosquitofish (*Gambusia affinis*), and vernal pool tadpole shrimp (*Lepidurus packardi*) also forage on VPFS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of VPFS. VPFS also disperse in high water events that can temporarily interconnect adjacent pools.

Optimal habitat – Vernal pools (0.02-10 ha in size) with neutral to slightly alkaline pH, low dissolved salts. Pools should contain abundant food sources such as bacteria, protozoa, algae, and detritus during the inundation period and dry out in the summer for successful hatching.

Conservation Strategy

The objective of the conservation strategy for VPFS is to permanently protect and actively manage habitat for VPFS on the Conservation Lands if it is determined that they are present. This includes the following measures:

- Permanently protect all vernal pool habitat on the Conservation Lands.
- Conduct monitoring to determine hydrology of the vernal pools, whether VPFS are present, and their distribution.

- Manage in perpetuity all existing vernal pool habitat.

4.3.7 Conservancy fairy shrimp (CFS; *Branchinecta conservatio*) Federally Endangered

Current Distribution on Conservation Lands

There are no records of CFS on the Conservation Lands and the site has not been surveyed.

Habitat and Life History Traits

Suitable habitat for the CFS includes vernal pools, alkaline pools, and vernal lakes (Helm 1998). Occupied pools ranged from 30 square meters (m^2) to 356,253 m^2. Occupied pools averaged 27,865 m^2 which is larger than the average pool size of all other endemic California branchiopods. Pool depth ranged from 10 to 40 cm with an average of 23.1 cm. Other habitat characteristics include low alkalinity, low total dissolved solids, a pH near 7, and being dominated by native vernal pool plants (USFWS 2005). The common thread among all types of habitat is that they dry out during the summer and fall. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst.

CFS forage on bacteria, protozoan, algae, rotifers, and bits of detritus. Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard, green-winged teal, bufflehead, greater yellowlegs, and killdeer all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot, bullfrog, mosquitofish, and vernal pool tadpole shrimp also forage on CFS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of CFS. The CFS also disperse in high water events which can temporarily interconnect adjacent pools.

Optimal habitat – Vernal pools with low alkalinity, pH near 7, low dissolved salts. Pools should contain abundant food sources such as bacteria, protozoa, algae, and detritus during the inundation period and dry out in the summer for successful hatching.

Conservation Strategy

The objective of the conservation strategy for CFS is to permanently protect and actively manage habitat for CFS on the Conservation Lands if it is determined that they are present. This includes the following measures:

- Permanently protect all vernal pool habitat on the Conservation Lands.
- Conduct monitoring to determine hydrology of the vernal pools, whether CFS are present, and their distribution.

4.3.8 Longhorn fairy shrimp (LHFS; *Branchinecta longiantenna*) Federally Endangered

Current Distribution on Conservation Lands

There are no records of LHFS on the Conservation Lands.

Helm (1998) surveyed 4,008 vernal pools, and similar habitats, for fairy shrimp. Only four pools contained LHFS. Habitat that contained LHFS in Helm's study included alkaline pools and rock outcrop pools. Pools which contained LHFS ranged from 4.6 to 2,788 m^2 and averaged 678 m^2. Pool depths ranged from 10 to 40 cm and averaged 23.1 cm. Other characteristics of pools with extant populations include a pH near neutral, and temperatures ranging from 10 to 28˚ C. The common thread among all types of habitat is that they dry out during the summer and fall. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst.

LHFS forage on bacteria, protozoa, algae, rotifers, and bits of detritus. Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard, green-winged teal, bufflehead, greater yellowlegs, and killdeer all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot, bullfrog, mosquitofish, and vernal pool tadpole shrimp also forage on LHFS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of LHFS. LHFS also disperse in high water events that can temporarily interconnect adjacent pools.

Optimal habitat – Alkaline vernal pools with a pH near 7. Pools should contain abundant food sources such as bacteria, protozoa, algae, and detritus during the inundation period and dry out in the summer for successful hatching.

Conservation Strategy

The objective of the conservation strategy for LHFS is to permanently protect and actively manage habitat for LHFS on the Conservation Lands if it is determined that they are present. This includes the following measures:

- Permanently protect all vernal pool habitat on the Conservation Lands.
- Conduct monitoring to determine hydrology of the vernal pools, whether LHFS are present, and their distribution.
- Manage in perpetuity all existing vernal pool habitat.

4.3.9 Vernal pool tadpole shrimp (VTPS; *Lepidurus packardi*) Federally Endangered

Current Distribution on Conservation Lands

There are no records of VPTS on the Conservation Lands.

Habitat and Life History Traits

Helm (1998) found VPTS in 17 different types of habitat, including alkaline pools, vernal pools, vernal swales, ditches, road ruts, and stock ponds. Average occupied pool size was 1,828 m^2. Occupied pool depth ranged from two to 151 cm, with an average of 15.2 cm. Optimal pools are neutral to slightly alkaline, clear, low in dissolved solids, and dominated by native vernal pool plants. The common feature among all types of habitat is that they dry out during the summer and fall. The VPTS was able to withstand water temperature as high as 32˚C, and only died when their pools dried. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst. However, cysts can hatch during the wet season without the pool drying out.

VPTS are omnivorous with a strong preference for animal matter. Live invertebrates, amphibian larvae, carrion, and detritus filtered from the water column make up the VPTS diet.

Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard, green-winged teal, bufflehead, greater yellowlegs, and killdeer all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot, bullfrog, and mosquitofish also forage on VPTS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of VPTS. VPTS may also disperse in high water events which can temporarily interconnect adjacent pools.

Optimal habitat: Neutral to slightly alkaline vernal pools, clear, low in dissolved solids, and dominated by native vernal pool plants. Pools should contain abundant food sources such as invertebrates, amphibian larvae, carrion, and detritus during the inundation period and dry out in the summer for successful hatching.

Conservation Strategy

The objective of the conservation strategy for VPTS is to permanently protect and actively manage habitat for VPTS on the Conservation Lands if it is determined that they are present. This includes the following measures:

- Permanently protect all vernal pool habitat on the Conservation Lands.
- Conduct monitoring to determine hydrology of the vernal pools, whether VPTS are present, and their distribution.
- Manage in perpetuity all existing vernal pool habitat.

4.3.10 California Condor (*Gymnogyps californianus*) Federally Endangered, CESA Endangered and Fully Protected

Current Distribution on Conservation Lands

No CACOs were observed in or near the Conservation Lands during any surveys, though USFWS radio-tracking efforts have recorded CACO over the vicinity of the Conservation Lands in the past.

Habitat and Life History Traits

CACO live in rocky shrubland, coniferous forests, and oak savannas (Birdlife International 2013). Individual birds have a huge range and have been known to travel up to 250 km (150 mi) in search of carrion. The birds prefer the carcasses of large dead animals like deer, cattle, and sheep, but have been known to eat the carcasses of smaller animals like rodents and rabbits. CACO begin to look for a mate when they reach sexual maturity at the age of six. The pair makes a simple nest in caves or on cliff clefts, especially ones with nearby roosting trees and open spaces for landing. A mated female lays one bluish-white egg every other year. Eggs are laid as early as January to as late as April. If the chick or egg is lost or removed, the parents will "double clutch". The eggs hatch after 53 to 60 days of incubation by both parents. Chicks are born with their eyes open and sometimes can take up to a week to leave the shell completely. They are able to fly after five to six months, but continue to roost and forage with their parents until they are in their second year. Ravens are the main predatory threat to condor eggs, while golden eagles and bears are potential predators of condor offspring.

Habitat – Optimal habitat: Foraging habitat is variable, but should contain a source of large mammal carrion.

Conservation Strategy

The objective of the conservation strategy for CACO is to permanently protect foraging habitat for CACO on the Conservation Lands. This includes the following measures:

- Permanently protect all habitat on the Conservation Lands.

- Leave dead livestock on-site to provide a source of carrion (with caveats). Livestock would be removed if they present a health risk to humans, livestock, or other Covered Species.

4.4 Habitat Overlap and Preferences Among Covered Species

As expected, habitat requirements and preferences for the Covered Species overlap in some areas and differ in others (Table 4). Terrain and soil preferences are generally similar with friable soils in areas of low relief being preferred by most species. The exception being soils with the wetland species, which need less permeable soils for breeding and estivation habitat. Even so, these breeding and estivation habitats are small in size and restricted to the areas of relatively low relief. This has relevance in that much of the management for the Covered Species can be focused on the flatter terrain, although SJKF, SJAS, and GKR have been shown to use steeper terrain. The steeper upper portions also are important as they form portions of the watershed, but management in these areas will be less intensive and mostly focus on maintaining the natural ecological processes and function in these areas. There is also widespread consistency with regards to herbaceous vegetation with most species preferring low vegetative cover and height. Diet preferences, as expected, differ because of the different trophic levels represented, but there are some consistencies with certain annual species of plants (e.g., *Erodium*, *Bromus*) being important food plants for the herbivore/granivores and grasshoppers and other insects being staples for BNLL and SJAS as well as being occasionally important for SJKF.

Woody cover preferences do appear to differ somewhat with some species preferring an open habitat whereas others may benefit from shrub cover. Fortunately, the Conservation Lands are of considerable size and therefore maintaining a mosaic of open grassland and low-density shrubland appropriately scaled according to home range size is feasible. Also, these preferences do not appear to be absolute, with GKR and SJKF able to occupy shrublands in some situations and all the desert species appear able to maintain viable populations in open grassland.

CACO differs from the other species in that it is far ranging and will likely only use the area for foraging since no nesting habitat is available on-site. Because it forages almost exclusively on carrion (USFWS 1996), maintaining the potential for this source of food on-site will be the main management objective for this species.

Table 4. Preferred habitat and diet preferences by Covered Species.

Common Name *Scientific Name*	Terrain	Soils	Herbaceous Vegetation	Woody Cover	Diet or Other Preferences
Giant kangaroo rat *Dipodomys ingens*	Low relief	Sandy loam	Low	Low or no shrub cover	Lepidium, Erodium, Bromus madritensis thought to be important
San Joaquin kit fox *Vulpes macrotis mutica*	Low relief	Loose-textured	Low	Low or no shrub cover	Generally rodents (especially kangaroo rats), but wide variety of other rodents, leporids, insects.
Blunt-nosed leopard lizard *Gambelia sila*	Low relief	NA	Low	Some shrub cover may be beneficial	Grasshoppers and other arthropods, smaller lizards
San Joaquin antelope squirrel *Ammospermophilus nelson*	Low relief or rolling hills	Sandy loam	Low	Some shrub cover may be beneficial, especially during droughts	Erodium, *Bromus madritensis*, Ephedra, Trifoium, grasshoppers and other arthropods thought to be important.
California tiger salamander *Ambystoma californiense*	Various including flat lands or foothills and upland terrain	NA	Low	None	Limited food intake for adults

Common Name *Scientific Name*	Terrain	Soils	Herbaceous Vegetation	Woody Cover	Diet or Other Preferences
Vernal pool branchiopods *Branchinecta lynchi* and possibly *B. longiantenna*, *B. conservatio*, and *Lepidurus packardi*	Low relief	NA	Native vernal pool vegetation	None	Generally bacteria, protozoa, algae, and detritus.
California condor *Gymnogyps californianus*	Foraging- No preferenc e	NA			Carrion, especially large mammals

5.0 *Management Implementation*

5.1 Background

While the management principles for this management plan have been outlined in Section 4, this section provides rationale for the specific management techniques as well as site-specific tasks and standards. Covered Species within the Panoche Valley have persisted for decades under current land uses and until new information demonstrates otherwise land uses such as grazing will be continued on the Conservation Lands. The goal is to maintain optimal vegetative conditions for Covered Species while maintaining well functioning ecosystem-level processes. The following discussion includes rationale and descriptions of widespread tasks such as vegetation management and access control as well as more intensive and spatially-focused tasks such as habitat restoration and translocation. Later specific tasks and standards are applied to each of the three conservation areas.

5.2 Vegetation Management

5.2.1 Manage For Herbaceous Structure

Because of the overlap with the Covered Species preferring low herbaceous vegetation (Table 4), this area will be a major target for management. Given the size of the Conservation Lands, most vegetation management will best be accomplished through extensive means such as livestock grazing.

Action – Implement Grazing Management Measures

Rationale – Grazing is the recommended means to maintain low herbaceous cover over large areas. The Panoche area is the northern limit for many of the Covered Species and grazing or some other type of vegetation management may be especially important to facilitate desert-like vegetation conditions. In the absence of heavy livestock grazing (especially in wet periods) the resulting vegetative production may make the habitat unsuitable for Covered Species. Grazing has been identified as beneficial during wet periods for some of these species at the Lokern Natural Area (Germano et al. 2012)—an area that receives roughly half the annual rainfall as Panoche. Grazing will also have the added benefit of reducing fire hazards in the area. Dry herbaceous vegetation is easily ignited and can swiftly carry fire across the landscape especially between April and October. By reducing these light fuels, fire spread rates are reduced and more easily controlled.

Risks/Challenges – Viable populations of Covered Species have persisted for many decades under current grazing conditions; sudden, large-scale or radical changes in management would be unnecessarily risky. Instead, changes to the current grazing regime will be relatively minor, incremental, and well-monitored.

Implementation Details – Livestock (cattle, sheep, horses, etc.) will continue to graze on the Conservation Lands, however, the grazing approach will seek to maximize benefits to the Covered Species and their habitat. To ensure that grazing practices will be managed to benefit the Covered Species the applicable standards and guidelines included in the BLM's Central California Standards for Rangeland Health and Guidelines for Livestock

Grazing (1999) (Standards and Guidelines) shall be incorporated into this HMP. Managing for desert-like habitat will have to be balanced with adequate rangeland health measures (such as soil protection, drought contingencies) in place so that ecosystem processes will continue to function appropriately. Grazing to meet management objectives will also have to be economically viable so that livestock operators will be willing to graze under the established conditions.

Livestock type **–** Historic accounts indicate that the Panoche area has been intensively grazed by both sheep and cattle. Today, most of flatter terrain is grazed by cattle, but seasonal sheep grazing is allowed by BLM in the Panoche Hills (Stacey Schmidt, personal communication). Sheep have some advantages over cattle in that fences are not needed and they are well suited for steeper terrain. Sheep are typically only grazed during the green season which could be positive or negative depending on how much forage reduction is needed. Cattle can be allowed to graze year-round and are typically better at controlling herbaceous vegetation and shrub cover.

Livestock class **–** This will be largely up to the operator, but a stocker operation (yearling steers and heifers) may provide the most flexibility. Under this scenario, stocker cattle would be purchased each year and then removed to a feedlot, sold, or moved to another pasture or range when residual dry matter (RDM) levels objectives have been met. Such an operation would provide considerable flexibility in terms of meeting range management objectives.

RDM targets by slope and vegetation type **–** California annual rangelands are typically managed for RDM. RDM is the amount of herbaceous plant material remaining at the end of the grazing season. This residue acts as a mulch which provides some protection from soil erosion and nutrient losses and provides a suitable germination environment for annuals. The amount of RDM influences herbaceous species composition (George et al. 2001) and habitat suitability for desert species (Germano et al. 2012).

Managing RDM levels in areas occupied by GKR is challenging because GKR (at high densities) can remove or bury substantial amounts of vegetative material over the summer months. Although clipping and caching is an important source of this removal, substantial amounts may be removed through their digging activities. Studies at the Lokern Preserve in June of 2011 found that vegetation was buried by about 2–4 inches of soil as a result of GKR digging activities. So, even without livestock grazing, during some years, GKR may reduce RDM levels to below the minimum suggested levels during the summer months. Therefore, RDM target levels will be assessed in May or June as opposed to the traditional fall time period. This will provide a better measure of livestock use than in the fall when use by livestock may be confounded by GKR effects on the landscape.

Because of GKR's ability to significantly modify RDM and bare ground levels, it is possible that grazing may not be needed in areas with high GKR abundance. However, the close association between GKR and heavy livestock grazing noted by many authors indicates that grazing may have a positive effect. In the spirit of making few changes to current land uses which have allowed for robust, viable populations of Covered Species, grazing will continue on the Conservation Lands for the foreseeable future.

Because the Conservation Lands have historically been heavily grazed and many of the Covered Species are desert adapted, RDM targets near the minimum suggested for soil protection are recommended (at least for the flatter terrain). As stated previously, this terrain has the highest density of Covered Species which have persisted for decades (if not longer) under grazing pressure. Therefore it is important to not make substantial changes in management. This terrain also is less subject to erosion than steeper areas and therefore there is less need for soil protection and thus a lower RDM level is acceptable from a rangeland health perspective. Bartolome et al. (2006) suggests minimum RDM levels (pounds/acre) of 300 on slopes of 0–10%, 400 on slopes of 10–20%, 500 on slopes of 20–40% and 600 on slopes greater than 40%. The first two slope classes are expected to cover most of the area inhabited by Covered Species and therefore a minimum RDM level of 350 pounds per acre is recommended in these areas. Since the RDM levels are expected to decline over the summer months, a buffer of 150 pounds/acre is added, bringing the RDM target in May/June to 500 pounds/acre which is consistent with that used in a study of the effects of grazing on many of these same Covered Species (Germano et al. 2011). Mulch management requirements established by BLM are similar, but generally less than those referenced above for Annual Grassland.

Although a target RDM of 500 lbs/acre will be managed for, in reality, grazing pressure is rarely uniform across the landscape and will include areas with more and areas with less than this amount, thereby creating a desirable mosaic of vegetation heights and densities.

Turnout criteria/range readiness – Turnout of livestock into a pasture will be allowed when RDM levels are at least 700 lbs/acre or 500 lbs/acre with at least 2 inches of new growth (following BLM Bakersfield guidelines for areas with listed species).

Vernal pools – The vernal pools within the Conservation Lands have experienced grazing over many decades. This important vegetation management tool can be used to control non-native annual grasses and other invasive plant species. Without vegetation management, non-native species can invade vernal pools, competing with native species and altering the hydrology of the pools. The primary management tool for the vernal pool habitat on the Conservation Lands will be through vegetation management activities such as grazing. Invasive plant species will be controlled as necessary. See Section 5.3.1 for more details regarding invasive plant species control.

5.2.2 Manage Woody Cover

Action – Increase Shrub Cover in Designated Areas

Rationale – Perennial shrubs can enhance the overall ecological health of the Conservation Lands by increasing diversity and helping to protect soil resources. Perennial shrub species have more established root systems than annual species and help hold the soil in place. Shrubs provide cover for BNLL and SJAS and may enhance habitat quality. *Atriplex* and *Ephedra* also are known food plants for SJAS and may have increased importance during years when annual plants fail to germinate, as is the case for Mohave ground squirrel, another state-listed species (Lietner & Lietner 1998).

Risks/Challenges – Establishing warm-season perennial shrubs in regions such as Panoche Valley is complicated by competition with fast-growing annual plants, seed predation and browsing by rodents, and lack of late-season rainfall in many years. Satisfactory conditions for recruitment and survival of seedlings are rare, but can occur during years of low rainfall or immediately after a drought when small mammal populations and annual cover is reduced. A drought year(s) followed by late-season rains in March/April is ideal for saltbush recruitment. Because this level of precision in long-term weather forecasting is not possible, the best strategy is often to seed in most years with the hope that conditions will be suitable for recruitment in some years. Wet years can be seeded as well, but application of broad-spectrum herbicides will likely be needed to control annual plants. If applied around January, good control of annuals can be achieved before saltbush has germinated, thereby reducing competition between the slow-growing perennial shrub seedlings and the rapidly growing annual plants.

Because some of the Covered Species differ in shrub cover requirements with SJKF and GKR generally preferring more open areas and SJAS and BNLL possibly benefiting from shrub cover, a landscape with a mosaic of open and low-density shrublands is recommended. Shrub cover targets in shrublands will generally be in the 1–10% range in relatively flat terrain. Higher shrub cover goals will be established in the steeper terrain as this terrain is generally not preferred by the two species that do best in open habitats. Establishing shrubs alongside washes would be a way to leverage their use by both BNLL and SJAS as both species are thought to prefer these areas (Best et al.1990; Warrick et al. 1998).

Implementation Details – The majority of the habitat within the Conservation Lands is currently open grassland, and creating a mosaic of habitat types will require establishing low-density saltbush stands in some areas. This may require restricting grazing through temporary fencing (e.g., electric) in some areas until the shrubs are established and of good size . This habitat enhancement (shrub establishment) should be phased in an effort to not change the character of the Conservation Lands too quickly. Establishing shrub patches and stringers along washes and roads and allowing for natural regeneration to expand the coverage is recommended. Shrub cover should be managed for the target cover, density, and distribution and tools such as prescribed fire or year-round grazing can be used as needed to decrease shrub cover and maintain the desired mix of habitat types.

Shrub establishment will be accomplished using low-impact and economical methods. Seed will be collected on-site, froman adjacent land, or from a local vendor. The ground will be prepared for seeding by pulling a spike-tooth harrow (5 feet wide) behind a four-wheel-drive pickup or ATV. Saltbush seed will then be hand broadcasted over the harrowed area at a rate of approximately 30 pounds per acre. After seeding, the area will again be harrowed to lightly cover the broadcast seed with soil. If the ground is compacted, two to five passes with the harrow will be made before and after seeding. Once a good crop of seedlings has germinated it will be protected from livestock trampling and browsing by temporary fencing (e.g., electric).

Riparian areas **–** Riparian areas are generally degraded from continuous livestock grazing with either no woody cover or widely spaced cottonwood trees in a savanna-like structure. Pristine riparian areas in the Panoche Valley region were once probably more thickly wooded than today with stands of cottonwood, sycamore, willows and a heavier understory. These areas are in sharp contrast with the open sparsely vegetated areas that characterize the habitat of several Covered Species that are desert adapted and therefore pose a challenge for management. On one hand, heavily wooded riparian areas add considerable diversity to the system and help with erosion control. However, they are probably unsuitable habitat for desert species and may serve to restrict movements,gene flow, and may even serve as population sinks for some species. For example, hundreds of SJKF occupy the city of Bakersfield, but generally avoid the natural riparian areas along the Kern River where they are often killed by larger predators. Shaughnessy (2003) found that the closely related swift fox (*Vulpes velox*) also avoided riparian areas and other areas with high coyote detection rates. Increased tree cover and structure may also harbor more raptors which could prey on covered rodent species and BNLL. In addition, thickly wooded riparian areas (depending on location and extent) could be a barrier to movement for desert species. For example, Panoche Creek runs basically east/west through the Conservation Lands and if thickly wooded, could restrict movement and gene flow from SCRCL to the VFCL and VRCL to the north. Therefore large changes in riparian structure are not recommended because of the attendant risks for desert species. Instead, the riparian areas will be managed to maintain a mosaic of open cottonwood savanna (current state) with interspersed denser stands.

5.2.3 Wetlands Management

Action- Management of Vegetation and Hydrology in CTS breeding ponds

Rationale – To be desirable for CTS breeding, ponds will be managed to have minimal to moderate levels of emergent vegetation (Ford et al. 2013). Having a diversity of microhabitats, including depths ranging from shallow to deep, spatial distribution and abundant diversity of submerged and emergent vegetation, and temperature ranges can be helpful in creating optimal CTS habitat for various life stages and predator avoidance areas (Ford et al. 2013).

Risks/Challenges – Over time, emergent vegetation can dominate a pond, increasing siltation and changing the hydrology of the pond. The ponds will be managed (e.g., through cattle grazing) to have a mosaic of habitats and over abundance of emergent vegetation will be addressed if found to decrease the habitat for CTS. Abundant submerged vegetation will not be removed because it can help in reducing predation. Invasive plant species will be controlled as necessary (see Section 5.3.1 for more details regarding invasive plant species control).

Implementation Details – The ponds will be at least partially grazed to control vegetation and create turbidity to reduce predation on CTS. Therefore, the ponds will be managed to have a mosaic of habitats.

5.3 Invasive Species Control

The Conservation Land Manager will implement control measures (e.g. selective herbicide) to reduce the extent of tamarisk and other invasive plants rated as "high" by the California Invasive Plant Council for which effective eradication methods have been established. In addition, should Covered Species monitoring indicate that feral pig habitat damage is negatively affecting Conservation Lands directly or through habitat impacts, the Conservation Land Manager will consult with CDFW to establish feral pig control measures on Conservation Lands. Any such program will be subject to all take avoidance and minimization measures contained in this HMP and any additional measures deemed necessary to adequately protect Covered Species (e.g., timing, general location of activities, etc.).

5.3.1 Plants

Action- Control invasive plant species that are identified as a threat or potential threat to Covered Species

Rationale – Invasive plants have disrupted ecosystems by outcompeting native plant species and changing the habitat structure and function in many natural areas. The Panoche area is no exception with non-native annual species being the dominant annual species in many years. Non-native grasses in particular may have substantially changed the character and structure of the habitat from what it was before European contact.

Risks/Challenges – Certain non-native species (e.g., filaree, red brome) are so abundant that eradication is not feasible. Such a task, even if it was reasonably possible, would be risky in that it would be cause a substantial change to current conditions and would eliminate at least two possibly important food plants for GKR and SJAS.

Implementation Details –Non-native species such as filaree, red brome and other naturalized non-natives will not be targeted for intensive control, but rather broad-scale tools such as cattle grazing will be used to manage for an appropriate habitat structure. Most of the intensive invasive species control will be directed towards newly arrived non-natives and exotics that are clearly detrimental to the system and have more localized distributions.

If newly arrived or newly discovered invasive plant species are observed within the Conservation Lands that are considered detrimental to the conservation values, measures will be taken to control those populations. Any new invasive plant species observed during all other biological surveys will be noted. If observed, those new populations will be mapped and a control plan will be developed. Measures such as manual removal, targeted grazing, mowing, or pesticide use could be used, among others. If pesticide use is determined to be the most effective control method, a Pesticide Control Advisor (PCA) and the appropriate regulatory agencies will be consulted to determine the most effective and least impactful method to treat the Conservation Lands. Pesticides will only be applied by a licensed applicator who is familiar with using pesticides in these habitat types and in the vicinity of sensitive species and habitats. Pesticides will only be applied using EPA-approved products and in a manner that is consistent with the labels.

5.3.2 Animals

Action – Control non-native and/or feral animal populations that are identified as a threat or potential threat to Covered Species.

Rationale – Like exotic plants, non-native animals can also disrupt ecosystems and in some cases cause the extinction of native species (Vitousek 1990; Hobbs & Huenneke 1992). Feral animals are not known to be a clear threat to the Panoche area ecosystem at this time, but species such as feral pigs and bullfrogs could cause problems in the future. Feral pigs have been found on portions of Silver Creek Ranch (author observation) and are abundant in the adjacent Diablo Range. Feral pigs typically increase soil disturbance and facilitate colonization by non-native species through their rooting activities (Hall Cushman et al. 2004) and thereby alter the composition of the vegetative community. Bullfrogs are known to be a significant predator of CTS larvae (Trenham & Shaffer 2005; USFWS 2010; Ford et al. 2013). Pools with permanent water are not optimal for breeding of CTS because bullfrogs can get established and predate heavily on CTS (USFWS 2010; Ford et al. 2013). Seasonal ponds that dry out during a portion of the year decrease the chances of bullfrogs establishing populations in these ponds.

Risks/Challenges – Feral pigs can be controlled by various lethal trapping and hunting methods, but eradication in areas other than island settings is virtually impossible.

Implementation Details – Although feral pigs do not appear to be a threat to the community at this time, a contingency plan for controlling their numbers should be developed, should they become a problem. This plan includes leaving provisions in the Conservation Easement for hunting or trapping for management purposes and some funds for trapping equipment and labor.

Bullfrogs have not been noted on the Conservation Lands but will be noted if present during larval surveys for CTS within existing and created pond(s). If it is determined that bullfrogs or non-native fish are present within a pond, that pond will be monitored to ensure that it dries out sufficiently during the dry season. Additional measures will be implemented if the pond is still inundated during August. The pond will be drained by pumping for approximately two to three weeks in late August to early September. Completely draining at this time of year will kill any bullfrog tadpoles or fish, but will avoid impacts to CTS larvae. Once the pond is dry, it will be allowed to refill through natural processes. All necessary permits and consultation with the regulatory agencies will be completed prior to implementing this activity. Through this consultation, the most effective means of draining the pond while minimizing the impact on listed species will be determined.

5.4 General Land Protection Measures

The Conservation Land Manager will provide and/or contract all equipment and personnel necessary to maintain fencing, access, operations, and other management activities on the Conservation Lands.

5.4.1 Access Control/Site Security

Action – Restrict access to the site by the public

Rationale – Access control is important in preventing or curtailing a variety of threats (off-road vehicle use, trespass grazing, wildfire, vandalism) to the Conservation Lands. Patrolling in combination with proper signs and fencing is expected to prevent or lessen any illegal or inappropriate activities by the public.

Risks/Challenges – The Conservation Lands are a large area and restricting access to its various boundaries and areas will be challenging. Fencing and signage will deter trespass but may not restrict access.

Implementation Details – At a minimum, Conservation Lands shall be surrounded by fencing that prohibits access that could impact Covered Species, outside of the activities described in this HMP. Perimeter fencing may be inclusive of adjacent lands if consistent management activities are implemented within all such pastures. All gates shall be locked and all public roads shall include signage at an interval of no less than 500 feet. The managing entity will have personnel on-site during much of the year conducting field tasks, but some patrolling will be needed during the winter months and at other times of limited field work. Signs will be placed along the boundaries of the Conservation Lands, especially along major roads and entryways. The Conservation Land Manager will also conduct public outreach to local schools and media to foster appreciation of the Conservation Lands and the habitat and species therein. Barbed wire fencing and locked gates will be maintained along the border between the Conservation Lands and adjacent private lands. In areas where the Conservation Lands are adjacent and contiguous with BLM pastures, no additional fence will be constructed or maintained. Incidents of trespass and other security issues shall be reported to USFWS and CDFW at least annually.

5.4.2 Debris Removal

Action –Litter and illegal dumping debris will be removed from the Conservation Lands.

Rationale – Litter and dumping areas can lead to an accumulation of material that can be harmful to Covered Species and their habitat.

Risks/Challenges – The Conservation Lands are large and identification of illegal dumping areas may take time to be discovered. General litter will require constant upkeep to be manageable.

Implementation Details – During site visits, the Conservation Land Manager will pick up trash and other debris or record the location of such debris so that it can be picked up at a later date.

5.5 Site-Specific Management Objectives and Actions

5.5.1 Valadeao Ranch

Summary of Current Conditions

As described previously, the VRCL are contiguous with the Project Footprint directly to the west, east, and northeast of the site (Figures 2 and 4). These lands are also contiguous with the VFCL and SCRCL. VRCL also includes several seasonal drainages. The property is dominated by Annual Grassland (approximately 6,700 acres) and ephedra shrubland (approximately 2,700 acres), and also supports Saltbush Shrubland, and smaller amounts of Juniper and Oak Woodlands. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 3,013 acres with slopes between 0 and 11% (range of slope gradient that defines one parameter of highly suitable habitat for several of the T&E species discussed in this document). Elevations on the VRCL range from approximately 1,400 feet to 2,100 feet above mean sea level (amsl).

T&E species observed (either directly or by their sign) on the VRCL include CTS, SJAS, GKR, and SJKF. Portions of the VRCL were found to be suitable for BNLL, SJAS, GKR, CTS, and SJKF in differing acreage amounts. The VRCL also support one known CTS breeding pond and estivation habitat for an additional known CTS breeding pond located on private land. This breeding pond and estivation habitat for both ponds will be preserved in perpetuity and will increase the mitigation value for CTS.

There are vernal pools within the VRCL that are potential habitat for listed vernal pool branchiopod species such as VPFS, CFS, LHFS, and VPTS. As part of the overall conservation strategy, these pools will be protected and managed in perpetuity.

Management objectives and tasks for the VRCL are summarized in Table 5.

5.5.2 Valley Floor Conservation Land

The VFCL encompass approximately 2,523 acres that are contiguous with the Project Site (Figures 2 and 3). These lands include several seasonal drainages and all of Panoche Creek that lies within the Project Site boundary, which is usually a deep-cut dry wash for most of the year, as well as the 100-year floodplain that bisects the Project site in two places. The VFCL provides corridors or landscape linkages for all of the T&E Species across the valley floor. These lands are comprised of mostly Annual Grassland habitat with smaller areas of wash/drainage and vernal pool and pond habitat. This area is generally flat with slopes less than 11%.

There are four ponds within the VFCL. CTS were historically documented at two of these ponds (Ponds #8 and #9). As part of the conservation strategy, they will be protected and managed in perpetuity. Historically CTS have been documented in the major drainages within the VFCL. Suitable estivation habitat is considered grasslands within 6,336 feet of breeding ponds.

Other T&E species observed (either directly or by their sign) on the VFCL include GKR, SJKF, SJAS and BNLL. Portions of the VFCL were found to be suitable for CTS.

There are vernal pools within the VFCL that are potential for listed vernal pool branchiopod species such as VPFS, CFS, LHFS, and VPTS. As part of the overall conservation strategy, these pools will be protected and managed in perpetuity.

Management objectives and tasks for the VFCL are summarized in Table 6.

Table 5. Management and Monitoring Objectives and Tasks for Valadeao Ranch Conservation Land

Metric	Objective	Tasks
Structure of herbaceous vegetation	*Objective 1:* Maintain relatively low herbaceous biomass to provide suitable habitat for desert species in most of the flat to gently sloping terrain, while balancing the need for adequate soil protection.	*Task 1:* Use of livestock grazing or pasture rest to keep RDM levels between approximately 500 and 1,000 pounds per acre in May/June on all pastures
		Task 2: RDM will be monitored on at least six permanent plots (three grazed, three ungrazed) once per year. This will include a minimum of 20 estimates (clip and weigh) of RDM per plot.
		Task 3: RDM will be estimated throughout the conservation area using a combination of clip-plots and visual estimation.
Structure of woody vegetation	*Objective 2:* Restore shrub cover on approximately 500 acres of relatively flat terrain to enhance cover for BNLL and SJAS.	*Task 4:* Use harrow and hand seeding techniques described above. Roughly parallel strips (5 feet wide) at a frequency of two per quarter mile will be prepared and seeded with Atriplex and/or Ephedra seed throughout a 500-acre area. This will be repeated at least once every three years on average until a goal of 1–5% shrub cover is established within the 500 acre area.
		Task 5: Seeded strips will be walked in May or June and the number of shrub seedings will be counted over the entire strip or a strip sample (depending on density). After 3 years of growth, the strips will be sampled for percent shrub cover to determine if objectives have been met.
	Objective 3: Maintain at least 50% of the low-relief area in open grassland with few shrubs (<1%).	*Task 6:* Moderate to high livestock grazing levels (including warm-season grazing) will be used to achieve this objective.
		Task 7: Shrub cover levels will be monitored approximately once per five years by using aerial imagery.
Herbaceous species composition	*Objective 4:* Maintain herbaceous cover species which include some known food plants for GKR (e.g., peppergrass, goldfields, filaree, red brome) through similar grazing patterns that have maintained this mix in the past. Annual changes in abundance and composition of food plants are expected due to fluctuations in rainfall levels.	*Task 8:* Vernal pool species composition will be monitored annually for the first three years and every five years thereafter.
		Task 9: Similar livestock grazing regimes that have supported GKR and their food plants will be continued.
		*Task 10:*Herbaceous species composition will be determined by point-intercept methods described earlier with at least 200 intercepts per plot on at least 3 pairs of plots.
	Objective 5: Monitor annual climatic data	*Task 11:* Establish at least one rain gauge on Valdeao Ranch and monitor precipitation at least monthly.
Key species monitoring objectives and measures	*Objective 6*: Enhance breeding habitat for CTS	*Task 12*: Create up to two CTS breeding ponds.
		Task 13: Perform larval surveys annually for the first three years and then every three years afterwards.
		Task 14: Monitor hydrology within ponds annually for the first three years and once every three years thereafter. Monitor rainfall levels annually.
		Task 15: Perform qualitative surveys of pond condition once during the wet season and once during the dry season.
	Objective 7: Protect current CTS potential breeding ponds	*Task 16:* Continue livestock grazing at similar levels that have maintained CTS in the past.
	Objective 8: Protect potential CTS estivation habitat	*Task 17:* Same as Task 3 above.
		Task 18: Continue livestock grazing at similar levels that have maintained CTS in the past.
		Task 19: Preform qualitative surveys of potential estivation habitat surrounding each pond once during the wet season and once during the dry season.
	Objective 9: Assess trends in abundance of giant kangaroo rats	*Task 20:* Nocturnal small mammals will be monitored once per year using live-trapping methods. Compare abundance trends over time and between grazed and ungrazed plots.
	Objective 10: Assess trends in abundance and distribution of SJKF	*Task 21:* SJKF abundance and distribution will be determined annually using camera stations.
	Objective 11: Assess trends in abundance and distribution of SJAS and BNLL	*Task 22:* SJAS and BNLL abundance and distribution will be determined annually using road surveys.
	Objective 12: Determine presence and distribution of vernal pool branchiopod	*Task 23:* Conduct protocol-level surveys for branchiopod species for two consecutive years. If no listed branchiopod species are observed, conduct protocol-level surveys every 15 years to determine if the status has changed.
		Task 24: Conduct modified wet-season surveys every three years if branchiopods are found.

Metric	Objective	Tasks
		Task 25: Monitor pool hydrology by recording water depth, extent of inundation twice/month during the west season annually for the first three years and every three years thereafter.
	Objective 13: Minimize the risk and spread of new invasive plant infestations	*Task 26:* The use of supplemental feed will be prohibited.
		Task 27: Any newly discovered invasive plant species will be promptly eradicated or controlled with the goal of eventual eradication. A control plan will be developed for those invasive species where multi-year control is needed.
		Task 28: Any new invasive plant species observed during other biological surveys will be noted and mapped. Monitoring on treated sites will be conducted annually for at least three years to determine if the species has been eradicated or if further control is needed.
	Objective 14: Restore habitat as dump sites	*Task 29:*Implement provisions of WMMP.
	Objective 15: Protect vernal pool habitat	*Task 30:* Continue livestock grazing at levels that are known to enhance or maintain vernal pool conservation values.
		Task 31: Qualitatively survey the pools once during the peak flowering period. Photos will be taken and notes recorded on habitat quality, signs of altered hydrology, sedimentation or erosion, invasive plants, and any damage to the pool or surrounding uplands.
	Objective 16: Control public access	Task 32: Construct new fence or maintain current boundary fence in areas where conservation borders private land.
		Task 33: Coordinate with BLM regarding access in areas where conservation land borders BLM land and there is no boundary fence.
		Task 34: Put up boundary signs at a rate of not less than one every 500 feet along the entire boundary.
		Task 35: Remove debris or trash shortly after located to prevent further dumping.

Table 6. Management and Monitoring Objectives and Tasks for Valley Floor Conservation Land

Metric	Objective	Tasks
Structure of herbaceous vegetation	*Objective 1:* Maintain relatively low herbaceous biomass to provide suitable habitat for desert species in most of the flat to gently sloping terrain, while balancing the need for adequate soil protection.	*Task 1:* Use of livestock grazing or pasture rest to keep RDM levels between approximately 500 and 1,000 pounds per acre in May/June on all pastures
		Task 2: RDM will be monitored on at least sixpermanent plots (three grazed, three ungrazed) once per year. This will include a minimum of 20 estimates (clip and weigh) of RDM per plot.
		Task 3: RDM will be estimated throughout the conservation area using a combination of clip-plots and visual estimation.
Structure of woody vegetation	*Objective 2:* Restore shrub cover on approximately 500 acres of relatively flat terrain to enhance cover for BNLL and SJAS.	*Task 4:* Use harrow and hand seeding techniques described above. Roughly parallel strips (5 feet wide) at a frequency of two per quarter mile will be prepared and seeded with Atriplex and/or Ephedra seed throughout a 500-acre area. This will be repeated at least once every three years on average until a goal of 1–5% shrub cover is established within the 500 acre area.
		Task 5: Seeded strips will be walked in May or June and the number of shrub seedings will be counted over the entire strip or a strip sample (depending on density). After 3 years of growth, the strips will be sampled for percent shrub cover to determine if objectives have been met.
	Objective 3: Maintain at least 50% of the low-relief area in open grassland with few shrubs (<1%).	*Task 6:* Moderate to high livestock grazing levels (including warm-season grazing) will be used to achieve this objective.
		Task 7: Shrub cover levels will be monitored approximately once per five years by using aerial imagery.
Herbaceous species composition	*Objective 4:* Maintain herbaceous cover species which include some known food plants for GKR (e.g., peppergrass, goldfields, filaree, red brome) through similar grazing patterns that have maintained this mix in the past. Annual changes in abundance and composition of food plants are expected due to fluctuations in rainfall levels.	*Task 8:* Vernal pool species composition will be monitored annually for the first three years and every five years thereafter.
		Task 9: Similar livestock grazing regimes that have supported GKR and their food plants will be continued.
		Task 10: Herbaceous species composition will be determined by point-intercept methods described earlier with at least 200 intercepts per plot on at least 3 pairs of plots.

Metric	Objective	Tasks
	Objective 5: Monitor annual climatic data	*Task 11:* Establish at least one rain gauge on VFCL and monitor precipitation at least monthly.
	Objective 8: Protect potential CTS estivation habitat	*Task 15:* Continue livestock grazing at similar levels that have maintained CTS in the past.
		Task 16: Preform qualitative surveys of potential estivation habitat surrounding each pond once during the wet season and once during the dry season.
Key species monitoring objectives and measures	*Objective 7*: Protect current CTS potential breeding ponds	*Task 12*: Continue livestock grazing at similar levels that have maintained CTS in the past.
		Task 13: Monitor hydrology within ponds annually for the first three years and once every three years thereafter. Monitor rainfall levels annually. Perform larval surveys annually for the first three years and then every three years afterwards.
		Task 14: Perform qualitative surveys of pond condition once during the wet season and once during the dry season.
	Objective 9: Assess trends in abundance of giant kangaroo rats	*Task 17:* Nocturnal small mammals will be monitored once per year using live-trapping methods. Compare abundance trends over time and between grazed and ungrazed plots.
	Objective 10: Assess trends in abundance and distribution of SJKF	*Task 18:* Kit fox abundance and distribution will be determined annually using camera stations.
	Objective 11: Assess trends in abundance and distribution of SJAS and BNLL	*Task 19:* SJAS and BNLL abundance and distribution will be determined annually using road surveys.
	Objective 12: Determine presence and distribution of vernal pool brachiopod	*Task 20:* Conduct protocol-level surveys for branchiopod species for two consecutive years. If no listed branchiopod species are observed, conduct protocol-level surveys every 15 years to determine if the status has changed.
		Task 21: Conduct modified wet-season surveys every three years if branchiopods are found.
		Task 22: Monitor pool hydrology by recording water depth, extent of inundation twice/month during the west season annually for the first three years and every three years thereafter.
	Objective 13: Minimize the risk and spread of new invasive plant infestations	*Task 23:* The use of supplemental feed will be prohibited.
		Task 24: Any newly discovered invasive plant species will be promptly eradicated or controlled with the goal of eventual eradication. A control plan will be developed for those invasive species where multi-year control is needed.
		Task 25: Any new invasive plant species observed during other biological surveys will be noted and mapped. Monitoring on treated sites will be conducted annually for at least three years to determine if the species has been eradicated or if further control is needed.
	Objective 14: Restore habitat as dump sites	*Task 26:* Implement provisions of WMMP.
	Objective 15: Protect vernal pool habitat	*Task 27:* Continue livestock grazing at levels that are known to enhance or maintain vernal pool conservation values.
		Task 28: Qualitatively survey the pools once during the peak flowering period. Photos will be taken and notes recorded on habitat quality, signs of altered hydrology, sedimentation or erosion, invasive plants, and any damage to the pool or surrounding uplands.
	Objective 16: Control public access	Task 29: Construct new fence or maintain current boundary fence in areas where conservation borders private land.
		Task 30: Coordinate with BLM regarding access in areas where conservation land borders BLM land and there is no boundary fence.
		Task 31: Put up boundary signs at a rate of not less than one every 500 feet along the entire boundary.
		Task 32: Remove debris or trash shortly after located to prevent further dumping.
	Objective 17: Salvage GKR that would likely be killed during project construction	*Task 33:* Capture GKR within the project footprint in accordance with GKR Relocation Plan.
		Task 34: Relocate GKR to suitable but unoccupied habitat on VFCL in accordance with GKR Relocation Plan
		Task 35: Monitor success of GKR colony for 5years.

5.5.3 Silver Creek Ranch

The SCRCL, which is approximately 10,890 acres, is located southeast of the Project Footprint (Figures 2 and 5). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. Annual Grasslands comprise the majority of ground cover on the site (approximately 8,400 acres) which can be dominated by non-native species in some years. The site also supports ephedra shrubland (approximately 2,260 acres), riparian areas, seeps, springs, and barrens. An area of tamarisk shrubland occurs along Silver Creek and in other areas nearby the creek. Field visits have indicated there are also emergent wetlands and marshes occurring along Panoche Creek. These lands include several seasonal drainages as well as upland habitat.

The purchase and management of the Silver Creek Ranch as conservation land is one of the most significant conservation actions for threatened and endangered species of the San Joaquin Valley. This ranch is specifically mentioned in the USFWS Recovery Plan as a high priority acquisition for the recovery of GKR and BNLL and it is a significant component of the northern core area for SJKF and SJAS. The site has had widespread and dense populations of GKR for many decades as well as concentrations of SJAS, SJKF, and BNLL sightings as well. Because the area has supported good numbers of several T&E species, a conservative approach to management is recommended. Similar land uses such as grazing will continue and only localized habitat enhancement will be attempted.

Management objectives and tasks for Silver Creek Ranch are summarized in Table 7.

Table 7. Management and Monitoring Objectives and Tasks for Silver Creek Ranch Conservation Land

Metric	Objective	Tasks
Structure of herbaceous vegetation	*Objective 1:* Maintain relatively low herbaceous biomass to provide suitable habitat for desert species in most of the flat to gently sloping terrain, while balancing the need for adequate soil protection.	*Task 1:* Use of livestock grazing or pasture rest to keep RDM levels between approximately 500 and 1,000 pounds per acre in May/June on all pastures.
		Task 2: RDM will be monitored on at least twelve permanent plots (six grazed, six ungrazed) once per year. This will include a minimum of 20 estimates (clip and weigh) of RDM per plot.
		Task 3: RDM will be estimated throughout the conservation area using a combination of clip-plots and visual estimation.
Structure of woody vegetation	*Objective 2:* Maintain at least 50% of the low-relief area in open grassland with few shrubs (<1%).	*Task 4:* Moderate to high livestock grazing levels (including warm-season grazing) will be used to achieve this objective.
		Task 5: Shrub cover levels will be monitored approximately once per five years by using aerial imagery.
		Task 7: Herbaceous species composition will be determined by point-intercept methods described earlier with at least 200 intercepts per plot on at least six pairs of plots.
	Objective 4: Monitor annual climatic data	*Task 8:* Establish at least one rain gauge on SCRCL and monitor precipitation at least monthly.
Key species monitoring objectives and measures	*Objective 6*: Protect current CTS potential breeding ponds	*Task 12*: Continue livestock grazing at similar levels that have maintained CTS in the past.
		Task 13: Monitor hydrology within ponds annually for the first three years and once every three years thereafter. Monitor rainfall levels annually. Perform larval surveys annually for the first three years and then every three years afterwards.
	Objective 7: Assess trends in abundance of giant kangaroo rats	*Task 14:* Nocturnal small mammals will be monitored once per year using live-trapping methods. Compare abundance trends over time and between grazed and ungrazed plots.
	Objective 8: Assess trends in abundance and distribution of SJKF	*Task 15:* Kit fox abundance and distribution will be determined annually using camera stations.
	Objective 9: Assess trends in abundance and distribution of SJAS and BNLL	*Task 16:* SJAS and BNLL abundance and distribution will be determined annually using road surveys.
	Objective 10: Determine presence and distribution of vernal pool branchiopod	*Task 17:* Conduct protocol-level surveys for branchiopod species for two consecutive years. If no listed branchiopod species are observed, conduct protocol-level surveys every 15 years to determine if the status has changed.
		Task 18: Conduct modified wet-season surveys every three years if branchiopods are found.
		Task 19: Monitor pool hydrology by recording water depth, extent of inundation twice/month during the west season annually for the first three years and every three years thereafter.
	Objective 11: Minimize the risk and spread of new invasive plant infestations	*Task 20:* The use of supplemental feed will be prohibited.
		Task 21: Any newly discovered invasive plant species will be promptly eradicated or controlled with the goal of eventual eradication. A control plan will be developed for those invasive species where multi-year control is needed.
		Task 22: Any new invasive plant species observed during other biological surveys will be noted and mapped. Monitoring on treated sites will be conducted annually for at least three years to determine if the species has been eradicated or if further control is needed.
	Objective 12: Restore habitat as dump sites	*Task 23:* Implement provisions of WMMP.
	Objective 13: Protect vernal pool habitat (if present)	*Task 24:* Continue livestock grazing at levels that are known to enhance or maintain vernal pool conservation values.
		Task 25: Qualitatively survey the pools once during the peak flowering period. Photos will be taken and notes recorded on habitat quality, signs of altered hydrology, sedimentation or erosion, invasive plants, and any damage to the pool or surrounding uplands.
	Objective 14: Control public access	*Task 26*: Construct new fence or maintain current boundary fence in areas where conservation borders private land.
		Task 27: Coordinate with BLM regarding access in areas where conservation land borders BLM land and there is no boundary fence.
		Task 28: Put up boundary signs at a rate of not less than one every 500 feet along the entire boundary.

Metric	Objective	Tasks
		Task 29: Remove debris or trash shortly after located to prevent further dumping.

6.0 Monitoring Details

The Conservation Land Manager will implement species-specific survey and monitoring tasks to establish current Covered Species habitat use and allow for determination of measurable changes in habitat use and population trends. Survey and monitoring tasks will be designed in a way that allows for tracking of long term trends in Covered Species persistence, habitat use, and estimates of relative population levels on the Conservation Lands.

The Conservation Land Manager will implement monitoring and reporting tasks that will provide responsible agencies with sufficient information to determine that Conservation Lands are sufficiently mitigating impacts to Covered Species and their habitat. All management, research and other activities allowed on the Conservation Lands will include documentation of types of measurements used, pre and post-activity measurements and measured net loss or gain to the Covered Species affected.

Monitoring will be designed to accomplish multiple goals and objectives.

- First, monitoring will be used to track the abundance and distribution of Covered Species.
- Secondly, it will be used to monitor the effectiveness of management so that needed adjustments can be made to management strategies and implementation. When possible, monitoring will be set up experimentally to evaluate management effectiveness.
- Thirdly, monitoring will be used to model the Panoche ecosystem in an effort to learn more about competition and other important drivers in the system. This latter objective will largely be accomplished by monitoring precipitation and multiple species and trophic levels concurrently on permanent plots, allowing for more efficient data collection and evaluation of relationships among species.

Monitoring frequency and effort will vary depending on a species' legal status, importance to the system, ease of monitoring, and sensitivity to management treatments. For example, GKR meets all the above criteria and will be one of the main focal points of monitoring. Vegetation is a primary driver of the system and a focus of management, therefore it also will be monitored frequently. SJKF, on the other hand, occur at much lower densities and are more difficult to monitor, so their abundance will be monitored less intensively and likely will not be a response variable in any experimental designs.

Monitoring will occur at two levels. First, a relatively intensive monitoring protocol will be established within permanent monitoring plots. Secondly, a series of less intensive, but generally more extensive monitoring will be applied throughout much of the Conservation Lands for species or key variables that are not suitably captured on the monitoring plots. Each type of monitoring is described in more detail below.

6.1 Monitoring Plots

The abundance of key animal and plant species will be monitored on a series of permanent monitoring plots. These plots will be approximately 40 acres in size and paired so that management treatments can be evaluated. Multiple species and trophic levels will be monitored concurrently, allowing for more efficient data collection and evaluation of relationships among species.

Initially, the monitoring plots will be designed to evaluate the effects of livestock grazing on vegetative structure, composition, and abundance of small mammals. Livestock grazing is a historic land use within the Panoche area and it may provide a cost-effective method of vegetation management during wet periods. However, questions remain about possible negative effects during droughts and current research from Brashare's group indicate that GKR have a profound influence on vegetation species composition and production and can remove as much or more vegetation than cattle during some years. Therefore, a legitimate question is whether GKR (at high densities) can modify the habitat sufficiently that livestock may not be needed. Thus questions about grazing and GKR effects on the habitat have important management implications and should be studied further. Long-term monitoring will help answer these questions and be a valuable and efficient way of doing so.

There will be a total of 12 pairs of monitoring plots set up on the Conservation Lands with 6 pairs on SCRCL, and 3 pairs each on the remaining two areas (VFCL and VRCL). Because of the great variability in annual rainfall and resulting vegetative cover and production, control plots are needed to sort out the effects of variation in rainfall. Therefore each pair of plots will consist of one treatment (grazed) and one adjacent control plot (non-grazed) in areas of high GKR density (note this may not be possible on VRCL). The control plots will be approximately 40 acres in size and fenced and the treatment plots will be the same size (for monitoring purposes) but will not be independent of (fenced off) the larger existing grazed pastures. Specific objectives are to compare the relative abundance of GKR and other nocturnal rodents, diurnal animals and plant species composition and production between grazing treatments. It is anticipated that this initial monitoring study will last at least several years to span a wide range of annual rainfall levels and corresponding densities in herbaceous vegetation.

6.1.1 Animal and Plant Surveys on Monitoring Plots

To determine the relative abundance of nocturnal rodents, one small mammal trapping grid (7x7 pattern, 10-meter spacing) will be placed within the center of each plot. Nocturnal rodent abundance will be monitored for five consecutive nights at each site. Non-folding Sherman live traps will be opened and baited one hour before sunset and checked 2.5 hours after sunset. Each trapping session will likely be spread over three weeks in August and/or September of each year. Captured rodents will be identified to species, marked by fur clipping or with temporary fur dye, weighed, sexed, and released at the capture site.

One diurnal monitoring transect will be established within each monitoring plot to assess the abundance of grasshoppers, diurnal mammals, birds and herpetiles. Each transect will be 800 meters in length and will form a square approximately 100 meters inside each plot. Each transect will be slowly walked in May and the number of birds, herpetiles and diurnal mammals seen during the transect will be recorded. For each sighting, the approximate distance from the transect line also will be recorded. Each transect will be repeated three times/year.

Data on vegetative cover will be collected near the end of the growing season (usually March) using the point-intercept method. Four 50-meter transects will be established within each experimental plot and an estimate of vascular plant cover will be determined from the intercept (Bonham 1989) of 100 points along each transect (50 centimeter spacing). Species richness surveys will be conducted by recording all species within 1 meter of the transect to result in a 100 square meter survey plot. Total vegetation cover and the estimated absolute cover of each species along the transect will be recorded. Plant guilds such as native forbs, non-native forbs, native grasses, and non-native grasses will be summarized across the transects.

RDM will be estimated by harvesting, drying, and weighing all grass and forb plants within five 1/4 m^2 plots along each vegetation transect in May or June.

6.1.2 Other Monitoring

As mentioned previously, other monitoring will be performed to capture key species or variables that are not adequately monitored within the above monitoring plots. Examples include precipitation, ranch-wide RDM, SJKF, BNLL, SJAS and wetland-associated species such as CTS.

Precipitation Data

Annual precipitation levels are thought to greatly influence the abundance and distribution of plant and animal species in the Panoche area. Therefore, precipitation data from a minimum of three on-site rain gauges will be collected and summarized to determine the effects of this important variable.

6.2 RDM

Monitoring residual dry matter (RDM) is important for managing California annual rangelands. Although RDM will be monitored on the plots described above, this will only cover a small portion of the ranch. Therefore a more rapid estimation technique suitable for large areas will be employed throughout the entirety of the Conservation Lands (Guenther and Hayes 2008) in May and June. Using this method, a total of five RDM zones will be established (Table 8). This method will also include performing a series of clip plots in key areas with differing aspects, elevations, and vegetation types to calibrate the surveyor's visual estimates, and traversing much of the Conservation Lands and visually estimating and mapping the area. Key areas should be located within relatively uniform vegetation and away from areas of heavy use by cattle (e.g., watering points). RDM will be measured and photographs will be taken at a minimum of 30 key areas each year for calibration purposes. Photographed key areas will include a robel pole and golf balls for scale and for determining vegetation height. Qualitative information on vegetation composition and structure will be collected at each key area to assess quality of estivation habitat for CTS. Color-coded maps showing RDM zones within each pasture and for the entire conservation area will be produced annually.

RDM will also be measured and or estimated to determine range readiness before livestock are turned out on a given pasture.

Table 8. RDM Objectives and Zone Descriptions

RDM Objective	RDM Class	RDM Description	Color Code
500–1000 lbs/acre	<250	Very Low	
	250–499	Low	
	500–1,000	Meets	
	1001–1500	High	
	>1500	Very High	

6.3 Upland Woody Cover

Woody cover is perennial in nature and therefore less subject to annual variation. Therefore, necessary monitoring frequency is less than with annual vegetation. Woody cover in upland habitats will be monitored primarily by interpreting aerial imagery once every five years to determine woody cover distribution and density. Field checks including some transects will be conducted in some areas to further quantify changes in density and distribution. Maps of current status of woody cover will be produced from this data once every five years.

6.4 Riparian

A riparian assessment will be conducted across selected reaches of the creek drainages every five years. Reaches will be selected during the first year of monitoring using a stratification process in which reaches are classified and randomly selected. The stratification categories could be based on attributes such as extent of riparian vegetation, slope, width of channel, soil type, and land use (e.g., grazed). Selected reaches will consist of 110 meter lengths of the creek drainages and the same reaches will be monitored during each monitoring year. Start and end points of reaches will be permanently marked in the field. Surveys will occur once every five years and will be conducted at a time of year where the flows are low and the plants are easily identified. Timing of subsequent surveys will be determined by using a similar phenology and flow condition as the previous surveys. Three systematic random transects will be established perpendicular to the drainage within the reach. These transect locations will be used in subsequent surveys.

Photo-documentation will occur during each survey. At a minimum, photos will be taken at the downstream end looking upstream, the downstream end looking across the drainage, the upstream end looking downstream, and the upstream end looking across the drainage.

During surveys, the green line will be located, the first perennial vegetation, embedded rock, or anchored wood above the water line on or near the water's edge (Winward 2000). The edge of the low flow channel will be used if the greenline is not readily apparent. The width of the riparian habitat or area influenced by the creek will be measured. Systematic randomly located 1-m^2 plots will be established perpendicular to the greenline, starting with the first plot centered on the green line or at edge of low flow channel. The total number of plots along the transect may vary depending on the width of the riparian corridor. However, plots will be established to sample at least 5% of the total transect length, with a minimum of 3 plots per transect. Within each plot, plant species composition and cover will be recorded by species. The same plot locations will be used in subsequent surveys.

Woody vegetation will be monitored along belts at each of the 3 permanently established transects within each selected reach. Belt transects will be 5 meters wide and the length of the riparian width. The same length belt transect will be sampled during each subsequent monitoring survey. The total number of individual or stems (if multi-branched), size class, and age (e.g., seedling, young, mature) will be recorded by species for each woody plant rooted within the plot. Size classes will be established prior to surveys. This information should provide insight on changes in structure and composition of the riparian habitat and whether regeneration is occurring.

During each survey, a streambank alteration assessment will be conducted (BLM 2011). A 92 cm long sample line is carried during surveys perpendicular to the creek and centered on the green line described above. The surveyor walks the length of the selected reach on both sides carrying the sample segment. Each step is recorded as altered or not altered. A line is considered altered if there is obvious current year's disturbance (e.g. hoof prints, trails) by large herbivores (e.g., cattle, sheep) (BLM 2011). The amount of alteration along a reach is determined by tallying the positive results and expressing them as a percent. This will provide a measure of grazing use change over time.

During the survey, the reach will be walked and general information will be collected on substrate, and signs of erosion or sediment deposition.

6.4.1 Vernal Pools

In order to assess impacts of vegetation management and climatic variation on the vernal pool flora and develop long-term management strategies, vernal pool vegetation monitoring surveys will be conducted at vernal pools annually for the first three years and then every five years. Vernal pool vegetation sampling methods will follow those described in *Classification, Ecological Characterization, and Presence of Listed Plant*

Taxa of Vernal Pool Associations in California (Barbour et al., 2007). One 10-meter^2 plot will be placed in each vegetation zone within each sampled pool. Total vegetation cover and the estimated absolute cover of each species within the plot will be recorded. Plant guilds such as native forbs, non-native forbs, native grasses, and non-native grasses will be summarized across the plots.

6.5 Covered Species

6.5.1 BNLL and SJAS

Although BNLL and SJAS will likely be recorded during the vertebrate monitoring plots, sample size will likely be too low to conclude much about the population trajectories of these listed species. Therefore, road surveys also will be implemented to assess the distribution and relative abundance of these two species. Other species of interest (e.g., burrowing owl) likely also will be recorded during road surveys. During road surveys, an observer will slowly drive along established routes and obtain locations for each BNLL, SJAS and other notable wildlife species using a global positioning system. These data points will be uploaded to a geographic information system database and the California Natural Diversity Database (CNDDB) to provide a permanent record of these species' spatial distribution over time.

6.5.2 SJKF

Because of their large home ranges and relatively low density, SJKF will be monitored using baited camera traps or scent stations. This technique provides an index of abundance and a measure of spatial distribution through time. Cameras will be placed at 30 sites spaced at least ½ mile apart and operated for at least five consecutive nights (minimum of 150 camera-station nights). Counts of SJKF and other animals photographed at each site will be recorded and summarized by year.

6.5.3 California Condor

No special surveys are planned to monitor use of the site by CACO. However, incidental sighting of condors will be recorded.

6.5.4 CTS

The objective of the conservation strategy for CTS is to permanently protect and increase habitat for CTS on the Conservation Lands. Monitoring will be conducted to determine whether the created CTS pond(s) are maintaining the desired conditions for CTS, whether CTS are using the existing and created pond(s) on the Conservation Lands, and to evaluate the quality of estivation habitat.

The objective of the constructed CTS breeding pond(s) is that they capture sufficient surface water runoff to fill to no more than three feet during the rainy season and that they will have continuous inundation for sufficient time for CTS larval development and metamorphosis (at least 10 weeks). The pond(s) will need to have seasonal dry-down no later than September to preclude bullfrogs from colonizing the pond and successfully recruit metamorphs. It is also desired under average rainfall conditions that the pond(s) be inundated five out of every ten years, with a minimum of three out of every ten years.

Hydrology will be monitored in existing and created pond(s) to determine whether ephemeral conditions occur that are favorable to CTS breeding and conditions that will reduce the likelihood of the presence of CTS predators (e.g., bullfrogs). Hydrology monitoring will occur annually for the first three years and every three years thereafter for all created and existing ponds on the Conservation Lands. Staff gauges will be installed within each pond within 6 to 12 months after Project construction. Depth and approximate percent of inundation will be recorded monthly throughout the rainy season at each pond.

Rainfall will be tracked annually during the rainy season (November through March) for the Conservation Lands to determine the rainfall amount and how it compares to the historic average. This will be done by installing a rain gauge on-site and recording the rainfall amount monthly.

Permanent photopoints will be established to document the conditions of the created CTS pond(s). Photos will be taken during the peak rainy season and at the end of the rainy season to document the seasonal dry-down period. Photographs will be taken annually.

The purpose of photo points would be to assess observable qualitative and quantitative changes.

Visual qualitative surveys will be conducted annually at all the existing and created pond(s) once during the wet season and once during the dry season. These surveys will document the vegetation composition and structure around each of the ponds, record hydrology, document any signs of erosion or sedimentation, presence of any invasive plant species, and monitor any structural components and associated structures for the created CTS pond(s). During surveys, any relevant recommendations will be made to improve CTS habitat conditions. In addition, recommended maintenance activities for the created CTS pond(s) will be made during this time. The desired conditions, original size, and dimensions of the pond(s) will be used as the control to determine whether maintenance or repair of the pond is necessary.

Annual larval surveys will be conducted for the first three years and every three years thereafter by a qualified biologist within all existing and created CTS pond(s) to determine whether or not CTS are present, if they are breeding, and if bullfrogs or other introduced predators are present. The purpose of these surveys is to provide a temporal snapshot of the status of the CTS on an ongoing basis and will include quantitative data on species and habitat condition such as non-native invasive species presence or absence, predator presence or absence and other known threats. Size and life stage will be noted during surveys with CTS larvae above 70mm in length deemed large enough to successfully metamorphose. Prior to surveys taking place, per USFWS 10A(1)a and CDFW Scientific Collection Permit requirements, surveyors shall notify the agencies of the proposed methodology to be used during the surveys. Methodologies shall follow the most current guidance from the regulatory agencies and shall be the most minimally invasive to achieve the desired data.

Short-statured grassland habitat is the desired condition for CTS estivation habitat surrounding the ponds. In addition to qualitative assessments of habitat immediately surrounding the ponds, qualitative vegetation composition and structure information will be collected at RDM survey locations to determine whether these conditions are present in estivation habitat further from the ponds. Notes on invasive plant species will be collected during these surveys. Recommendations to improve CTS estivation habitat will be made during these surveys. This could include changing the grazing regime or removing invasive plant species, among others.

6.5.5 Listed Vernal Pool Branchiopod Species

The objective of the conservation strategy for the potential listed vernal pool branchiopod species (i.e. VPFS, CFS, LFS, VPTS) is to determine presence and distribution, and permanently protect these species on the Conservation Lands. Monitoring will be conducted to determine the presence and distribution of each species, monitor the species if present, and conduct qualitative surveys to determine whether there are any potential changes to the habitat that could impact the species.

Protocol-level surveys will be conducted for two years in a row to determine if the covered listed vernal pool branchiopod species are present on the Conservation Lands and their distribution. Methods will follow the most current guidance from the regulatory agencies. If no listed vernal pool branchiopod species are observed, protocol-level surveys will be conducted every 15 years to determine if the status has changed.

If it is determined that listed vernal pool branchiopod species are present on the Conservation Lands, modified wet-season monitoring surveys will be conducted every three years within the vernal pools. Monitoring will be conducted twice during the wet season to target the potential listed species present. At each pool, five to 15 standardized dip-net pulls will be completed and species and relative abundance will be recorded for all individuals collected. Photos will be taken of each pool during surveys and a CNDDB form will be submitted to CDFW for all listed species observed.

Hydrology monitoring will be conducted to determine the extent of ponding in relation to precipitation patterns over time and to inform vernal pool branchiopod surveys. Vernal pool branchiopod survey methods will follow those described in the *Listed Vernal Pool Crustaceans Routine Monitoring Protocol for Preserved Areas* prepared by Carol Witham in consultation with Holly Herod and others at the USFWS (Appendix H).

Surveys will be conducted annually for the first three years and every three years thereafter. Staff gauges will be installed within each pool. Depth and extent of inundation will be recorded approximately twice monthly throughout the wet season.

Qualitative surveys will be conducted once during the spring during peak vegetation flowering period. Surveys will consist of taking a photo of each pool, and making general notes on habitat quality, signs of altered hydrology, sedimentation or erosion activity, trash and debris, any damages from other activities, and whether any invasive plant species are present.

7.0 Adaptive Management

Adaptive management has been identified earlier as one of the main management principles by which the Conservation Lands will be managed in perpetuity (Section 4). Another definition of adaptive management is provided in the USFWS Five Point Policy for Habitat Conservation Plans as "a method for examining alternative strategies for meeting measurable biological goals and objectives, and then if necessary, adjusting future conservation management actions according to what is learned" (USFWS 2000). Grazing will be based on an adaptive management strategy that has been defined as an integrated method for addressing uncertainty in natural resource management (Holling 1978; Walters 1986; Gundersen 1999).

7.1 Overview

Various conditions change on properties over time and can result in a need to change practices that worked, or were assumed to work, previously. This is especially true when applied to land management over decades. However, changes should not be made arbitrarily. Qualified biologists familiar with the species in question, the methods being employed and results of relevant monitoring and research should be the only people suggesting changes. These changes should not occur for management or financial purposes but only for the benefit of the Covered Species and/or Conservation Lands.

7.2 Management Strategy Adjustment Process

During the implementation of the HMP, the Conservation Land Manager may determine that a modification of procedures is needed. This is a normal part of the adaptive management process. The reasons for the needed change, recommended changes, risks, and benefits of changing procedures should be investigated and documented. If the change is minor, the Conservation Land Manager can determine if the change should be implemented. If the procedure is changed significantly or has the potential to significantly impact Covered Species, concurrence from the state or federal permitting agencies should be obtained before implementation of the new strategy. Any changes that are more environmentally protective than the previously approved methods may be implemented as needed. However, no alterations which reduce the level of monitoring effort will be put in place without prior authorization from permitting agencies. An example of an acceptable exception would be implementation of updated regulatory agency protocols for species surveys.

8.0 Coordination and Outreach

Given the conservation objectives and mitigation-related origin on the Conservation Lands, the property will be largely managed as an independent unit. However, where there are opportunities to enhance the conservation values, reduce stewardship costs, or increase stewardship efficiency, coordination with and outreach to others will be used to best effect.

Agency Coordination – Where lands adjacent to or in the vicinity of the Conservation Lands are owned and managed for similar conservation objectives and with compatible land uses—in particular, by BLM and CDFW—effort will be expended to coordinate any management or monitoring activities in a way that would increase efficiency, improve conservation effect or information gained, and/or reduce costs. Coordination will also take the form of notification for any opportunities to improve their stewardship activities or gain additional stewardship funding, any activities that may impact their lands (e.g., pesticide application under certain conditions), new and concerning exotic invasives, pathogen outbreaks, and other forms as necessary. In general, a 'good neighbor' ethic will be embraced for stewardship.

Public access criteria –In general, there will be no public access to the Conservation Lands, the primary purpose being conservation and there being certain habitat and species sensitivities. Further, provisions for public recreation—that would provide for the security of both the public and the sensitive species—would be an administrative and cost burden that is neither anticipated by the Applicant nor required by the Agencies. Access would be provided under certain circumstances to entities other than the Owner/Applicant, including the following uses and conditions:

a. Lessees: Grazing leases are anticipated to serve conservation objectives through vegetation management. Those lessees would, of course, have access to the Conservation Lands for this purpose, with specific conditions determined and documented in the leases.
b. Agencies: Access to the Conservation Lands will be provided to the Agencies through the Conservation Easement and in service of their role as third-party beneficiaries in enforcing and defending the easement.
c. Public safety entities: Public safety entities (including fire and police departments) will have access to the Conservation Lands for public safety purposes. It is intended that relationships be established with these entities, and documents provided to them, such that public safety activities are conducted with minimum disturbance to the conservation values. Decisions regarding appropriate response to wildfires (e.g., whether areas should be allowed to burn versus aggressive fire control) and plans for any needed fuel breaks will be developed between the Conservation Land Manager and the fire departments.
d. Additional public safety entities: Engagement with other public agencies (such as the US Department of Agriculture or Mosquito and Vector Control Districts) will be undertaken, usually upon their request or in response to public notices that pertain to the Conservation Lands. If there are instances where the directed actions or requests from those agencies conflict with the conservation objectives of the Conservation Lands, there will be an effort made to engage the agencies in

a discussion to determine a course of action that serves both public interests (that of conservation and of the specific agency objective).

e. Other entities with compatible land use: On a case-by-case basis, and to the extent possible with available management resources, other compatible land uses will be considered (e.g., bee keeping).
f. Research: Biological monitoring and applied research are part of the management approach and key to adaptive management on the Conservation Lands. Where this lends itself to publications, these will be prepared and submitted to an appropriate scientific or other professional journal so as to enhance the capacity in the general conservation community. Such information will also be communicated in meetings, conferences, informal reports, and website representations.

In addition, there will be requests received from others (e.g., academic or other nonprofit organization researchers, private consultants, etc.) to conduct research on the Conservation Lands. Each research request will be reviewed to determine whether it:

1. Poses no appreciable risk to the species, biological processes, or abiotic environment;
2. Will result in information that contributes to effective conservation of the Conservation Lands
3. Does not require excessive oversight or other management resources.

For any research involving or potentially impacting a protected species, the researcher will be required to obtain appropriate state and/or federal permits. If the research is approved, the researcher will be required to approve and sign an agreement to limit liability of the manager and land owner, include acknowledgement of any assistance (of manager) in any reports or publications, and provide copies of related reports and publications for the record.

a. Other access: Access of other groups for educational or other purposes will be initiated or requests entertained on a case by case basis, with decisions based on the purpose of the access, any risk to the Conservation Lands, any benefit to the

Conservation Lands, and the resources required by the manager to accommodate or organize such access.

9.0 Reporting

An annual report will be prepared for the previous fiscal year (October 1–September 30) that describes the general conditions on the Conservation Lands, stewardship activities undertaken that year (including all management, monitoring, and the Conservation Easement activities—if the easement holder is the same entity as the manager), summaries of biological monitoring results, and outreach and coordination activities. Emerging trends and/or issues will be described. As experience and data accumulate, the reports will increasingly provide a longer term perspective, comparing the previous year with data and observations from previous years. This report will be provided to the regulatory agencies and land owner with a target date of the 1st of January.

Other reports to regulatory agencies will be prepared as required, including reports on activities conducted under a USFWS 10(a)(1)(A) permit or state permits.

10.0 Funding

The funding requirements for management and for monitoring, enforcement, and defense of the Conservation Easement over the Conservation Lands will be determined by a comprehensive due diligence process and use of the PAR3© software (Rogers 2012). Funds required for these purposes include three years of management costs and an endowment—funded in full at the beginning of the three-year initial management period—that has been calculated to provide an appropriate average annual budget based on a long-term drawdown (aka capitalization rate) of 4.5% (i.e., CNLM's current capitalization rate for conservation endowments it manages for preserves in its portfolio). The initial management amount provides a source of funds for responsibilities towards the Conservation Lands in the first years of operation, allowing the endowment time to begin accumulating investment income for use to support management expenses after the three-year period elapses, as well as protecting the value of the endowment during the first few years following establishment, buffering against any temporary downward trend in the market.

The initial and endowment costs for management and activities related to the Conservation Easement(s) will be presented in a PAR report and accompanied by a detailed cover letter that presents all assumptions. Costs for initial specific restoration and protection activities—including initial CTS pond(s) creation, dump site restoration, riparian restoration, vernal pool enhancement, and GKR relocation, and all of the maintenance, monitoring, and attaining success criteria that is associated with these activities—will be calculated separately.

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Appendix A – Figures

Energy Renewal PARTNERS, LLC

BR
10/15/2013

Legend

County Line
City Limit
Project Footprint
Valley Floor Conservation Lands
Valadeao Ranch Conservation Lands
Silver Creek Ranch Conservation Lands

N

0 2 4
Miles

Duke Energy Renewables
Panoche Valley Solar Project

Project Location

Figure
1

Energy Renewal PARTNERS, LLC

BR
10/15/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

N

0 3,500 7,000
Feet

Duke Energy Renewables
Panoche Valley Solar Project

Action Area

Figure 2

Energy Renewal
PARTNERS, LLC

BR
10/15/2013

Legend

Project Footprint
Valley Floor Conservation Lands
Introduced Annual Grassland
Wash/Drainage/ Seasonal Stream
No Data
Vernal Pool
Stock Pond

N

0 625 1,250 2,500
Feet

Duke Energy Renewables
Panoche Valley Solar Project

Project Footprint and
Valley Floor Conservation Lands Biotic Habitats

Figure
3

Legend

- Valadeao Ranch Conservation Lands
- Project Footprint
- Valley Floor Conservation Lands
- No Data
- Introduced Annual Grassland
- Wash/Drainage/ Seasonal Stream
- Vernal Pool
- Pond
- Mechanically Disturbed
- Barrens
- Ephedra Shrublands
- Saltbrush Shrublands
- Juniper Woodlands
- Oak Woodlands

N

0 1,000 2,000 4,000
Feet

BR
10/17/2013

Energy Renewal PARTNERS, LLC

Duke Energy Renewables
Panoche Valley Solar Project

Valadeao Ranch Conservation Lands Biotic Habitats

Figure 4

Energy Renewal
PARTNERS, LLC

BR
10/15/2013

Legend

Silver Creek Ranch Conservation Lands
Introduced Annual Grassland
Wetlands and Associated Habitats
Ephedra Shrublands
No Data

N

0 625 1,250 2,500
Feet

Duke Energy Renewables
Panoche Valley Solar Project

Silver Creek Ranch Conservation Lands
Biotic Habitats

Figure
5

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Legend

- Project Footprint
- County Line
- City Limit
- Mitigation Lands
- BLM Land
- Ciervo-Panoche Natural Area

N

0 2 4
Miles

Duke Energy Renewables
Panoche Valley Solar Project

Ciervo-Panoche Natural Area

Figure
6

Energy Renewal
PARTNERS, LLC

BR
11/4/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valley Floor Suitable Habitat (approx 2,517 acres)
- Valadeao Ranch Conservation Lands
- Valadeao Ranch Suitable Habitat (approx 6,611 acres)
- Silver Creek Ranch Conservation Lands
- Silver Creek Ranch Suitable Habitat (approx 7,151 acres)

N

0 3,500 7,000
Feet

Duke Energy Renewables
Panoche Valley Solar Project
Giant Kangaroo Rat Mitigation Lands*

*For the purpose of this figure, data from Live Oak Associates was used for the Valadeao and Silver Creek Ranches, and clipped to the boundaries as shown. Locations with a slope between 0 and 11% were used for the Valley Floor Conservation Lands.

Figure
7

Slope Percentages and Approximate Acreage per Conservation Land

Slope %	VR	VFCL	SCR
0 - 5	1,108	2,416	3,058
5.1 - 11	1,919	101	2,394
11.1 - 21	2,117	7	1,982
21.1 - 35	2,541	1	1,586
35.1 - 172	3,086	0	1,871

Energy Renewal PARTNERS, LLC

BR
10/21/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

N

0 3,500 7,000
Feet

Duke Energy Renewables
Panoche Valley Solar Project

San Joaquin Kit Fox Mitigation Lands

Figure
8

Legend

Project Footprint	Valadeao Ranch Conservation Lands
Valley Floor Conservation Lands	Valadeao Ranch Suitable Habitat (approx 7,876 acres)
Valley Floor Suitable Habitat (approx 2,517 acres)	Silver Creek Ranch Conservation Lands
	Silver Creek Ranch Suitable Habitat (approx 8,824 acres)

N

0 3,500 7,000
Feet

Energy Renewal PARTNERS, LLC

BR
10/21/2013

Duke Energy Renewables
Panoche Valley Solar Project

Blunt-nosed Leopard Lizard Mitigation Lands*

*For the purpose of this analysis, locations with a slope between 0 and 11% or within 625' of an area of drainage are considered suitable BNLL habitat.

Figure
9

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Potential Mitigation Pond Location
- Surveyed Breeding Pond
- Surveyed Pond
- 100-year Floodplain

N

0 1,000 2,000 4,000
Feet

Duke Energy Renewables
Panoche Valley Solar Project

Valadeao Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

Figure 10

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Legend

- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- Potential Mitigation Pond Location
- 100-year Floodplain

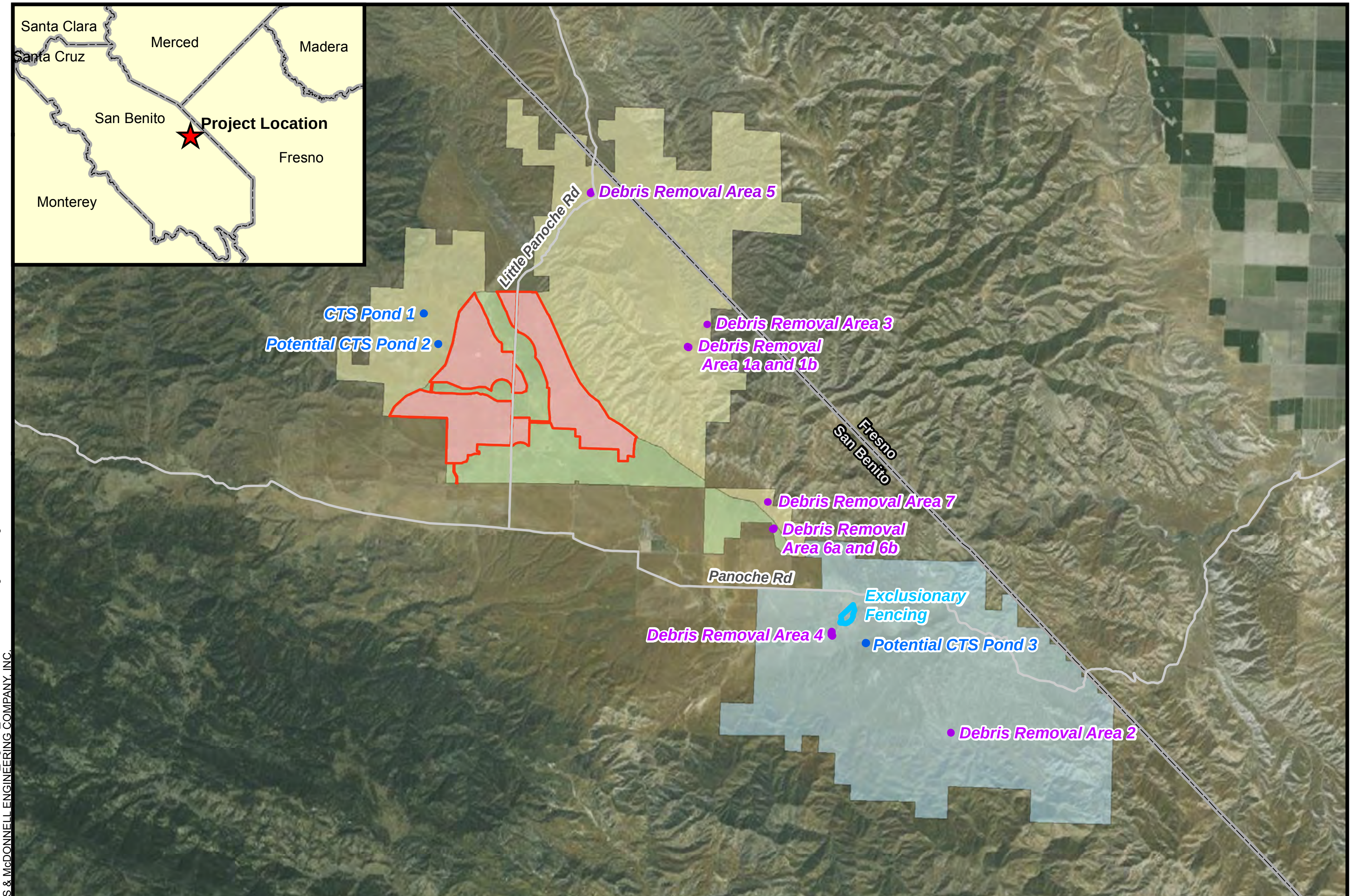
N

0 1,500 3,000
Feet

Duke Energy Renewables
Panoche Valley Solar Project

Silver Creek Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

Figure
11



LEGEND

- Exclusionary Fencing
- Streets
- County Boundary
- CTS Areas
- Debris Removal Area
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch

Source: ESRI and Burns & McDonnell Engineering.

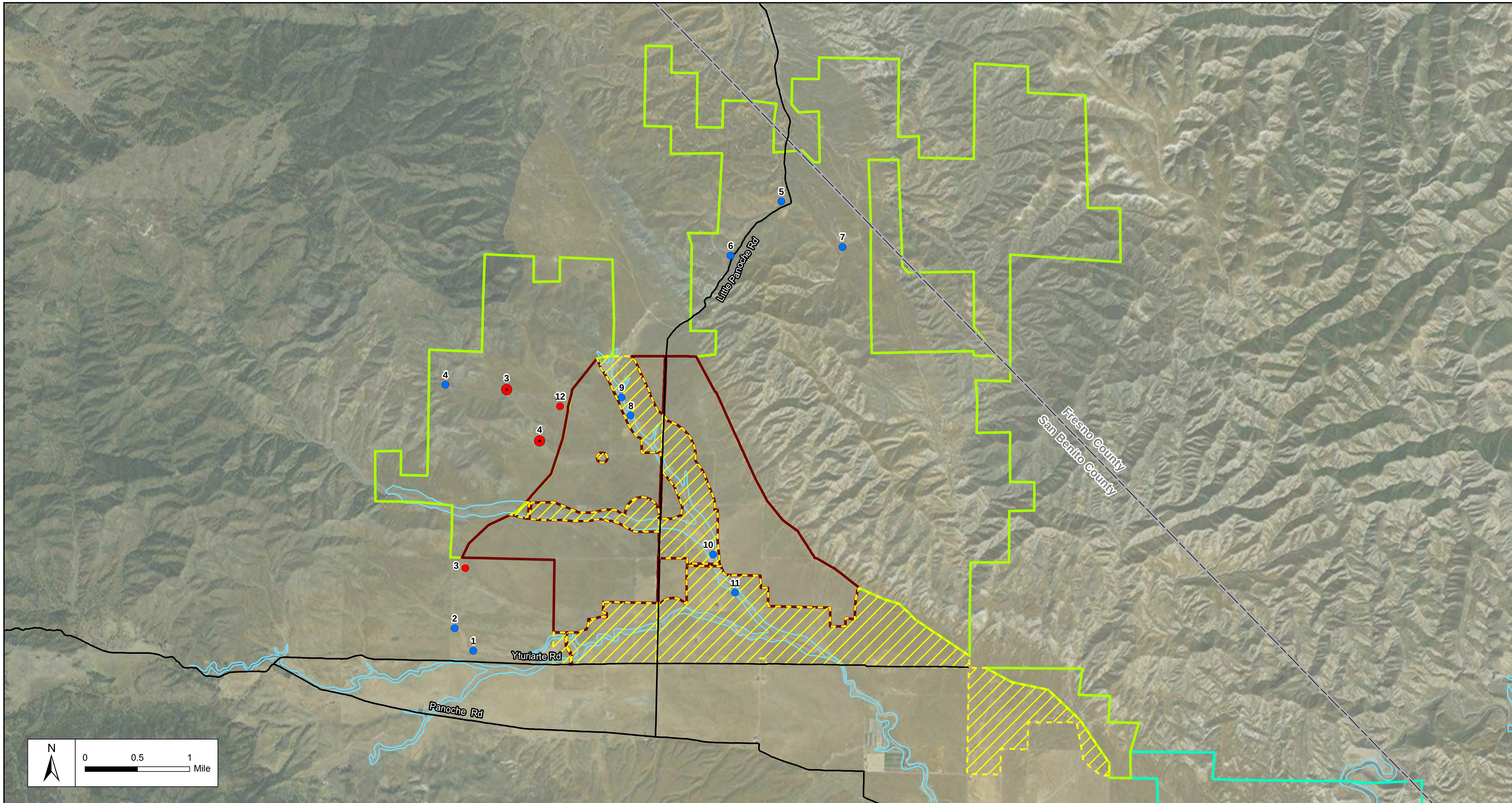
BURNS McDONNELL

Figure 12

MITIGATION AREAS OVERVIEW

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 4 Mitigation Areas Overview.mxd

Issued: May 29, 2015 elaine



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Legend

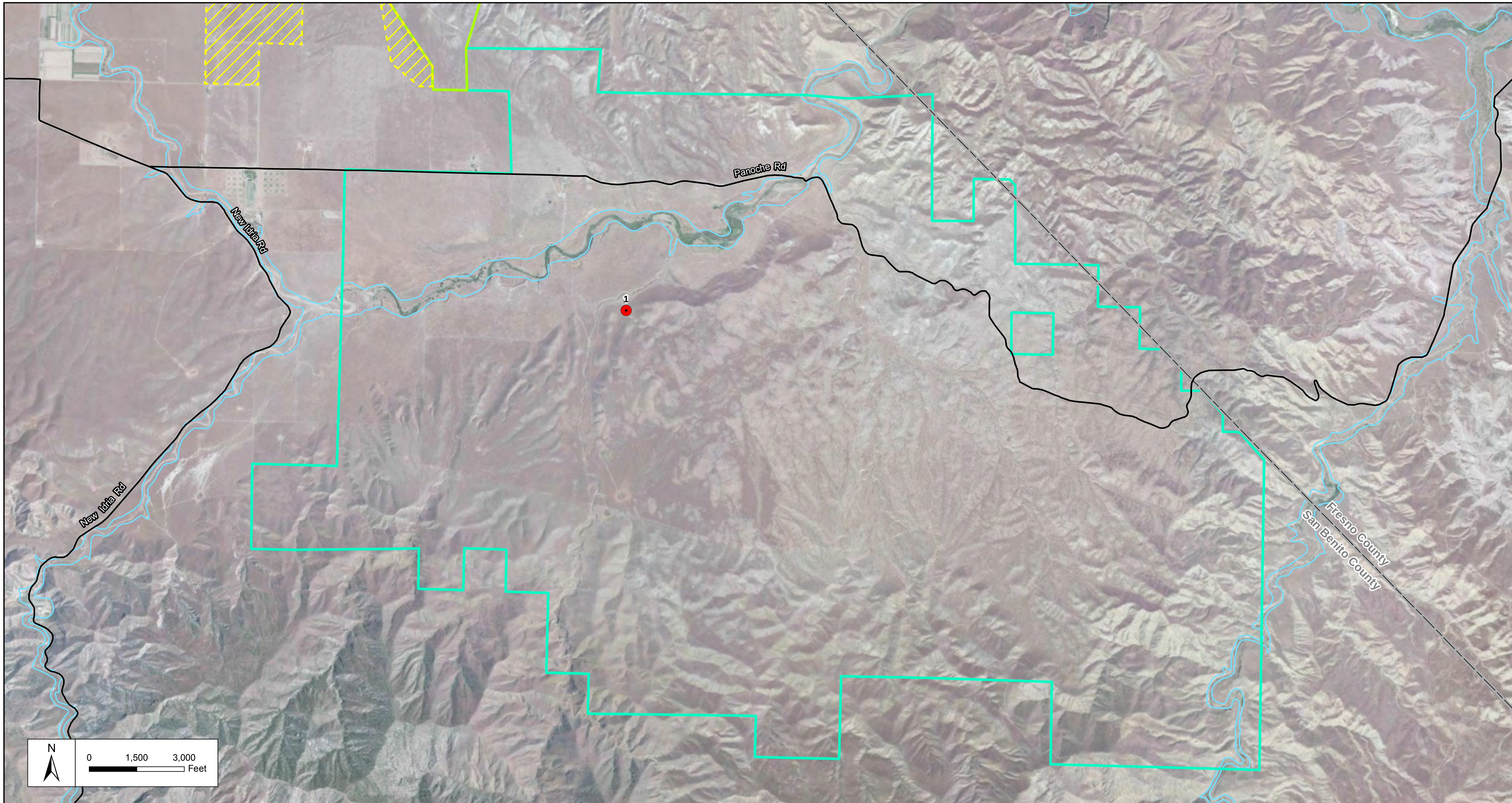
- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Potential Mitigation Pond Location
- Surveyed Breeding Pond
- Surveyed Pond
- 100-Year Floodplain

Panoche Valley Solar Project

Valadeao Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

FIGURE 13

JH 2015-05-29



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Silver Creek Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

FIGURE 14

JH 2015-05-29

Appendix B – Biotic Habitat Detail

Appendix B
Biotic Habitat Descriptions

1.0 Biotic Habitats

1.1 Annual Grassland

The most widespread and dominant species are annual grasses; non-native herbaceous species are distributed more patchily. Species present in the Introduced Annual Grasslands include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (Vulpia myuros). Dominant forbs included broad-leaved filaree (Erodium botrys), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullien (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Native species that maintain a presence must be generally tolerant of grazing and saline clay-rich soils. Areas which have not been previously disturbed by historic cultivation or been subject to heavy grazing also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitatum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

Grasslands dominate the lower slopes and valley bottoms in continuous stands that are interrupted only by a few larger washes. Some grassland patches were entirely comprised of non-native species, though these areas were uncommon. One plant on the California Native Plant Society (CNPS) California Rare Plant Rank 4 species list, the serpentine leptosiphon (*Leptosiphon ambiguous*), was identified in this alliance. The VFCL and Project Footprint are almost completely composed of Introduced Annual Grasslands.

On the SCRCL, grasslands occur primarily on the lower slopes of the Griswold and Panoche Hills and valley bottoms, and are largely composed of non-native annuals. Grassy cover was seldom observed to exceed 20 percent, giving the area a sparsely vegetated, somewhat desert-like appearance. In years where precipitation is not as generous as experienced in 2010, much of the area classified as Grasslands may appear to be relatively barren of plants.

On the Valadeao Ranch Conservation Lands, grasslands dominate the lower slopes and valley bottoms in continuous stands that are interrupted only by a few larger washes. Up to 100 percent of the short grass plant association may be non-native, but this situation was patchy and uncommon in 2010. One plant on the CNPS California Rare Plant Rank 4 species list, the serpentine leptosiphon, was identified in this alliance.

1.2 Ephedra Shrublands

Plant associations that were noted to occur within the Ephedra Shrublands include *Artemisia californica*- Senecio flaccidus scrub, *Eastwoodia elegans* - Ephedra californica scrub, *Ericameria linearifolia* - Ephedra californica scrub*, Ericameria linearifolia* - Ericameria nauseosa scrub, *Ericameria linearifolia* - Gutierrezia californica scrub, *Eriogonum fasciculatum* var. *polifolium* - Artemisia californica scrub, *Eriogonum fasciculatum* var. *polifolium* - Ephedra californica scrub, *Eriogonum fasciculatum* var. *polifolium* - Gutierrezia californica scrub, *Eriogonum fasciculatum* var. *polifolium* - Yucca whipplei scrub, and *Gutierrezia californica* - Ephedra californica scrub. Most shrub species in this alliance were widespread at low frequencies in areas beyond the extent of the assemblage where it dominates. In the understory layer, introduced annual grasses generally attain overwhelming dominance. The understory assemblage is often sparse, and non-diverse cover is typical of all study area shrublands associations that occupy xeric, steep slopes with southern aspect, although some associations in this alliance had dense understory. Other notable plants found within this alliance included introduced grasses, coyote brush (*Baccharis pilularis*), silver lupine (*Lupinus albifrons*), narrow leaf milkweed (*Asclepias fascicularis*), Sandberg bluegrass (*Poa secunda*), crinkled onion (*Allium crispum*), white fiestaflower (*Pholistoma membranaceum*), foothill larkspur (*Delphinium hesperium* ssp. *pallescens*), and wild oats (*Avena* sp.) Native perennial species were generally sparse in this alliance. Two plants on the CNPS California Rare Plant Rank 4 species list were observed within this alliance: the naked buckwheat (*Eriogonum nudum* var. *indictum*) and the Santa Clara thorn mint (*Acanthomintha lanceolata*). The transition zone between the Ephedra alliance of hillsides and the Introduced Annual Grassland alliance typical of lowlands was observed to be extensive and broad. This habitat is not present on the VFCL or Project Footprint.

On the SCRCL, plant associations that were noted to occur within the Ephedra Shrublands include *Eriogonum fasciculatum* – Ephedra californica scrub, *Eastwoodia elegans* – Ephedra californica scrub, *Gutierrezia californica* – Ephedra californica scrub, *Ericameria linearifolia* – Ephedra californica scrub, and *Eriogonum fasciculatum* – Hesperoyucca whipplei scrub. Typically, the upland shrub assemblage at the SCRCL is neither dense nor diverse. Total shrub canopy cover exceeds five percent only in patch- scale stands. The most evenly and widely distributed species, Ephedra californica, also forms often expansive, monospecific overstories of less than two percent absolute shrub cover, which were classified within the area mapped as Grasslands.

On the VRCL, Ephedra Shrublands occur in Las Aquilas Creek, an arroyo-like wash at the southwestern edge of the VRCL, in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, along ephemeral drainages, and steep rocky and thin-soiled south-facing slopes. Most shrub species in this alliance were widespread at low frequencies in areas beyond the extent of the assemblage where it dominates. In the understory layer, introduced annual grasses generally attain overwhelming dominance. The understory assemblage is often sparse, and non-diverse cover is typical of all study area shrubland associations that occupy xeric, steep slopes with southern aspect, although some associations in this alliance had dense understory.

Other shrubland association canopy dominants are present in this zone at very low frequencies or in small, highly grazed patches. It is likely the position of this transition is maintained by long-standing patterns of range cattle grazing. Mature *E. californica* are apparently among the least palatable shrubs available to cattle, but recruitment of this species was seen only rarely where the populations occupied lowland areas mapped as Introduced Annual Grasslands. In contrast, diversity is much greater (especially among native species) where Introduced Annual Grasslands occupy shrubland canopy gaps on the more remote, upper slopes of the VRCL.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to Introduced Annual Grasslands.

The Ephedra alliance is more prevalent to the east of Little Panoche Road. There is evidence that it was more widespread on the western face of the Panoche Hills prior to a widespread fire that swept this area within the last decade, leaving many large *E. californica* stumps. Otherwise, all associations that were mapped in this alliance exhibit relatively undisturbed canopy development have not been recently burned and due to landscape ruggedness, have not received heavy grazing pressure.

1.3 Barrens

Barrens are ridgeline and south or (rarely) west-facing very steep slopes that exhibit a precipitous drop- off in vegetative cover. In terms of vegetation, the assembled species diversity is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Barrens that interrupt shrublands alliance vegetation are less common, but were found to support occurrences of rare plant populations more often than any other mapped association. Botanical surveys conducted in the Panoche Valley and Panoche Hills suggest that Barrens habitats, while comparatively lacking in total cover, can support assemblages with greater native character, and can include rare species. Large patches of bare soil were commonly evident within barrens polygons mapped in 2010. Given that barrens are an exclusively annual collection of species, it seems likely that their aerial extent is variable, dependent on local rainfall amounts and the spacing of storm events. In comparatively dry years, it is conceivable that barrens extents could be expressed at up to twice the area mapped in 2010. Aerial photographs dated September 2008 consistently indicate greater barrens extents, especially on the lower western slope of the Panoche Hills immediately above the Project Footprint. This habitat is not present on the VFCL.

On the SCRCL, areas classifiable as true "Barrens" are commonly embedded within Grasslands on south- facing aspects and on ridge areas, in both the Griswold and Panoche Hills. In relatively dry years, Barrens supporting less than one percent total cover may be expressed across as much as 30 percent of the area mapped as Grasslands on the SCRCL.

On the VRCL, two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia macrostachys*. Barrens total cover rarely exceeds one percent on the VRCL. Members of the relatively sparse barrens assemblage are adapted to some of the harshest habitat available within the study area. Low cover may be resultant at least in part from low soil moisture retention and from erosion and use by rodents. The ridgeline and southern aspects are exposed to intense drying from sun and wind and are very steep. The soil surface appears to be highly eroded and ground creep is evident. This habitat appears to be attractive to burrowing rodents, whose grazing and digging further affect plant cover. Finally, transitions to barrens are accompanied by a clear change in soil color; barrens can be grouped into "red," "blue-grey," and "white" clay soil types. Adjacent slopes of similar aspect and steepness but lacking these unusually colored soils support typical (dense and tall) stands of Introduced Annual Grasslands or Ephedra alliance vegetation, suggesting a soil toxicity that may be inherent to the bands of red, blue-grey, and white clays. Plants occurring in barrens on the VRCL include the introduced annual herb *E. cicutarium*, and native *P. erecta, Blepharizonia laxa, Monolopia* spp.*, Phacelia tanacetifolia, Salvia columbariae*, and *Camissonia boothii*. Two plants on the CNPS California Rare Plant Rank 4 species list, the naked buckwheat (*Eriogonum nudum* var. *indictum*) and the benitoa (*Benitoa occidentalis*), and one plant on the CNPS California Rare Plant Rank 2 species list, the California groundsel (*Senecio aphanactis*) were also identified in this alliance on the VRCL.

1.4 Saltbush Shrubland Alliance

Saltbush shrubland within the study area consists of nearly pure to species depauperate mixed stands of saltbush associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest *A. polycarpa* cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character. This habitat is not present on the VFCL, Project Footprint, or on SCRCL.

Two associations within the saltbush shrubland alliance exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages five to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *E. fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens (described below) that are often present on adjacent slopes of similar aspect. Native character is thus relatively high, and undisturbed habitat (i.e., ungrazed) is available for potentially occurring rare plant species that are associated with saline soil. *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa* occurs in the channel bottoms of ephemerally watered washes and very narrowly along the adjacent slope bases. All channels in which this association occurs also hold one or more ephemeral or seasonal springs that exhibit saline character, and exhibit sandy soils that are somewhat atypical of the clay-dominated hill and valley soils of the study area. Shrub canopies are confined to wash edges due to trampling by range cattle, and average cover rarely exceeds 10 percent. The riparian corridor is thus normally rather indistinct in structure relative to the surrounding scrub, but the shift in species is consistent and sharply bounded. It is likely that this association was once and would become more widespread in ephemeral wash habitat in the absence of cattle use. But *A. polycarpa* appears to be highly palatable, and use by livestock in this steep and xeric landscape is concentrated in wash habitats.

1.5 Juniper Woodlands Alliance

Juniper woodlands within the study area occur only on north-facing slopes of moderate steepness. Rocky outcrops and talus, which are commonly prominent in the study area's shrublands alliances, are absent from woodlands habitat. Finally, the area's woodlands are rather sparsely treed, and share a common understory assemblage with shrublands (mainly introduced annual grasses), yet are noticeably devoid of a significant shrub layer.

The ecotones with adjacent shrub associations are often visually distinct, appearing as a sudden loss of the tree canopy. Individual J. californica rarely exceed 15 feet in height. Girths of up to 20 inches diameter at breast height suggest that most of the trees in all occurrences have aged enough to be called "mature". The tree population structure, furthermore, appears to be skewed toward older trees, and recruitment was not apparent. It is possible recruitment has been excluded by grazing cattle, as the gentler slopes occupied by this association do not exclude cattle use for grazing and shading. It is apparent from old stumps that trees of narrower girth have been harvested. Both occurrences east of Little Panoche Road were clearly larger in extent prior to harvest, and the older fence posts in these areas appear to be rough juniper. This habitat is not present on the VFCL, Project Footprint, or on SCRCL.

The Juniper woodlands alliance is not common, totaling only 68 acres of the VRCL with all occurrences being less than 16 acres. Two associations within this alliance occur on the VRCL: *Juniperus californica - Ephedra californica* and *Juniperus californica - Ericameria* *linearifolia*. The *Juniperus californica - Ephedra californica* association occupies middle elevations of north-facing slopes. *J. californica* canopy cover ranges from 5 to 20 percent. The shrub layer is sparse, and is composed of mainly *E. californica*. Subdominant shrubs include *Ericameria linearifolia*, *Gutierrezia californica*, *Eriogonum fasciculatum*, and *Artemisia californica*. The herbaceous layer is never dense. It is composed mainly of introduced annual grasses, the same assemblage as found within the shrubland associations that dominate the surrounding landscape. The contrast in the shrub and herbaceous layers of adjacent shrublands and woodland associations is likely due to the presence of the trees. *Juniperus californica* patches are the only significant provider of shade across much of the study area, and so are gathering places for range cattle during much or all of the year. As such, trampling and intensified herbivory appear to be important limiting factors for plants that have not reached escape height. Roosting habitat for birds is provided, and evidence was seen of use by other large mammals such as coyote (evidence of deer was not observed anywhere within the study area). It is likely that, in the absence of grazing use, the association would provide habitats for native plant species that require additional shading. The *Juniperus californica- Ericameria linearifolia* association occupies middle to upper elevations of north-facing slopes. On average, canopy closure does not exceed ten percent. Both diversity and abundance of the shrub and understory assemblages are increased noticeably relative to the closely similar *Juniperus californica*.

Ephedra californica association. In all occurrences, *E. linearifolia* achieves higher abundance and cover than other shrubs, including *Ephedra californica*. Greater understory development may be related to the often higher elevation, along with relatively steep slopes occupied by this association, which would tend to limit use by range cattle.

1.6 Oak Woodlands Alliance

Oak woodlands occupy lower slopes and wash edges with northern aspect. They transition upslope to *Juniper californica* woodlands. The oak woodlands were found in the hills west of Little Panoche Road only. The Oak woodlands alliance can be associated with acorn-processing cultural resources. The terrain within the Oak woodlands can be very rough. Steeply banked, tree-shaded gullies were observed to support a higher diversity of native annual and perennial herbs than any other habitat available in the woodland, shrubland, or grassland associations of the study area. This greater diversity likely results from cattle exclusion through rough terrain and fencing. The dependable seasonal shading that is provided by dense canopies of *Q. douglasii* (a winter-deciduous oak) creates additional microhabitats not available elsewhere, and generates considerably greater soil organic matter accumulation. Productivity and nutrient cycling functions, support of diversity (including wildlife), and arrest of ground creep (talus, gullies, and slides are common in shrublands) are enhanced by the presence of trees. Oak woodlands are absent from the VFCL, Project Footprint and SCRCL even though Oak woodland alliances occur on nearby slopes at similar or higher elevations than the SCRCL.

The *Quercus douglasii - Juniperus californica* association was the only association in this alliance found on VRCL. This association develops the highest tree canopy cover found within the study area, and is starkly evident in the study area's landscape. The association's distribution is limited to two locations mapped with polygons, but each occurrence is relatively large. The occurrence that was mapped at the study area's southwestern corner appears to extend well off-site to the west, and other large examples are visible on Gabilan Range slopes to the west. This woodlands association likely represents the region's most xeric and lowest elevation plant community in which *Q. douglasii* is dominant in this area. One plant on the CNPS California Rare Plant Rank 4 species list, the Salinas milkvetch (*Astragalus macrodon*), was identified in this alliance.

1.7 Wetlands and Associated Habitats

Many wetland types occur on the Conservation Lands. However, most hold water during only part of the year. Wetland and associated habitats include: ephemeral spring or seasonal spring, perennial spring, seasonal stream, wash, drainage, three associations*: Salix laevigata - Sambucus nigra* on perennial springs and *Distichlis spicata* and *Distichlis spicata - Isocoma menziesii var. vernoniodes* on ephemeral/seasonal springs, and riparian habitats consisting of three associations: *Populus fremontii* forest, zonal riparian, and tamarix semi-natural shrublands.

Panoche Creek and Las Aquilas Creek run between portions of the Project Footprint but are contained entirely within the VFCL. They are ephemeral creeks that are dry in the summer. Smaller washes and drainages feed these larger creeks. The Project Footprint supports several seasonally flooded pools and stock ponds, predominantly in the northern portion of the Project Footprint along unnamed washes. Habitat for aquatic species and amphibians within the Project Footprint is limited to the few stock ponds and ephemeral pools. The VFCL support seasonal streams, washes, and drainages, all of which are seasonally wet or wet only during rain events.

On the SCRCL, riparian stands associated with seasonally or perennially moist substrates, including seeps, and springs, appear to be very rare and unevenly distributed within the area. Riparian habitats occur along the Panoche and Silver Creeks. It should be noted that the SCRCL were not surveyed during the wet season, therefore, seasonal seeps and vernal pools onsite may not have been identified during the reconnaissance surveys.

Habitats at springs and seeps would typically support plant species that are dependent on a reliable availability of shallow groundwater to survive the annual drought (May-October), and the vegetation extent would be expected to narrowly adhere to the wetted zone. Plant associations adjacent to these resources, would be subject to continuation of livestock grazing utilized to manage the SCRCL to benefit Covered Species. No flowing springs were found in an upland setting during the September 2010 survey. Evidence of seep zones that provide ephemeral flows and sustained root zone moisture in an upland setting were found only within one relatively deeply incised canyon near the southern survey edge. At the floor of this canyon, a small area of well-developed episalic crust was found at a clear shift from shrublands to dominance by saltgrass (*Distichlis spicata*). Although not all incised features could be viewed in the available time, areas outside the Silver Creek and Panoche Creek riparian zones appeared to convey little runoff during the 2010 wet season.

Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.), and is classified as Tamarix Semi-Natural Shrubland. Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site both upstream and downstream. In this area, saltgrass appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site for at least three miles was observed to be completely dry and largely devoid of plants. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent Typha marsh (*Typha* Herbaceous Alliance) centrally, and *Schoenoplectus americanus* mid- marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge. All riparian zonal alliances within the survey area are patchy, with one or two species at most attaining dominance. Co-occurring with species such as *Frankenia salina* and *Juncus mexicanus*, dominants in these three alliances indicate a somewhat saline and possibly alkaline soil and shallow groundwater environment. Trees are largely absent, as are species adapted to a floating or submerged habitat. A marsh environment that had developed in response to springs with excellent water quality would be expected to support a more diverse assemblage within each alliance, even with pressure from livestock use.

The small area of riparian woodland located south of Panoche Road is, like the *Distichlis* meadow, confined to the first terrace outside the saturated zone. The woodland canopy, classified as a degraded *Populus fremontii* Forest Alliance, reaches about 30 percent closure and includes a significant presence of red willow (*Salix laevigata*) where it is most dense. The stand currently exhibits many mature and dead trees but essentially no recruitment and no understory due to intense livestock use. It is possible that this occurrence, and the marsh and meadow vegetation associated with the Panoche Creek riparian corridor on the SCRCL, are dependent upon annual inputs of relatively fresh water that originate in the upper Griswold Creek and Panoche Creek drainages and serve to flush salts and toxins that accumulate in the topsoil and the plants as evapotranspiration consumes the perennial spring flows.

The VRCL support ephemeral and seasonal seeps and springs, including the *Distichlis spicata* and *Distichlis spicata - Frankenia salina* associations. Ephemeral springs and seasonal springs occurrences are embedded within or adjacent to occurrences of *the Atriplex polycarpa - Isocoma acradenia* var. *bracteosa* association, at ephemeral and seasonal seeps and springs. Dominants occur patchily and sometimes very densely. All occurrences are associated with drying soils (wet just beneath the surface in June) and a moderate to strong development of an evaporative saline soil crust. *A. polycarpa* growing in this association are invariably stunted by the habitat or by unrelenting cattle browsing. Seasonally wet habitats are otherwise rare in the study area. It is certain that native species diversity is enhanced and maintained within these polygons. Species such as *Mimulus guttatus, Spergularia marina,* and *Sueada moquinii* were found in this limited association and not elsewhere within the study area.

The VRCL also support perennial springs and the *Salix laevigata – Sambucus nigra* association. Three perennial springs intersect the study area near or at its far western edge. All occur in steep, rocky channels at an elevation of about 1,300 feet. Alignment of these springs and of the less persistent seeps in this area suggests fault control of flows. Given the active seismic environment, it is likely expressions of this association are not long-lived in the study area. This hypothesis would be supported by the observations of shrub dominance and general lack of older trees at study area perennial springs. For example, larger willows (*Salix laevigata*) and trees such as Fremont poplar (*Populus fremontii*) that occur at area streams are absent. Native perennial and shrub diversity, however, is greatly enhanced at these features. Cover is multi-layered and approaches 100 percent, providing excellent habitat for wildlife that rely on the surface water.

Ponds constructed to capture any brief flows that occur, such as the ponds observed throughout the hills and valleys on the VFCL and the VRCL, were largely absent from drainages on the SCRCL; two constructed ponds were identified on the SCRCL. Rather, constructed water tanks and troughs for livestock are more common on the SCRCL, as the area appears to be largely devoid of naturally occurring, fresh surface water during the normal dry season.

Vernal pools were located on the VRCL and the VFCL. Reconnaissance surveys on the SCRCL did not locate any vernal pools; however, these surveys were made during the dry season.

1.8 Mechanically Disturbed and Unvegetated

Areas that have been repeatedly or recently disturbed with resulting devegetation are uncommon on all three Conservation Lands and the Project Footprint. Significant disturbance was found only at a few existing farmland structures and in livestock gathering areas that might otherwise support Annual Grasslands vegetation. Roads cross the area very sparsely, and only Little Panoche Road is completely paved while Panoche Road is partially paved. Panoche, Little Panoche, and Ytiarte Roads are open to public use.

2.0 Rare Plant Populations

No federal or state listed plant species were located during Project-level surveys conducted for the Project. In addition, no federal or state listed plant species were located during reconnaissance-level surveys of the VFCL, VRCL and SCRCL.

Six different non-listed rare or sensitive plant species were observed during the survey of plant associations on VFCL, VRCL, and SCRCL. These included Santa Clara thorn mint (*Acanthomintha lanceolata*) (CNPS Rank 4.2), Salinas milkvetch (*Astragalus macrodon*) (CNPS Rank 4.3), benitoa (*Benitoa occidentalis*) (CNPS Rank 4.3), naked buckwheat (*Eriogonum nudum* var. *indictum*) (CNPS Rank 4.2), serpentine leptosiphon (*Leptosiphon ambiguus*) (CNPS Rank 4.2) and California groundsel (*Senecio aphanactis*) (CNPS Rank 2B.2). Santa Clara thorn mint was found on one talus slope on the western edge of the VRCL where the *Eriogonum fasciculatum - Artemisia californica* association was identified. Salinas milkvetch was found within *Quercus douglasii – Juniperus californica* woodlands near the northwest corner of the VRCL. The single population of benitoa was located on barrens in the northeast corner of the VRCL. The rare plant species with the greatest number of occurrences was naked buckwheat with 25 separate populations recorded. Populations of this species were found on grassy, north-facing slopes classified here as *Ericameria linearifolia - Ephedra californica* association (18 occurrences), Introduced Annual Grasslands association (four occurrences), or *Eriogonum fasciculatum - Artemisia californica* (three occurrences). Some populations of naked buckwheat were observed to occur in the thousands. The annual serpentine leptosiphon was detected in grassland on the slopes of northwest Panoche Valley on the VRCL. Two populations of California groundsel were located in barrens habitat classified here either as barrens or as a patchy inclusion in Introduced Annual Grasslands near Little Panoche Road.

3.0 Invasive Plant Species

As is common through much of central and southern California, numerous invasive plants can dominate the landscape. Grasses such as red brome are dominant in the non-native grasslands as well as being a component of the shrub communities in many of the other habitat types on the Project. Other invasives, such as *Erodium cicutarium*, are commonly found but are not as devastating to the historic natural landscape as invasive bromes. Invasive plants out compete native species leading to decreased diversity in the habitat; extirpation of some natives; lower quality forage; and sometimes, increased risk of range fires which can further damage habitats, especially saltbush which do not recover from fire mortality. Many invasive plants are also quick to successional growth giving them an advantage on disturbed habitats where remediation may be desirable.

Of significance in terms of invasive plants is a stand of tamarisk that has developed semi-open to impassable stands in a 30 to 100 foot wide corridor along Silver Creek in the SCRCL. The population extends well off-site both upstream and downstream. Evidence of effects from groundwater drawdown from this species includes soil salination with the native saltgrass forming meadow-like swards between the tamarisk thickets.

Appendix C – Covered Species Detail

Appendix C
Covered Species Descriptions

Blunt-nosed Leopard Lizard (Gambelia sila) (BNLL)

Status and Description:

Legal status – The BNLL is currently listed as endangered by the ESA and endangered by the CESA (Fish and Game Code §§ 2050 et seq.) and it is also a Fully Protected species under California Fish and Game Code Section 5050. The BNLL was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967), and is currently listed as endangered under the ESA of 1973, as amended. No critical habitat has been designated for the BNLL. The BNLL is included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

Species ecology – The BNLL most closely related to the long-nosed leopard lizard (*Gambelia wislizenii*), and was originally thought to be a subspecies. Montanucci (1970) presented solid information for the separation of the two species based upon studies of hybrids between the BNLL and long-nosed leopard lizard. The two species will hybridize where their ranges overlap. Adult male BNLL are larger than females, ranging in size from 8.7 to 12.0 centimeters (cm) in snout-vent length. Total length including the tail can be up to 35.7 cm (Germano and Williams 2005). Adult males weigh between 31.8 and 37.4 grams and adult females weigh between 20.6 and 29.3 grams. BNLL are quite often the largest lizard throughout its range and coloration can vary greatly. Background colors on the dorsal surface can range from yellowish, light gray or dark brown depending on the surrounding soil and vegetation. The ventral surface is uniformly white. The color pattern on the back consists of longitudinal rows of dark spots interrupted by white, cream, or yellow bands. These cross bands can aid in distinguishing the BNLL from other leopard lizards; the cross bands of the BNLL are much broader, more distinct, and extend from the lateral folds on each side of the body. Juvenile BNLL have blood-red spots on the back that darken with age.

BNLL originally inhabited the San Joaquin Valley, ranging from Stanislaus County in the north to the Tehachapi Mountains of Kern County in the south (Montanucci 1970). The foothills of the Sierra Nevada and Coast Range Mountains defined the eastern and western boundaries. The currently known occupied range of the BNLL is scattered in undeveloped lands of the San Joaquin

Valley and Coast Range foothills. The Ciervo, Tumey, and Panoche Hills and the Panoche Valley all support populations of BNLL in the northern portions of its range. The BNLL prefers to inhabit open, sparsely vegetated areas of low relief. Nonnative grasslands and valley sink-scrub communities support BNLL populations on the San Joaquin Valley floor. Valley needlegrass grasslands and alkali playas also provide suitable habitat for BNLL. The most important aspect of any BNLL habitat is sparse vegetation. BNLL rely mainly on speed to avoid predators and catch prey. A thick cover of herbaceous vegetation impedes BNLL movement, making them more vulnerable to predators and less likely to capture prey. In areas with thick herbaceous vegetation, BNLL will utilize barren washes and roads (Warrick et al. 1998).

Adult BNLL emerge from below ground dormancy in early to mid-April and remain active into July and August (Germano and Williams 2005; CDFW 2004). Adults are rarely seen in September. Hatchlings emerge in July and remain active into late October and early November (Germano and Williams 2005; CDFW 2004). Optimal air temperatures for BNLL range between 23.5°C and 40°C and optimal ground temperatures are between 22°C and 36°C. Home range areas differ between males and females. Warrick et al. (1998) found the average home range of males to be 4.24 hectares and females to be 2.02 hectares. Males will aggressively defend their home ranges against other males. Germano and Williams (2005) noted many instances of males with scars the outline the jaws of other adult BNLL. Other studies had Passive Integrated Transponders (PIT) tags broken in fighting males (Germano and Williams 1993).

Other lizards that may overlap with the BNLL include the side-blotched lizard (*Uta stansburiana*), western whiptail (*Aspidoscelis tigris*), and coast horned lizard (*Phrynosoma coronatum*; Stebbins 2003). The BNLL is the largest of these lizards and will consume smaller lizards when given the opportunity. Germano and Williams (2005) noted adult BNLL eating side-blotched lizards and smaller BNLL. While adult BNLL do not hesitate to prey on smaller lizards, grasshoppers, crickets, and beetles make up the majority of their diet (Germano et al. 2007). Diet preferences can vary by location and year. Coleopterans made up the bulk of BNLL diet on the Elkhorn Plain and Lokern Natural Area. Grasshoppers were the main prey source on the Kern Front Oil Field (Germano 2007). Bees, wasps, and ants will also be taken by BNLL, although in smaller numbers than grasshoppers and beetles.

Adult BNLL emerge from dormancy in early April and breeding activity begins within a month of emergence. Breeding activities last from April through the beginning of June and may last throughout June. Eggs are laid in June and July, with clutch size ranging from two to six eggs (Montanucci 1967) and hatchlings emerge after approximately two months of incubation. Germano and Williams (2005) first noted hatchlings appearing on the Elkhorn Plain in mid-July, depending on the weather trends of that year. Cool wet weather patterns in April may delay the emergence of adults, thus delaying egg laying and hatchling emergence.

Potential predators for the BNLL include whipsnakes, gopher snakes, western rattlesnake, loggerhead shrike, American kestrel, prairie falcon, burrowing owl, various diurnal raptors, SJKF, coyote, American badger, and adult BNLL. Germano and Williams (2005) found several individuals that had been struck by passing vehicles.

San Joaquin Kit Fox (Vulpes macrotis mutica) (SJKF)

Status and Description:

Legal status – The SJKF is currently listed as endangered by the ESA and threatened by the CESA (Fish and Game Code §§ 2050 et seq.). The SJKF was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967), and is currently listed as endangered under the ESA of 1973, as amended. No critical habitat has been designated for the SJKF.

The SJKF is included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

Species ecology – The SJKF was originally described to science by C. Hart Merriam (1888) from near Riverside, California. This area is now highly urbanized and no longer supports kit fox. Historically, eight subspecies of kit fox have been recognized, but now only two are recognized: kit fox (*Vulpes macrotis macrotis*) and SJKF (*Vulpes macrotis mutica*; Mercure et al. 1993). The kit fox is the smallest canid species in North America, and the SJKF is the larger of the two subspecies. SJKF have long, slender legs and are approximately 30 cm tall at the shoulder. The average male weighs 2.3 kilograms and the average female weighs 2.1 kilograms (Morrell 1972). SJKF have a relatively small, slim body, large ears set close together, and a long, bushy tail tapering toward the tip. The tail is usually carried low and straight. The most common colorations are described as buff, tan, or yellowish-gray on the body. Two distinctive coats develop each year: a tan summer coat, and a silver-gray winter coat. The undersides vary from white to light buff. The tail is distinctly black tipped.

Other species of fox that occur in the Panoche Valley region include the red fox (*Vulpes vulpes*) and gray fox (*Urocyon cinereoargenteus*). Because all three fox species inhabit the same region, are often fast moving, and nocturnal, identification of SJKF can be a challenge. The coat color and black tipped tail can usually distinguish the SJKF from the red fox. Gray foxes also have a black tipped tail, but also have a distinct black line running along the top to the tail, which is lacking in the SJKF. The small body size of the SJKF can also aid in identification.

Historically, SJKF was known to occur in most of the San Joaquin Valley from southern Kern County north to San Joaquin County (Grinnell et al. 1937); however these authors believe that the SJKF had already had its range substantially reduced by the 1930s. Currently, the largest extant populations of SJKF are in western Kern County on and around the Elk Hills and Buena Vista Valley, and the Carrizo Plains Natural Area in San Luis Obispo County (USFWS 1998). The USFWS (1998) identified three core areas for SJKF populations: Carrizo Plain, western Kern County, and the Ciervo-Panoche Natural Area. The Ciervo- Panoche Natural Area consists of the Ciervo Hills, Tumey Hills, Panoche Hills, and the Panoche Valley. Cypher et al. (2007) identified the Panoche Valley and the Pleasant Valley populations as potential source populations for recolonizing reclaimed farmland in the San Luis Unit of the Central Valley Project. This study showed reasonable connectivity between Panoche Valley and Pleasant Valley along the western edge of the San Luis Unit, as well as reasonable connectivity between Panoche Valley, Pleasant Valley, and reclaimed farmland to the east. Survey efforts to determine SJKF population size are currently underway at Ciervo Panoche Natural Area in Fresno and San Benito Counties, Fort Hunter Liggett in Monterey County, and Camp Roberts in Monterey and San Luis Obispo Counties. Recent records from the 1980s and 1990s also exist for San Luis Reservoir in Merced County (Briden et al. 1987), North Grasslands and Kesterson National Wildlife Refuge on the valley floor in Merced County (Paveglio and Clifton 1988), and in the Los Vaqueros watershed in Contra Costa County. Optimal habitat for SJKF is arid with relatively low grassland vegetation. Preferred habitat is often dependent on the density of kangaroo rats and lagomorphs, the two favored prey items of SJKF.

SJKF are predominantly nocturnal, with peaks in activity occurring during crepuscular periods and are occasionally seen during the day during late spring and early summer (Meaney et al. 2006; Orloff et al. 1986). Distance of nightly movements varies depending on the season. Nightly movements on the Elk Hills Naval Petroleum Reserves averaged 15.4 km during the breeding season, and 10.2 km during the pup-rearing season (USFWS 1998). Home ranges have been reported from as small as 2.6 km2 to as large as 31 km2 (USFWS 1998). Home ranges may overlap, depending on prey density and prey allocation. Zoellick et al. (2002) found that home range size and home range overlap of SJKF did not differ between undisturbed areas and areas disturbed by the Naval Petroleum Reserves. Zoellick et al. (2002) showed up to a 30 percent home range overlap in SJKF, and surmised that this was due to a localized food source such as a high density or rabbits.

The diet of the SJKF varies seasonally and annually, based on variation in abundance of potential prey. In descending order of occurrence, white-footed mice, California ground squirrels, kangaroo rats, SJAS, black-tailed jack rabbits, and chukar partridge were identified in SJKF scat (USFWS 1998; Archon 1992). Other studies have shown that kangaroo rat and lagomorphs are important staples in the diet of SJKF (Meaney et al. 2006). Laughrin (1970) collected over 600 scat samples of SJKF, and 80 to 90 percent of this contained kangaroo rat remains (Laughrin 1970 in Meaney et al. 2006). Cypher et al. (2000) noted that SJKF abundance in the southern San Joaquin Valley was highly correlated with precipitation based prey abundance, particularly kangaroo rat. Drought years, which decreased kangaroo rat abundance, produced significant negative and rapid changes in SJKF abundance. SJKF is also an opportunist and will not pass up potential scavenging opportunities. Scat samples have also included human foods, paper, cloth, and larger mammals such as cattle and sheep that had been scavenged.

SJKF occupy several dens throughout their home range during the year. Dens are usually modified ground squirrel, badger, or coyote dens, and can be up to 2.3 m deep (Tannerfeldt et al. 2003). Radio telemetry studies indicate that foxes use individual dens for an average of 3.5 days before moving to a different den. Possible reasons for frequently changing dens include parasite load, prey depletion, and predator avoidance (Egoscue 1956; USFWS 1998); however an adult SJKF can easily cover its entire home range in one night (Cypher et al. 2005). Multiple dens in the home range of an individual SJKF are necessary for thermal regulation, resting, and predator avoidance. Den openings are 20 to 25 cm high and less than 20 cm wide to exclude coyotes and badgers

(Meaney 2006). Resting dens usually are simple with only one opening, while natal dens can be much deeper and more complex, and have multiple openings. Artificial dens constructed by humans can act as suitable dens for SJKF. Artificial dens are generally lengths of buried pipe or culvert approximately 20 cm in diameter (Cypher et al. 2007).

Females are capable of reproducing at ten months old and begin searching for natal dens in September and October (USFWS 1998). Pair bonds between male and female SJKF vary; some will mate for life while others may only remain together for a single breeding season. SJKF litters can range from one to six pups and success is often dependent on prey abundance (White and Ralls 1993). SJKF litter size averaged 3.8 for adults more than one year old and 2.5 for yearlings (Cypher et al. 2000). Natal dens have more than one opening and are changed two to three times per month. Females rarely hunt while lactating and the male supplies the female with prey during the first few weeks of pup-rearing (Meaney 2006). Family groups generally split up in October, although pups may remain with the parents and assist with rearing the next generation.

Dispersal of yearling SJKF averaged eight kilometers during a six year study on the Naval Petroleum Reserves (Scrivner et al. 1987). Long distance dispersals of up to 69 km by SJKF throughout their range have also been noted (Meaney 2006). While agricultural lands may not present suitable habitat for SJKF, they have been known to disperse through them. Agricultural lands, highways, aqueducts, and urban areas have all been used by dispersing SJKF (USFWS 1998). While these man-made obstacles do not seem to inhibit SJKF dispersal and nightly movements (Zoellick et al. 2002, Cypher et al. 2005), fences and walls can create impenetrable barriers to SJKF movement (Cypher and Van Horn Job 2009). Simple fence alterations such as portals, larger mesh or hog wire, and elevating the bottom six inches off the ground can negate the negative effects of fences and walls and make them permeable to SJKF (Cypher and Von Horn Job 2009).

Predators of the SJKF include golden eagle, domestic dogs, coyotes, red fox, and badgers. Cypher et al. (2005) radio collared 63 SJKF. Twenty-five of those were recovered dead, and of those 25, 12 (48 percent) were killed by large predators, most likely coyotes. Fences which are not permeable to SJKF as described above, can cause a serious threat to SJKF being chased by potential predators. However, a permeable fence may aid in SJKF escape if the fence is situated to provide through points at reasonable intervals and limits the ability of predators to pass through (Cypher and Van Horn Job 2009).

California Tiger Salamander (Ambystoma californiense) (CTS)

Status and Description

Legal status – The CTS population segment that may occur within the Conservation Lands is currently listed as threatened by the ESA and threatened by the CESA (Fish and Game Code §§ 2050 et seq.). Two other distinct population segments in Sonoma County and Santa Barbara County are listed as endangered by the ESA. The Santa Barbara County Distinct Population Segment was listed as endangered in 2000. The Sonoma County Distinct Population Segment was listed as endangered in 2002. The remaining population occurs throughout central California, including the study area. The Central California Distinct Population Segment was listed as threatened in 2004. No Recovery Plan has been written for the CTS to date.

Species ecology – The CTS was formerly classified as a subspecies of tiger salamander (*Ambystoma tigrinum*) but has since been identified as an individual species (Kraus 1988; Shaffer et al. 1991). A broad head, small eyes, and tubercles on the side of the feet characterize CTS. Coloration is a black back with yellow, cream, or white oval spots or bars. Some individuals may have a prominent cream band on the undersides. Snout-vent length ranges from 7.6 to 12.7 cm, and total length ranges from 15 to 22 cm (Stebbins 1966 and 2003).

The CTS originally inhabited most of central California, and remains in remnant populations throughout much of its original range. CNDDB records for CTS show its distribution encompasses portions on Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare, Tuolumne, and Yolo Counties (NatureServe 2009). About 80 percent of all extant occurrences are in Alameda, Contra Costa, Madera, Merced, Monterey, San Benito, ad Santa Clara counties, with 30 percent of all occurrences in Alameda County (*ibid*.). The use of vernal pools and other temporary bodies of water for breeding limits the CTS to areas of low elevation and low topographic relief throughout their range (Stokes et al. 2008). Ephemeral vernal pools which refill with water on a yearly basis, are 40 to 80 cm in depth, and have a surface area of 0.2 hectares or more are optimal for breeding CTS, although small, shallower pools will also house breeding CTS (Stokes et al.

2008). Depth of the breeding pool was highly correlated with breeding CTS. Stokes et al. (2008) found no CTS larvae in pools with an average depth of less than 22 cm. Deep pools with permanent water may not be optimal for breeding populations of CTS because they often house predatory fish, crayfish, or bullfrogs that prey upon larval CTS. This creates a narrow window of pool depth where the pool will not completely dry out before CTS have metamorphosed, but also not contain water year round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005).

Activity patterns of adult CTS are not well understood. Adult CTS live their entire lives in the burrows of small mammals such as the California ground squirrel. Adults begin moving toward breeding pools when the first fall rains begin to inundate pools. Breeding adults will continue moving to pools through the winter and spring. Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al. 2001; Trenham and Shaffer 2005). Adult CTS leave the breeding pools in late spring and return to upland habitats. Trenham and Shaffer (2005) used pitfall traps at various intervals away from a pool to determine the extent of upland use. They found that the numbers of adult CTS declined as distance from the pool increased out to 620 meters. Subadults also moved up to 600 meters away from the pools, but most were concentrated between 200 and 600 meters from the pool. This has led managers to suggest preserving upland habitats with suitable small mammal burrows out to 600 meters from breeding pools (Trenham and Shaffer 2005).

CTS may take upward of four to five years to reach sexual maturity (Trenham et al. 2000). Although individuals can live upward of ten years, less than 50 percent of individuals breed more than once (Trenham et al. 2000). Rainfall can significantly alter adult breeding pool attendance, and production of metamorphs tends to be a boom-or-bust scenario (Loredo and Van Vuren 1996). Typically, greater numbers of breeding adults return to pools during years with greater rainfall (Trenham et al. 2000 and 2001; Cook et al. 2006; Stokes et al. 2008). Males are often the first to arrive at breeding pools and remain in the pool longer than females (Trenham et al. 2000). Larvae remain in the pools approximately four months and emigrate from the pools as they dry. Metamorph emigration typically occurs throughout May and is directly related to the pool drying date (Trenham et al. 2000).

Often amphibian populations are used as an example for the metapopulation/source-sink models. The CTS populations at different breeding pools often act in a metapopulation fashion (Trenham et al. 2001). Mark – recapture studies found that while most breeding adults return to their natal pool, 22 percent dispersed to different ponds (Trenham et al. 2001). It should be noted that Trenham and Shaffer (2005) did not capture any CTS, adult or subadult, more than 620 meters from the pool. Thus, pools more than 1,240 meters from one another may limit dispersal. Breeding CTS have been known to use artificially created pools, and the creation of pools in a stepping-stone fashion has been suggested to aid dispersal between populations (Stokes et al. 2008).

The diet of larval and metamorphosed CTS is not well studied. Studies on the diet of other larval *Ambystomids* have found that less developed larvae prey mainly on zooplankton, and larger, more developed larvae prey on amphipods, mollusks, and insect larvae as well as zooplankton (Dodson and Dodson 1971; Hoff et al. 1985; McWilliams and Bachmann 1989). Adult diet consists of terrestrial invertebrates such as earthworms, snails, and other insects. Vertebrates, such as small mammals and fish, may be taken as well (Stebbins 1959; NatureServe 2009).

Predatory fish and amphibian populations negatively affect CTS populations. Mosquitofish (*Gambusia* sp.), smallmouth bass (*Micropterus dolomieu*), green sunfish (*Lepomus cyanellus*), and bullfrogs (*Rana catesbiana*) are common predators of CTS larvae and adults (NatureServe 2009). Yearly drying of vernal pools used for breeding greatly reduces the numbers of these potential predators, however heavy spring and winter rains can connect pools to other permanent water sources and introduce CTS predators.

San Joaquin Antelope Squirrel (Ammospermophilus nelsoni) (SJAS)

Status and Description

Legal status - The SJAS is listed as threatened under CESA (October 2, 1980). The species does not have its own recovery plan, but is included in the *Recovery Plan of Upland Species of San Joaquin Valley, CA* (USFWS 1998).

Species ecology – The SJAS is one of five subspecies in the genus *Ammospermophilus*. This genus is generally confined to desert and arid steppe habitats and open shrubland communities in the southwest United States and portions of Mexico. Merriam (1893) collected the type specimen for this species in Tipton, Tulare County, California.

Adults weigh between 130 and 170 grams. They have a fusiform shape typical of ground dwelling squirrels. They are buffy tan, have a light stripe on their sides, and have lighter fur on the ventor. They are much smaller than the California ground squirrel (*Otospermophilus beecheyi*), and have a shorter, less bushy, flatter tail.

Grinnell and Dixon (1918) observed an uneven distribution, and they noted that the species occurred in abundance in a few spots that included the Lokern and Elk Hills.

According to Williams (1980), as of 1979, there was 680,000 acres of habitat of which only 102,000 acres was of good quality; none of the best habitat originally described by Grinnell and Dixon remained. Good quality is defined as habitat that supports one to four individuals per acre. The SJAS has been nearly eliminated from the Tulare Basin floor and continues to exist in more marginal areas such as the mountainous areas bordering the western edge. In 1979, there was a notable decline and disappearance from a number of formerly occupied patches including Pixley, Alkali Sink and Kerman Ecological Reserves, and Allensworth State Park (although SJAS were never abundant here; Wes Rhodenhamel, pers. comm.).

SJAS are found in arid annual grassland and shrublands and are numerous in areas with sparse to moderate cover of shrubs including saltbush, ephedra (*Ephedra* sp.), bladderpod (*Isomeris arborea*), golden bushes (*Isocoma* sp.), matchweed and others. SJAS are present but tend to sparsely inhabit shrubless areas. SJAS use shrubs and burrows to escape predators and escape the heat of the sun. For this reason, they may be somewhat dependent on kangaroo rats whose burrows they may enlarge and takeover. The range of the GKR overlaps extensively with the SJAS, but microhabitats may differ. SJAS are also associated with friable soils.

SJAS breed in late winter and early spring. Young do not breed in the first year. Gestation is 26 days, and there are six to 11 embryos. Young are born in March and April and emerge from the burrow after 30 days. The young are weaned as early as late April to late May. Mortality on the Elkhorn Plain Ecological Reserve was 0.7 for young and 0.5 to 0.6 for adults.

These squirrels are generally omnivorous eating green vegetation, fungi, insects (primarily grasshoppers), and seeds (including filaree, brome, ephedra, and saltbush). SJAS are diurnal.

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Appendix D – Covered Species Survey Results Summary

Appendix D

Covered Species Survey Results Summary

Covered Species are those species which this CMP is designed to conserve and protect in perpetuity. These species are considered extant on all Conservation Lands; several studies have been completed to identify the suitable habitat for each species for each of the conservation areas (Table 1). These areas will be the focus for management and monitoring for specific Covered Species while preserving the entirety of the Conservation Lands for all Covered Species (see Appendix A for Species Descriptions). Habitat suitability for three of the Covered Species, BNLL, GKR, and SJKF, was determined by several decision rules which varied slightly for each species based on literature review, occupancy sampling, habitat suitability modeling, and survey results. The location of the CTS mitigation lands was based on 1.2 mile buffers around pond habitat. For the remaining Covered Species, SJAS, and CACO, habitat and open space were the primary criteria as supporting on-going long term conservation efforts for these species.

Table 1. Covered Species and Conservation Acreage on VFCL, VRCL, and SCRCL

Species	Federal	State	Conservation Acreage
Blunt-nosed Leopard Lizard	Endangered	Endangered, Fully Protected	11,883
San Joaquin Kit Fox	Endangered	Threatened	14,863
Giant Kangaroo Rat	Endangered	Endangered	16,576
San Joaquin Antelope Squirrel	None	Threatened	24,185[1]
California Tiger Salamander	Threatened	Threatened	3,694[2]
California Condor	Endangered	Endangered, Fully Protected	24,185[3]

[1]For purposes of this table, San Joaquin antelope squirrel suitable conservation acreage is assumed to include all of the Conservation Lands because this species is not slope-limited.

[2]Suitable aestivation habitat on VFCL and VRCL

[3]Entire Conservation Lands acreage is suitable foraging habitat for this species.

Blunt Nosed Leopard Lizard (BNLL)

No BNLL were found within the Project Footprint during the 2013 adult season surveys (May 9 to July 13, 2013). There were a total of 27 observations of BNLL in the VFCL (Figure 1) with the majority of the observations associated with the wash habitat along Panoche Creek. Also included on Figure 1 are the 105 observations of BNLL from previous surveys in 2009 and 2010 (LOA 2010). None of the previous observations are located in the Project Footprint, but are fully located within the VFCL.

The 2013 hatchling and sub-adult season surveys were completed between May 9 and July 13, 2013. There were a total of 13 observations of BNLL made during the surveys (Figure 1). A majority of the observations made during the hatchling and sub-adult season surveys were associated with the wash habitat along Panoche Creek in the VFCL. However, there was one observation of a BNLL hatchling made outside the Valley Floor Conservation Lands. This BNLL hatchling observation was found just north of the Valley Floor Conservation Lands boundary that encompasses Las Aguilas Creek. The Project site boundaries were modified to avoid this observation and the area within the avoidance zone was added to the VFCL. SCRCL were surveyed in September of 2012. Three teams of three biologists surveyed drainages, with one biologist walking within the drainage and two biologists walking on either side of the drainage. It is important to note that during BNLL focused surveys, juvenile BNLL were observed within drainages and on hill slopes. In addition, BNLL were incidentally observed during GKR focused surveys from September 11th through September 21st, 2012. The majority of these observations were not associated with drainages. Thirty-one BNLL were observed during focused surveys for BNLL and 30 were incidental detections during GKR focused surveys. A total of 61 BNLL detections occurred in a two-week period. All BNLL observed were juveniles except for two subadults (Figure 2).

Suitable soil type and vegetation combinations exist on the Valadeao Ranch Conservation Lands to support BNLL populations; although to date, no BNLL have been observed on the VRCLs. This may be more a factor of sub-optimal survey conditions (cool and wet) than an absence of BNLL. In addition, suitable habitat is contiguous within the western and southeastern edges of the Project site. Additional potential habitat occurs throughout the length of Little Panoche Valley (northern portion of the Valadeao Ranch Conservation Lands).

Consultation with USFWS and CDFW determined that the amount of potentially suitable habitat appropriate for mitigation falls within a larger region, which includes undeveloped areas with slopes between 0 and 11 percent that are roughly contiguous with the Panoche Valley floor and contain well drained soils and non-native grasslands, which includes parts of the VRCL, the VFCL, and a large portion of SCRCL. The Applicant has secured roughly 1,485 acres on the VRCL, 2,523 acres of suitable VFCL (including 389 acres of onsite floodplain), and 7,875 acres on SCRCL that have these characteristics, totaling 11,883 acres of suitable habitat Conservation Lands.

Giant Kangaroo Rat

The GKR source populations on the SCRCLs were surveyed in September of 2012. The source populations were originally mapped by Williams et al. (1995). One hundred 50-meter (m) radius plots were surveyed for GKR and active precincts on the Silver Creek Ranch. GKR presence was verified by the presence of presumed scat (larger than 7 millimeters (mm)) and footprints (larger than 47mm), and further verified by the presence of surface pit caches as well as suitable burrows. Active precincts were identified by the presence of scat, footprints, tail drags and surface pit caches. Ninety-nine of the 100 plots surveyed supported GKR. Average density for these plots was 25.66 GKR precincts per plot, with an average of 13.23 per acre. As population densities of GKR on the Silver Creek Ranch within the source population polygons are high and the suitable habitat of Silver Creek Ranch outside of these polygons is moderate, the average density for GKR plots on the Silver Creek Ranch was used for the source population areas. That density estimate was reduced (proportionally to reductions on the Project site and Valley Floor Conservation Lands form high to moderate) to an estimate of 2.63 GKR per acre for the suitable habitat outside of the source populations. These density estimates were used to estimate a population of up to 44,871 individual GKR (Table 2).

Table 2 Estimated Number of GKR On Valadeao Ranch and Silver Creek Ranch Conservation Lands*

Mitigation Site	Average Density Of GKR (GKR/ACRE)	GKR Habitat (Acres)	Estimated Number of Individuals	Source for Density Estimates
Total Valadeao Ranch CL	0.31	6,830	2,137	Average density of GKR precincts for transects in moderately suitable habitat on the Project site and Valley Floor CL
Silver Creek Ranch CL† (High Suitability)	13.23	2,441	32,294	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek
Silver Creek Ranch CL† (Moderate Suitability)	2.63	4,782.3	12,577	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek Ranch CL reduced proportional to reductions in estimates on the Project
Silver Creek Ranch CL (Total)		**7,223.3**	**44,871**	**The total of the two rows above.**

*Based on empirical data collected in 2009, 2010 and Historical Data. 1992-1995 (Williams et al. 1995), 2009 and 2010 appeared to be relatively good for GKR. Population densities can be 6.6 times lower in poor years.
†Based on empirical data collected in 2012 on Silver Creek Ranch Conservation Lands within source population polygons previously defined and previously identified in Figure 41 of the Recovery Plan (USFWS 1998).

In addition, a 100 percent coverage survey of the Project Footprint for GKR was conducted and a systematic stratified sampling effort was completed on the Conservation Lands in February and March

2013. Follow-up surveys on the Action footprint were conducted from July 13 to July 15, 2013, to verify or update the status of inactive sites. The survey methodology that was implemented was approved by CDFW and was provided to USFWS prior to start of the survey.

Field surveys used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR sign. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings.

Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area were devoid of all sign (fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as "other kangaroo rat."

Within the Project Footprint and Valley Floor Conservation Land, the surveyed grid accounted for 100 percent coverage plus a 500-foot buffer (in areas where landowner access was granted). The Silver Creek Ranch Conservation Lands and Valadeao Ranch Conservation Lands were surveyed using the same methodology described above but with wider transects. No buffers were surveyed for the Conservation Lands since surveyors did not have landowner access outside these areas. Transects were systematically distributed across the Project Footprint and included areas previously identified as high and low suitability habitats in past studies. The Silver Creek Ranch Conservation Lands and Valadeao Ranch Conservation Lands surveys were designed to cover approximately 20-30 percent of the Conservation Lands, therefore, transect spacing was approximately 148 meters.

A total of 48,446 survey grid cells were evaluated for GKR presence; 9,430 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell, or data equipment error. These areas are combined within the cells that are highlighted as "No Data."

Of the 16,775 total survey grid cells located within the Project Footprint and the 500-foot buffer study area, approximately 13,825 survey grid cells were able to be evaluated (11,858 within the Project Footprint boundaries and 1,967 within the 500-foot buffer). A total of 296 of these grid cells were observed to be active at the time of the survey (1.8 percent of evaluated cells). A total of 197 cells within the Project Footprint are considered active (1.7 percent of evaluated cells in the Project Footprint), while 99 cells within the 500-foot buffer were considered to be active (0.5 percent of evaluated cells in 500 foot buffer). The remaining 2,950 grid cells were not evaluated primarily due to lack of landowner access. These areas are combined within the cells that are noted as "No Data." Table 3 describes the results of the GKR survey and Figure 3 depicts the results of the GKR survey in the Project Footprint.

Table 3 GKR survey results within the Project Footprint

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**Total**
Project Footprint	197	88	11,572	1	99*	11,957
500-foot Buffer	99	183	1,685	0	2,851	4,818
Total	**296**	**271**	**13,257**	**1**	**2,950**	**16,775**

*No data areas in the Project Footprint were located along fence line locations along the 500-foot buffer and Valley Floor Conservation Lands. None are wholly within the Project Footprint. The entire Project Footprint area was surveyed during the GKR survey.

Of the 11,190 total survey grid cells located within the Valley Floor Conservation Lands study area, approximately 10,001 survey grid cells were evaluated. A total of 896 of these grid cells were observed to be active at the time of the survey (9.0 percent of the cells evaluated). The 1,189 grid cells were not evaluated primarily due to lack of landowner access based on grazing operations or other restrictions. Table 4 describes the results of the GKR survey and Figure 4 depicts the results of the GKR survey on the VFCL within the study area.

Table 4 GKR survey results within the VFCL

	GKR Grid Cell Status

	Active	Inactive	No GKR	Relict GKR	No Data	Total
VFCL	896	740	8,364	1	1,189	11,190

VFCL = Valley Floor Conservation Lands

Of the 10,309 total survey grid cells located within the Silver Creek Ranch Conservation Lands study area; approximately 8,211 survey grid cells were evaluated. A total of 1,883 of these grid cells were observed to be active at the time of the survey (23.0 percent of the cells evaluated). The 2,098 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, or other reasons precluding surveyors from entering the grid cell. Table 5 describes the results of the GKR survey and Figure 5 depicts the results of the GKR survey on the Silver Creek Ranch Conservation Lands within the study area.

Table 5 GKR survey results within the SCRCL

	GKR Grid Cell Status					
	Active	Inactive	No GKR	Relict GKR	No Data	Total
SCRCL	1,883	1,414	4,914	0	2,098	10,309

SCRCL=Silver Creek Ranch Conservation Lands.

Of the 10,166 total survey grid cells located within the Valadeao Ranch Conservation Lands study area, approximately 6,973 survey grid cells were evaluated. A total of 58 of these grid cells were observed to be active at the time of the survey (1.0 percent of the cells evaluated). The 3,193 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell. Table 6 presents the results of the GKR survey and Figure 6 depicts the results of the GKR survey on the Valadeao Ranch Conservation Lands within the study area.

Table 6 GKR survey results within the VRCL

	GKR Grid Cell Status					
	Active	Inactive	No GKR	Relict GKR	No Data	Total
VRCL	58	48	6,866	1	3,193	10,166

VRCL = Valadeao Ranch Conservation Lands

Based on this most current survey information, a map of the active and inactive GKR cells was prepared and larger colonial concentrations were delineated. Four of the larger colony concentrations within the Project Footprint were converted to GKR avoidance areas and added to the Valley Floor Conservation Land (approximately 58 percent of total active and inactive GKR blocks within the original Project Footprint). These areas were selected due to the large numbers of concentrated active and inactive GKR precincts, presence of high quality habitat, and direct connectivity to protected lands such as the Valley Floor Conservation Land, SJKF corridor, Valadeao Ranch Conservation Lands, and adjacent BLM landholdings. The summary above takes the move of the avoidance areas to the Conservation Lands into consideration.

The results of the 100 percent survey were used to generate estimates of the total number of GKR potentially supported in the Project Footprint. It was conservatively assumed that all 197 active cells were located in high quality GKR habitat even though habitat quality in the Project Footprint appears to be compromised over much of the occupied area due to past land use practices. An attempt was made to field verify the density of GKR per active cell, however, based on field conditions (heavy grazing), it was not possible to identify individually clipped precincts within the grid cells. Without performing systematic grid trapping study, it is assumed that each active cell within the Project Footprint is occupied with at least one individual GKR. This resulting assumed minimum density is within the range provided by Williams and above the density predicted by the habitat suitability model (HSM) for the Project.

Using this density estimate for GKR within the Project Footprint, a minimum of 197 GKR are expected to occur within the Project Footprint currently. Typically GKR populations can fluctuate significantly from year to year and within years, potentially leading to a population increase across the Project Footprint outside of the cells identified as active during the survey. A population increase would likely result in occupancy of at least the currently inactive GKR cells found within the Project Footprint. Therefore, a minimum reasonably expected estimate of the population potentially supported within the Project Footprint is 285 individual GKRs.

To account for possible increases in density from one year to the next, a potentially higher density should be assumed. Project Footprint densities of GKR are not available in literature. The only colony evaluated in Williams (1992) from the Valley Floor was not trapped and no density estimate specifically for that GKR colony was calculated. In the Panoche region, other density estimates are available for Silver Creek Ranch, the vicinity of Valadeao Ranch, and on the east side of the Panoche Region in the vicinity of Panoche Creek alluvial fan. Of these, the

Project Footprint is most likely more similar to Valadeao Ranch than Silver Creek Ranch or Panoche Creek, given the very high quality habitat conditions present on the latter two. Therefore, using the maximum measured density for the Valadeao Ranch area (7.90 GKR/acre), up to 506 GKR may be present within the Project Footprint.

GKR are a species that has periodic population irruptions, resulting in large increases in numbers of individuals and potentially large areas of adjacent habitat becoming occupied over very short time periods. Although these population increases may follow years of favorable precipitation, a direct causative link has not been determined. When these events occur, existing populations can increase greatly. While this type of population increase is an observed phenomenon, predicting the resulting population on a particular area (e.g. Project Footprint) is problematic and not the typical condition.

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San Joaquin Kit Fox

A variety of surveys intended to detect SJKF site use of the Project Footprint and Conservation Lands were conducted during 2009, 2010, 2012, and 2013. A summary of the results of these surveys is included in the following paragraphs.

Scat-sniffing Dog Surveys

Evidence of SJKF on the Project Footprint, and portions of VFCL and VRCL was gathered during scat-sniffing dog surveys conducted by Working Dogs for Conservation. These surveys were conducted onsite between July 30th and August 16th, 2010, walking 33.19 miles (53.42 kilometers [km]) of non-random transects. During these surveys, 52 fresh (< 8 days old) and 311 old scats (> 8 days old) were collected. Individual SJKF mark their territory with urine and feces, as well as use latrines several times per day. The scats collected during these surveys were sent to the Smithsonian to have Deoxyribonucleic Acid (DNA) analyzed. From these scats, 22 separate individual SJKF were identified in the study area of the Project Footprint, VFCL, and

VRCL (11 male and 11 female). Nine individuals were located on both the Project Footprint and Conservation Lands, and 13 individuals were located exclusively on the Conservation Lands. As the scat- sniffing dog surveys were conducted at the end of the summer of 2010, the data collected represents a good estimate of the number of individuals occurring in the study area for a good year (the winter of 2009-2010 was a year with high precipitation and 2010 was a year with a high density of prey species).

Scat was collected from up to 35 percent slopes, a slope that is much steeper than typically reported for this species. These results from empirical data defining slope use by SJKF in the local vicinity of the Project site is important to note, as species use landscapes differently in different locations and settings. Studies often report much lower slope ranges in the literature for this species, without defining what slopes were available for use in the study area (i.e., if all slopes in the study area are less than 15 percent, then SJKF use on slopes greater than 15 percent cannot accurately be assessed).

Spotlight Surveys

Spotlighting surveys on the SCRCL have been completed with 20.5 nights of spotlighting producing two to 10 SJKF observations per night. A total of 137 detections of SJKF and 11 detections classified as probable SJKF have occurred to date. It is important to note that kit foxes were detected within drainages, on flat land, on hill slopes, and even on ridges or hills. The SJKF observed on the SCRCL appear to use hills with much steeper slopes than previous literature suggests which is similar to the results of the scat-sniffing dog surveys on the VRCL.

Camera Trap Surveys

Twenty camera trap stations were set up on the Silver Creek Ranch Conservation Lands, and have recorded SJKF at 17 out of 20 stations. All camera traps were placed at least a half mile from each other. The 17 detections occurred on 119 of 275 trap nights, resulting in approximately 43 percent detection. Individual camera trap detections of SJKF ranged from 0 percent to almost 64 percent detection. Only one station detected two SJKF in the same photo, all other stations detected one individual at a time. As SJKF rarely exhibit unique identifying features, individuals are difficult to distinguish. Therefore, it is not possible to confirm the exact number of individuals that visited any given camera trap location.

SJKF Den Locations

Concurrent with the 2013 GKR surveys all known SJKF den and known SJKF natal den locations were recorded and mapped. A total of 46 SJKF dens were observed within the study area (37 known adult dens and 8 natal dens). Table 7 presents the results by study area component and Figure 7 shows the locations of these dens within the study area.

Table 7 San Joaquin Kit Fox Den Observations

	Project Footprint	VFCL	SCRCL	VRCL	Total
Known Dens	2	17	7	11	**37**
Known Natal Dens	1	5	1	1	**8**
Total	**3**	**22**	**8**	**12**	**46**

Habitat Suitability

The Project will be preserving over 24,000 acres that benefit the SJKF. However, any lands with greater than 11 percent slopes were presumed to be less than optimally suitable. This decision was made based on scat-sniffing dog results on the Project site, Valley Floor Conservation Lands, and part of the Valadeao Ranch Conservation Lands. The proportion of lands considered suitable for SJKF was contingent upon the slope values such that, for example, 100% of lands with <11% slopes were considered suitable but only 50% of lands with 11.01-21% slopes was considered suitable. The scale used for ranking is described in Table 8.

Table 8 Slope Classes and SJKF Scat

Slope Class	Scats Collected in This Slope Class	Prorated Habitat Suitability Acres	Acres of Land: Acres of Suitable Habitat
0-11%	70%	100% Suitable	1 : 1
11.01-21%	18.5%	50% Suitable	1 : 0.5
21.01-35%	11.5%	25% Suitable	1 : 0.25
>35%	0%*	0% Not Suitable	1 : 0

The Project Footprint contains 2,492 acres of suitable SJKF habitat. The Conservation Lands contain approximately 14,863 acres of suitable SJKF habitat according to this method. It is important to note that the Conservation Lands contain over 24,000 acres that would be managed for and could potentially be used by SJKF.

Valley Floor Conservation Lands located on the southern portion of the Project Footprint would remain intact (undisturbed and unfragmented), thus allowing SJKF to continue to disperse across this portion of the Project Footprint. Additionally, the Valley Floor Conservation Lands incorporated in washes provides for increased connectivity for dispersing SJKF throughout the total Project Footprint.

California Tiger Salamander

A total of 12 ponds are present on the VFCL and the VRCL and just outside these areas (see Table 9 and Figure 8); three ponds are offsite, five are within the VRCL and four are within VFCL. CTS were documented in two ponds (Ponds #3 and #12) and documented historic occurrences in two ponds (Ponds #8 and #9) (see Figure 8); one pond offsite, one on the VRCL, and two within the VFCL. No larvae or adult CTS were detected within the Project Footprint but historically CTS have been documented in the major drainages within the VFCL. Ponds #8 and #9 are no longer considered suitable for CTS, but they will be monitored as will all ponds on these Conservation Lands.

Table 9. Ponds Surveys during Protocol CTS Larval Surveys, March, April, and May, 2010

Location #	Habitat Type	Findings	Dry by Date
01	Stock Pond	Clam Shrimp	Still Hydrated 21 May
02	Old Stock Pond	None	21 May (completely dry)
03	Stock Pond	CTS Larvae	Still Hydrated 21 May
04	2 Stock Ponds	None	21 May (completely dry)
05	Old Stock Pond	None	12 April (completely dry)
06	Stock Pond	None	21 May (completely dry)
07	2 Old Stock Ponds	None	21 April (almost dry)
08	Ephemeral Pool Complex	None	21 May (only 1 pool hydrated)
09	3 New Stock Ponds	None	21 May (only 2 pools hydrated)
10	Ephemeral Pool Complex	None	21 May (completely dry)
11	Old Stock Pond	None	Still Hydrated
12	Stock Pond	CTS Larvae	Drying fast 21 May

Four of the five ponds and 4,028.1 acres of potential estivation habitat (including 669.7 acres within 0 to 2,100 feet of breeding habitat; 287.2 acres between 2,100 to 2,640 feet from breeding habitat; and 3,071.2 acres between 2,640 to 6,336 feet from breeding habitat) will be permanently protected on Conservation Lands. Suitable aestivation habitat is considered grasslands within 6,336 feet of breeding ponds (see hatch on Figure 8). The current status of CTS on the SCRCL is undetermined at this time. No surveys occurred on the SCRCL for CTS; however, at least two manmade ponds support potential habitat. Ponds on the SCRCL will be monitored for at least three years; where CTS are detected; those ponds and associated aestivation habitat will be added to conservation acreage for this species.

San Joaquin Antelope Squirrel

Conditions were suitable for observation of this species during all BNLL surveys and many of the other surveys conducted for Covered Species associated with the Project Footprint and Conservation Lands. A single observation of an SJAS was recorded during GKR surveys on the Project Footprint. During that same period, one observation was recorded on VRCL and 13 observations were recorded on SCRCL. These observations each represented individual SJAS as they were recorded during a single survey effort. During the BNLL protocol surveys between June and September 2013, SJAS observations were recorded as follows: Project Footprint (30); VFCL (5) and VRCL (14) (Figure 9). Many of these observations that were likely the same individual observed multiple times over the survey period.

SJAS were regularly observed in the more diverse habitats on the VRCL and SCRCL during surveys conducted in 2009, 2010, and 2012 by Live Oak Associates, Inc. (LOA). The entire acreage of the Conservation Lands is considered suitable mitigation for this species. Based on these results, SJAS are expected to occur on the Project Footprint in very low numbers. Three individuals were observed within the Project Footprint during various surveys conducted in 2009, two individuals were detected on the VFCL, and seven on the VRCL during 2010 surveys. The overall population levels of this species on the VFCL and the VRCL is considered low; however, on the SCRCL, SJAS populations are considered high, with hundreds observed throughout most of the SCRCL during 2010 reconnaissance surveys, in addition, 119 were observed incidentally in a two-week period in September of 2012.

California Condor

Although the CACO has not been observed over the site to date, it may pass over and/or forage over the site from time to time. One of the active CACO release sites is located at Pinnacles National Monument in the Gabilan Mountains of San Benito County. Pinnacles National Monument is located approximately

16 flight miles southwest of the Project Footprint. As of May 2013, this population stood at 25 "free-flying" individuals (USFWS 2013). No critical habitat for the CACO has been designated in San Benito County. The California Natural Diversity Database (CNDDB) has no records of the CACO in San Benito County, even though Pinnacles National Monument is an active release site in the county.

No suitable nesting habitat exists on the Project Footprint or Conservation Lands. Although possible foraging habitat may exist on the Project Footprint and Conservation Lands, the CACO has not been observed during other biological surveys onsite (including ongoing golden eagle/raptor use surveys). According to the USFWS, radio-tracking surveys of released CACO have identified this species occurring over the Project Footprint while in flight, likely while foraging.

Aerial nest surveys targeting nesting golden eagles did not identify any potential CACO nests within ten miles of the Project footprint. The Conservation Lands shall provide habitat preservation. VFCL will conserve approximately 2,523 acres of suitable CACO foraging habitat. Conservation Lands on the VRCL and SCRCL will include approximately 10,772 acres and 10,890 acres of suitable CACO foraging habitat, respectively. When combined, Conservation Lands will total approximately 24,185 acres of suitable CACO foraging habitat.

Vernal Pool Fairy Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; Figure 10).

The winter 2010 Protocol Vernal Pool Branchiopod Surveys identified VPFS within the study area in one pool, a small berm pond located along the boundary of Sections 4 and 9. One other pool, created by excavated dirt used for the berm around the occupied pool, was identified as hydrologically connected with the VPFS occupied pool. VPFS were not found in any other potential habitat throughout the project site or the VRCL (Figure 11).

Conservancy Fairy Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; Figure 10).

The 2005 USFWS Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon does not note any extant populations of CFS in San Benito County. The CNDDB has no records of CFS occurring in the Project Footprint or on U.S. Geologic Service (USGS) quads or the encompassing quads. No critical habitat for CFS has been designated in San Benito County.

No CFS were observed on the Project Footprint or the VFCL and VRCL during winter 2010 Protocol Vernal Pool Branchiopod Surveys.

Longhorn Fairy Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; Figure 10).

The 2005 USFWS Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon does not note any extant populations of LHFS in San Benito County. The CNDDB has no records of LFS occurring in the Project Footprint or the encompassing USGS quads. No critical habitat for LFS has been designated in San Benito County.

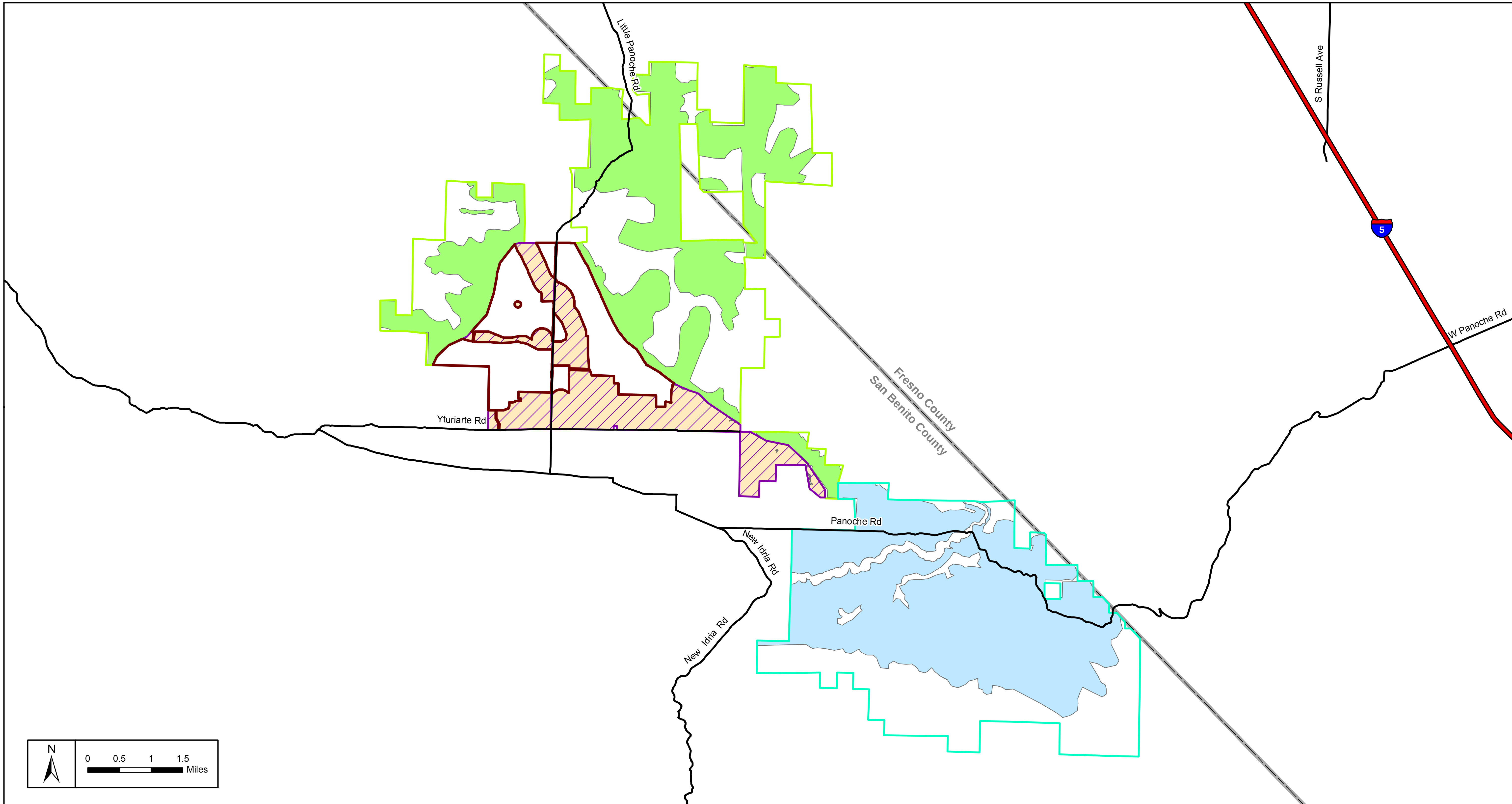
No LFS were observed on the Project Footprint or the VFCL and VRCL during winter 2010 Protocol Vernal Pool Branchiopod Surveys.

Vernal Pool Tadpole Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were

The 2005 USFWS Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon does not note any extant populations of VPTS in San Benito County. The CNDDB has no records of VPTS occurring within the Project Footprint or the encompassing USGS quads. No critical habitat for VPTS has been designated in San Benito County.

No VPTS were observed in the Project Footprint or the VFCL during winter 2010 Protocol Vernal Pool Branchiopod Surveys. However, VPTS were observed in one pool on the VRCL during the winter 2010 Protocol Vernal Pool Branchiopod Surveys.



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valley Floor Suitable Habitat *(approx. 2507 acres)*
- Valadeao Ranch Conservation Lands
- Valadeao Ranch Suitable Habitat *(approx. 6598 acres)*
- Silver Creek Ranch Conservation Lands
- Silver Creek Ranch Suitable Habitat *(approx. 7149 acres)*

Panoche Valley Solar Project

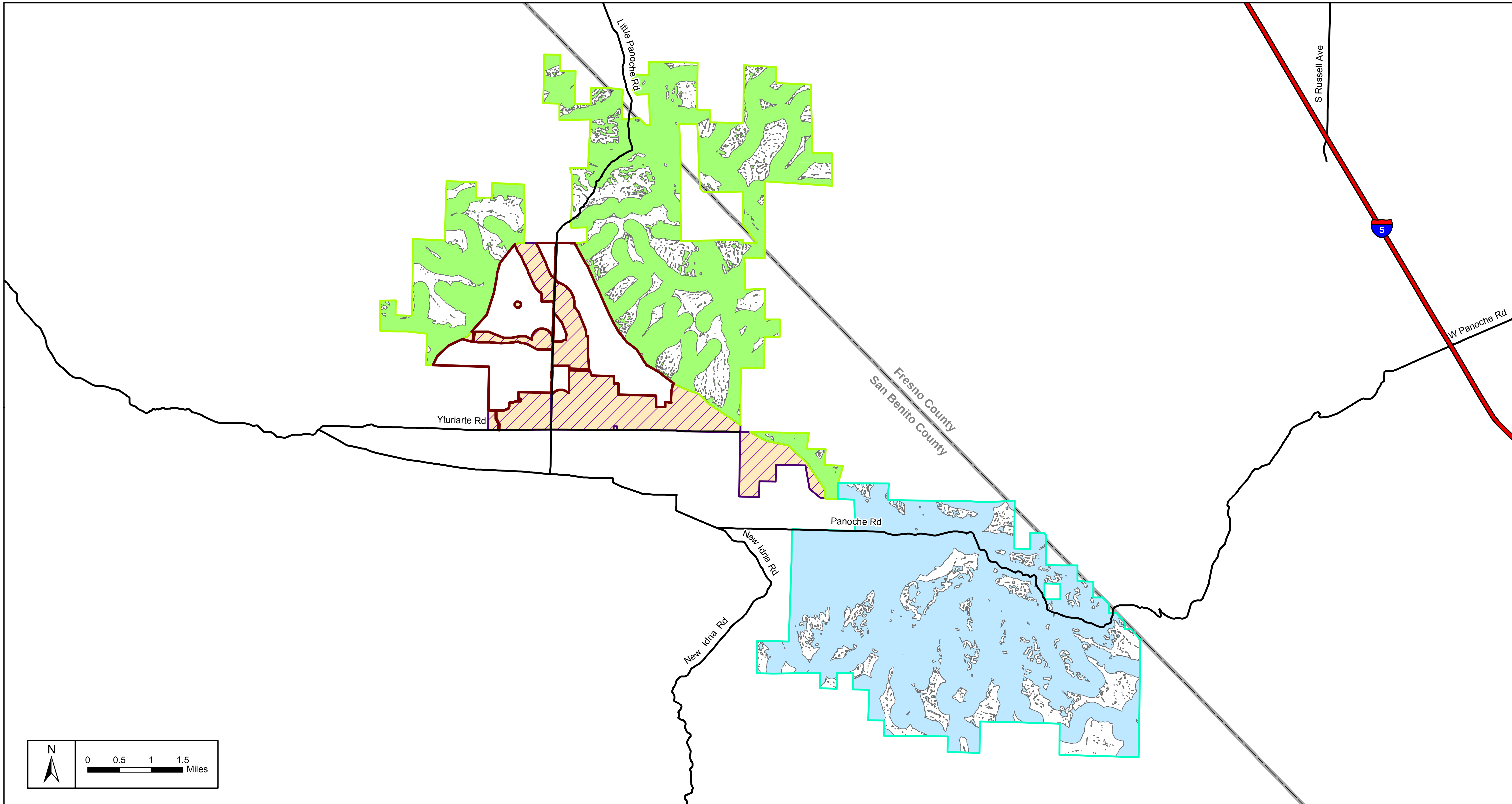
Giant Kangaroo Rat Mitigation Lands*

*For the purpose of this figure, data from Live Oak Associates was used for the Valadeao and Silver Creek Ranches, and clipped to the boundaries as shown. Locations with a slope between 0 and 11% were used for the Valley Floor Conservation Lands.

FIGURE

1

JH 2015-05-29



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valley Floor Suitable Habitat (approx. 2,514 acres)
- Valadeao Ranch Conservation Lands
- Valadeao Ranch Suitable Habitat (approx. 7,876 acres)
- Silver Creek Ranch Conservation Lands
- Silver Creek Ranch Suitable Habitat (approx. 8,824 acres)

Panoche Valley Solar Project

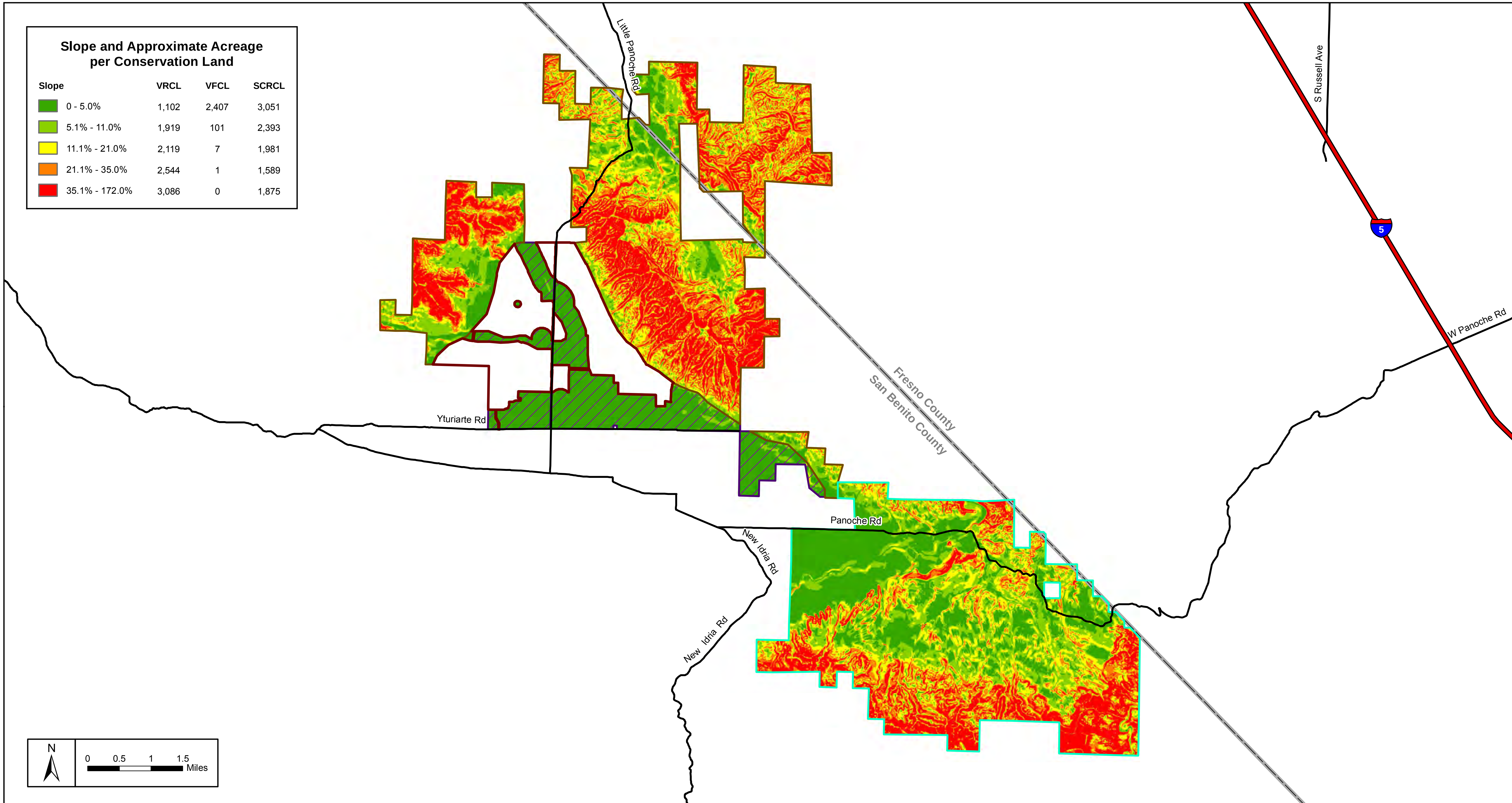
Blunt-nosed Leopard Lizard Mitigation Lands*

*For the purpose of this analysis, locations with a slope between 0% and 11% or within 625 feet of an area of drainage are considered suitable BNLL habitat.

FIGURE

3

JH 2015-05-29



Slope and Approximate Acreage per Conservation Land

Slope	VRCL	VFCL	SCRCL
0 - 5.0%	1,102	2,407	3,051
5.1% - 11.0%	1,919	101	2,393
11.1% - 21.0%	2,119	7	1,981
21.1% - 35.0%	2,544	1	1,589
35.1% - 172.0%	3,086	0	1,875

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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

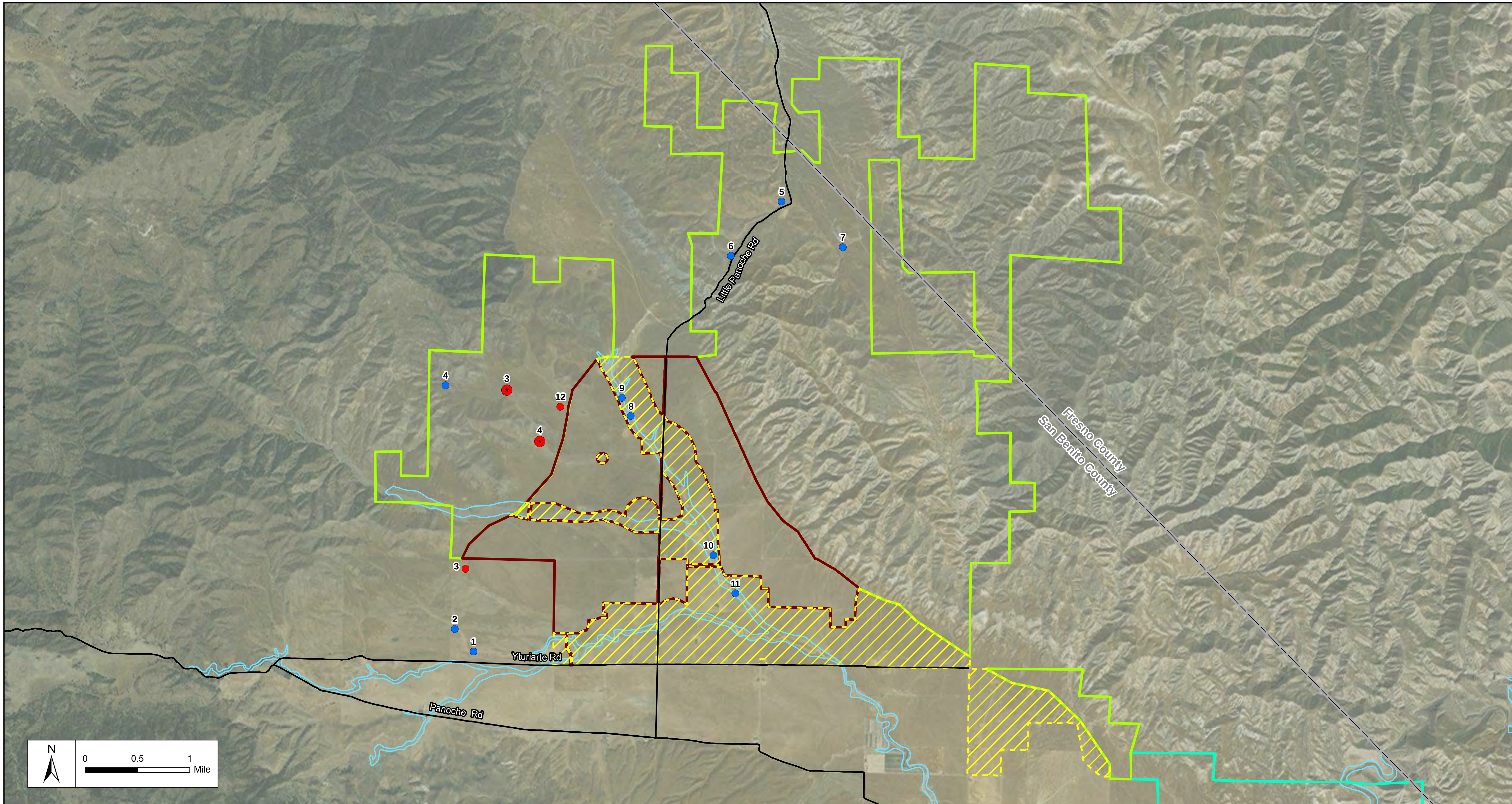
Panoche Valley Solar Project

San Joaquin Kit Fox Mitigation Lands

FIGURE

2

JH 2015-05-29



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Legend

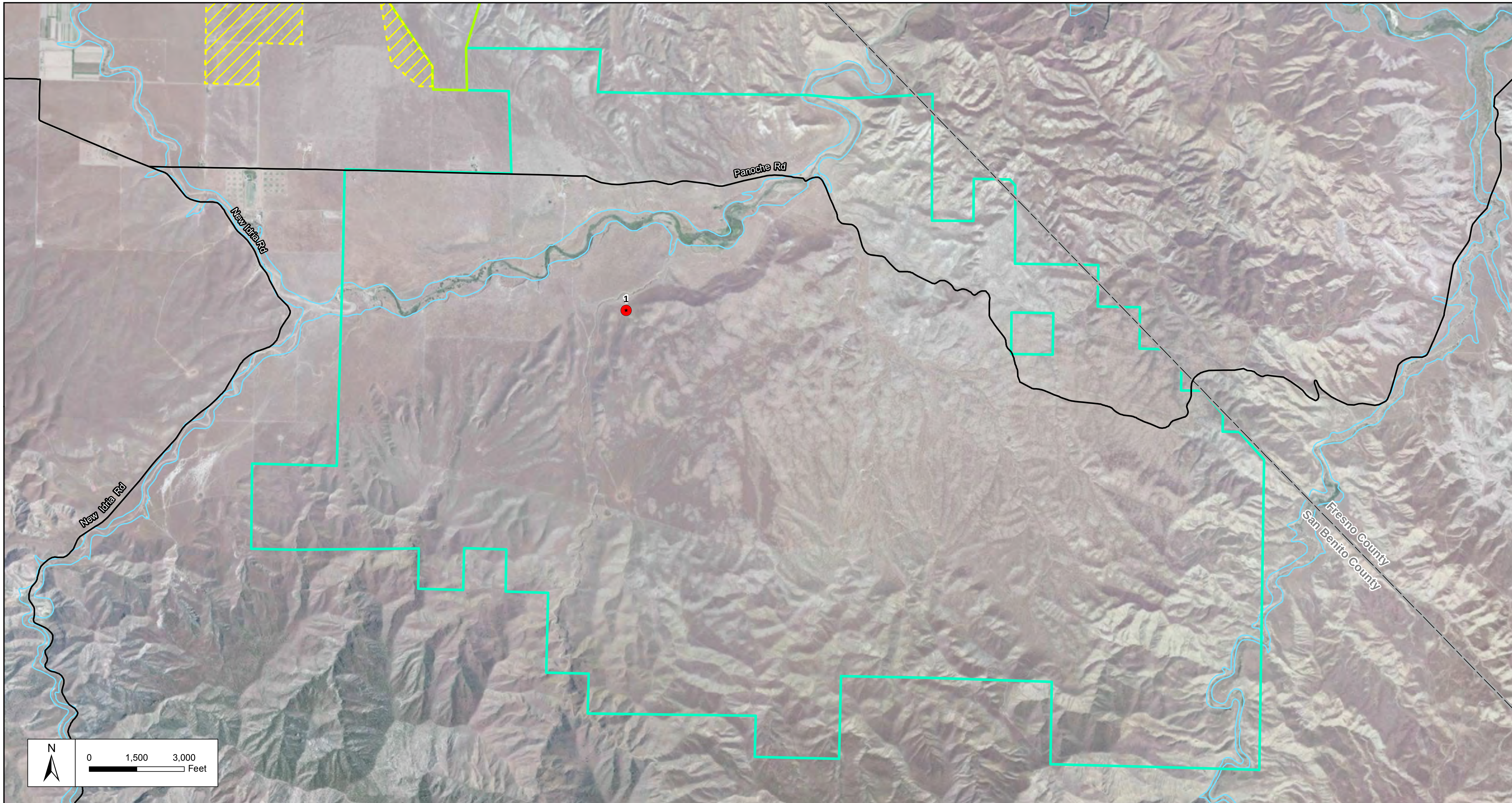
- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Potential Mitigation Pond Location
- Surveyed Breeding Pond
- Surveyed Pond
- 100-Year Floodplain

Panoche Valley Solar Project

Valadeao Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

FIGURE
4

JH 2015-05-29



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Legend

- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- Potential Mitigation Pond Location
- 100-Year Floodplain

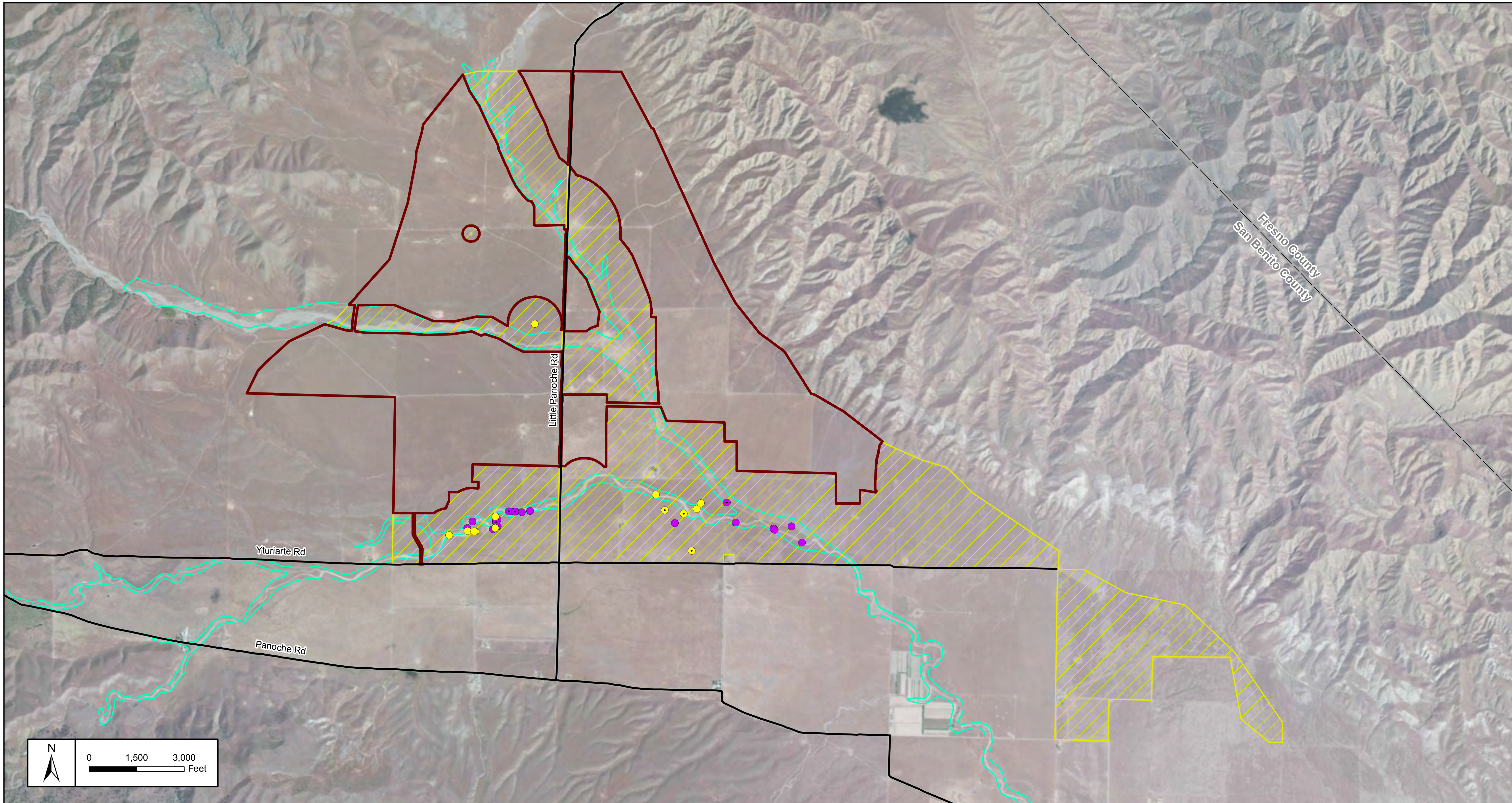
Panoche Valley Solar Project

Silver Creek Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

FIGURE

5

JH 2015-05-29



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- 100-Year Floodplain
- 2013 Adult BNLL Observation (In Protocol)
- 2013 Adult BNLL Observation (Incidental)
- 2013 Hatchling/Sub-Adult Observation (In Protocol)
- 2013 Hatchling/Sub-Adult Observation (Incidental)

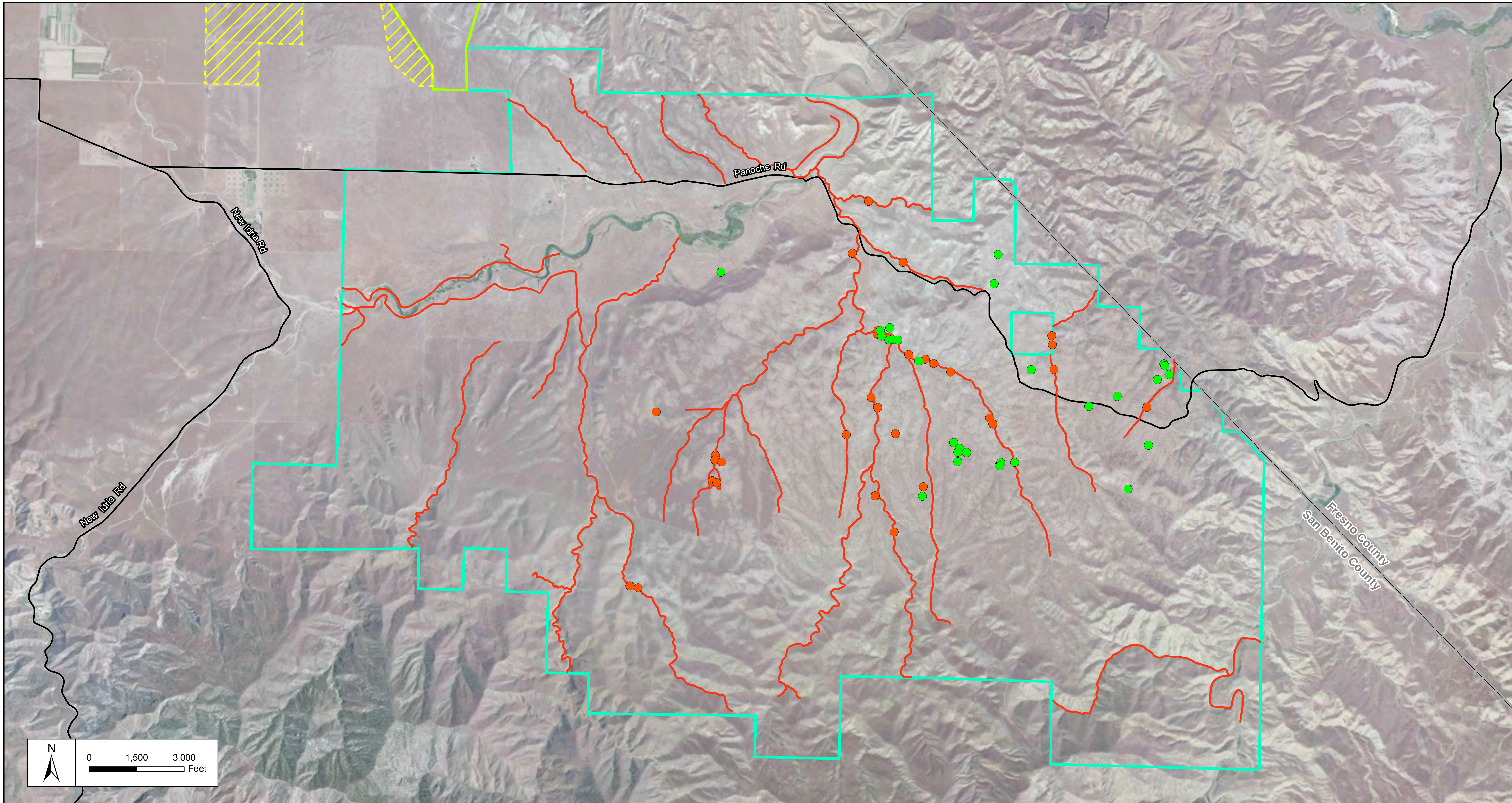
Panoche Valley Solar Project

2013 Bunt-nosed Leopard Lizard Protocol Survey Results

FIGURE

6

JH 2015-05-29



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Legend

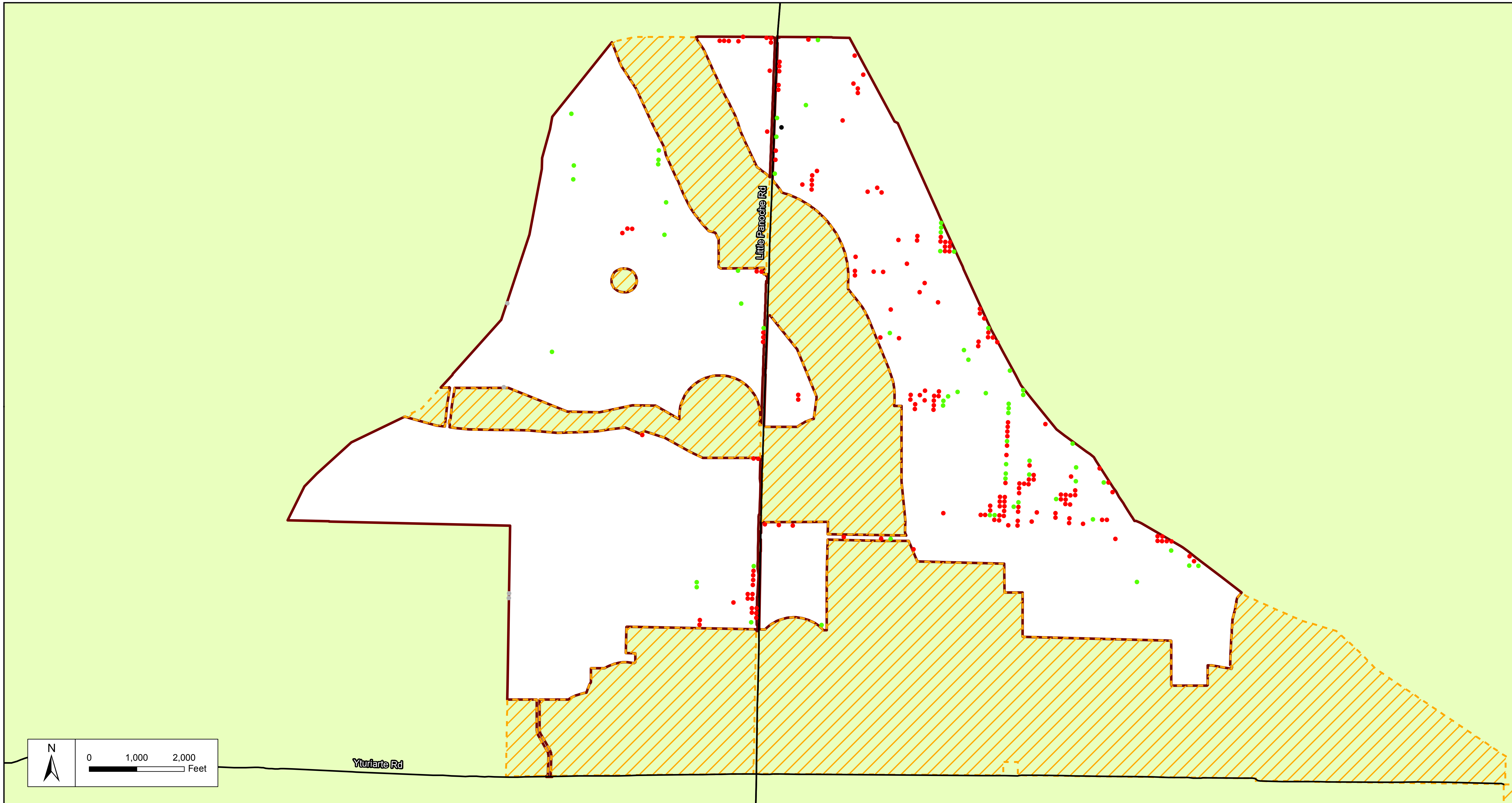
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- BNLL Observation During Focused Surveys
- Incidental BNLL Observation
- BNLL Focused Survey Route

Panoche Valley Solar Project

Blunt-nosed Leopard Lizard Observations on Silver Creek Ranch Conservation Lands

FIGURE 7

JH 2015-05-31



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- GKR Evidence, Active
- GKR Evidence, Inactive
- Relict GKR Sign Present
- No Data

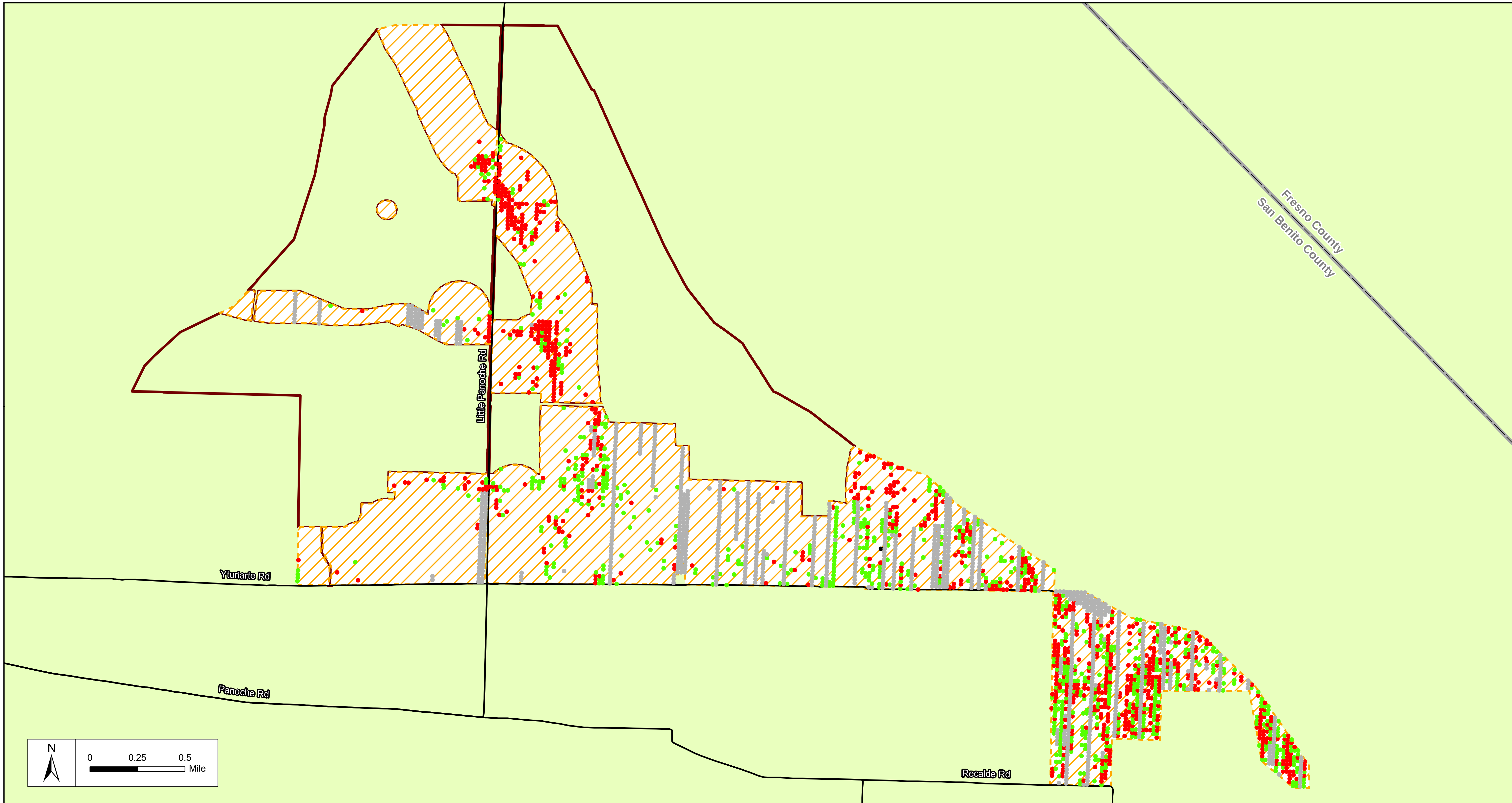
Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations

Project Footprint

FIGURE 8

JH 2015-05-31



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- GKR Evidence, Active
- GKR Evidence, Inactive
- Relict GKR Sign Present
- No Data

Panoche Valley Solar Project

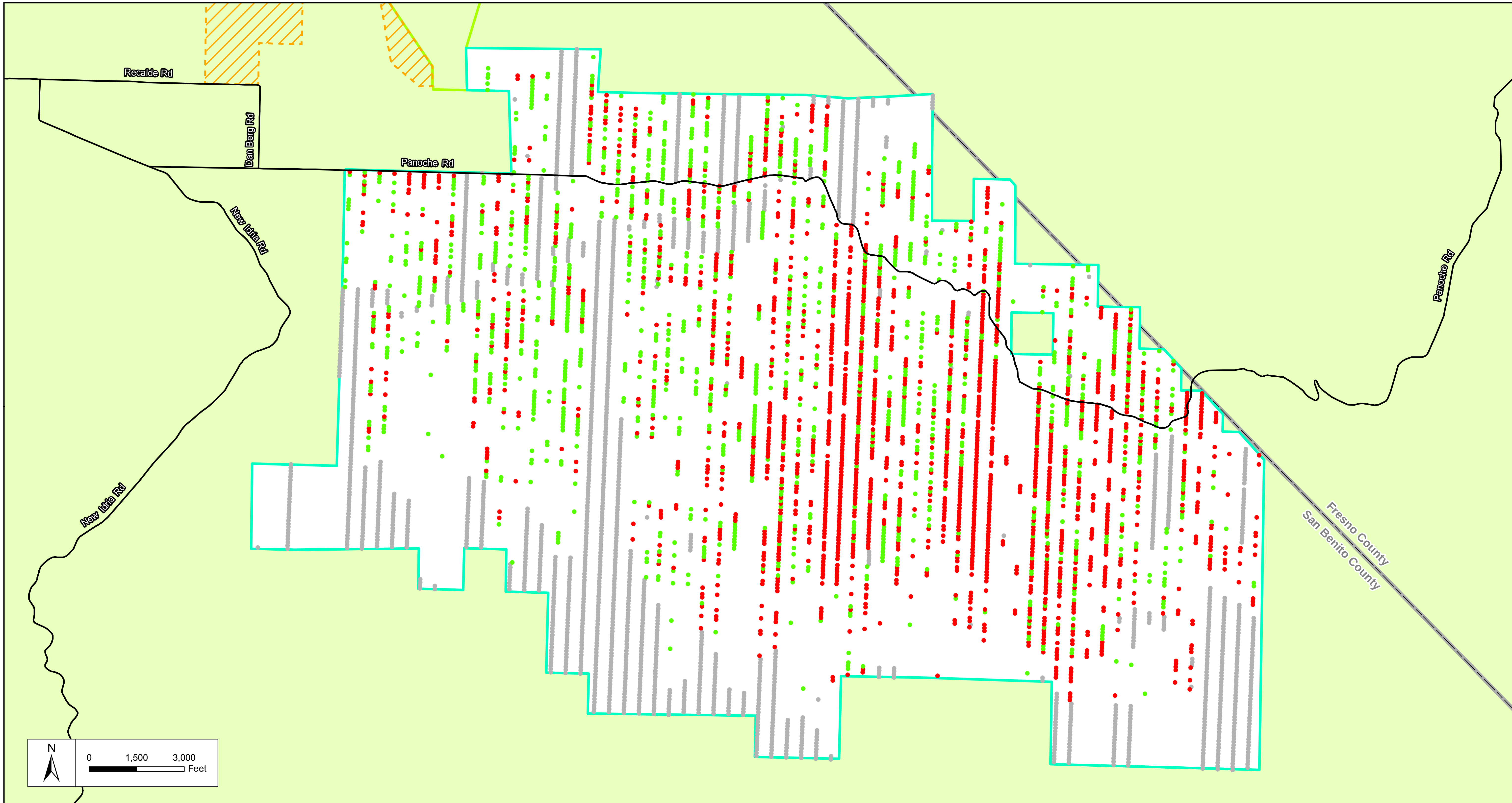
2013 Giant Kangaroo Rat Observations

Valley Floor Conservation Lands

FIGURE

9

JH 2015-05-31



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Legend

Silver Creek Ranch Conservation Lands	GKR Evidence, Active
Valadeao Ranch Conservation Lands	GKR Evidence, Inactive
Valley Floor Conservation Lands	No Data

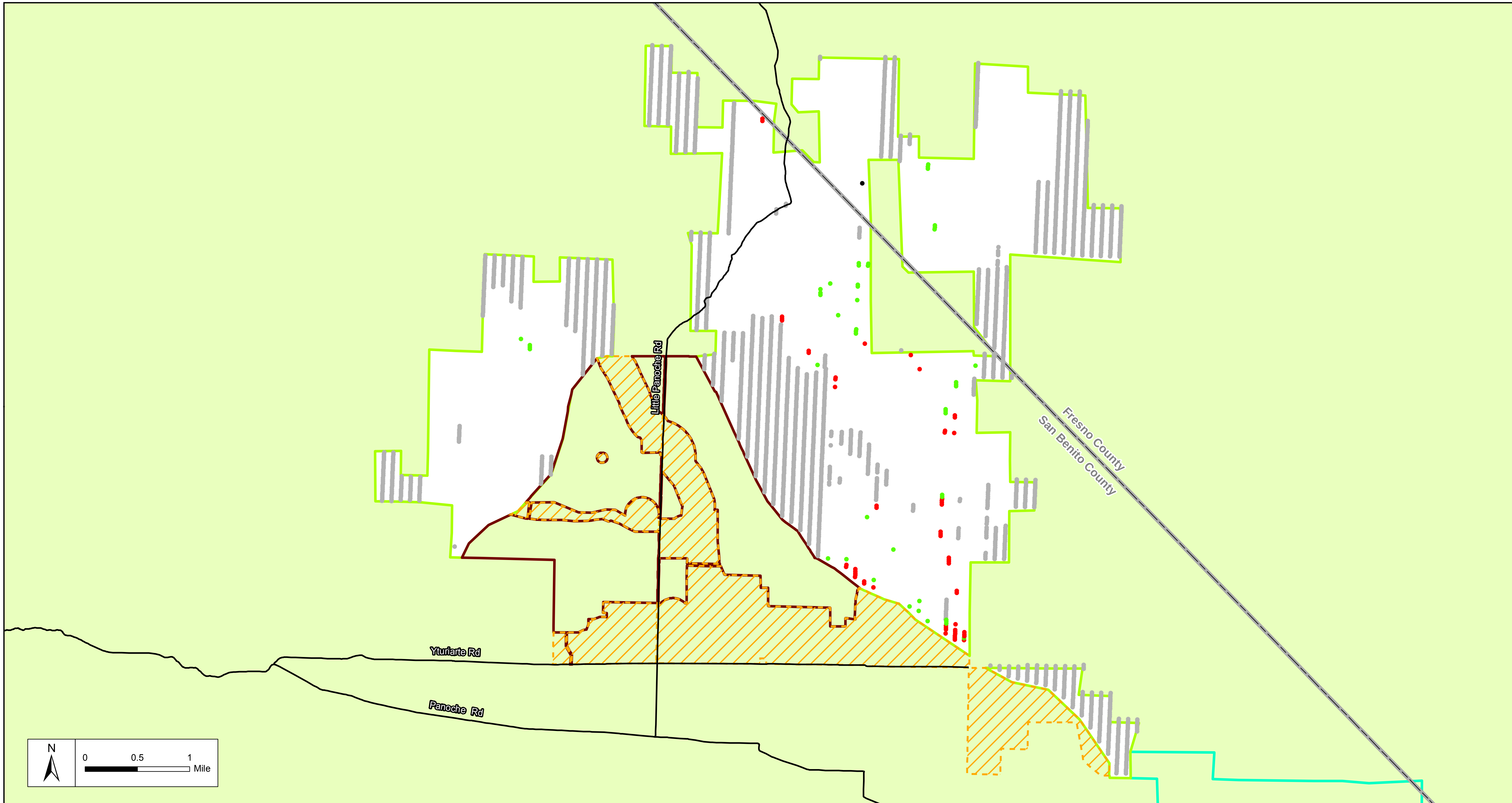
Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations

Silver Creek Ranch Conservation Lands

FIGURE 10

JH 2015-05-31



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- GKR Evidence, Active
- GKR Evidence, Inactive
- Relict GKR Sign Present
- No Data

Panoche Valley Solar Project

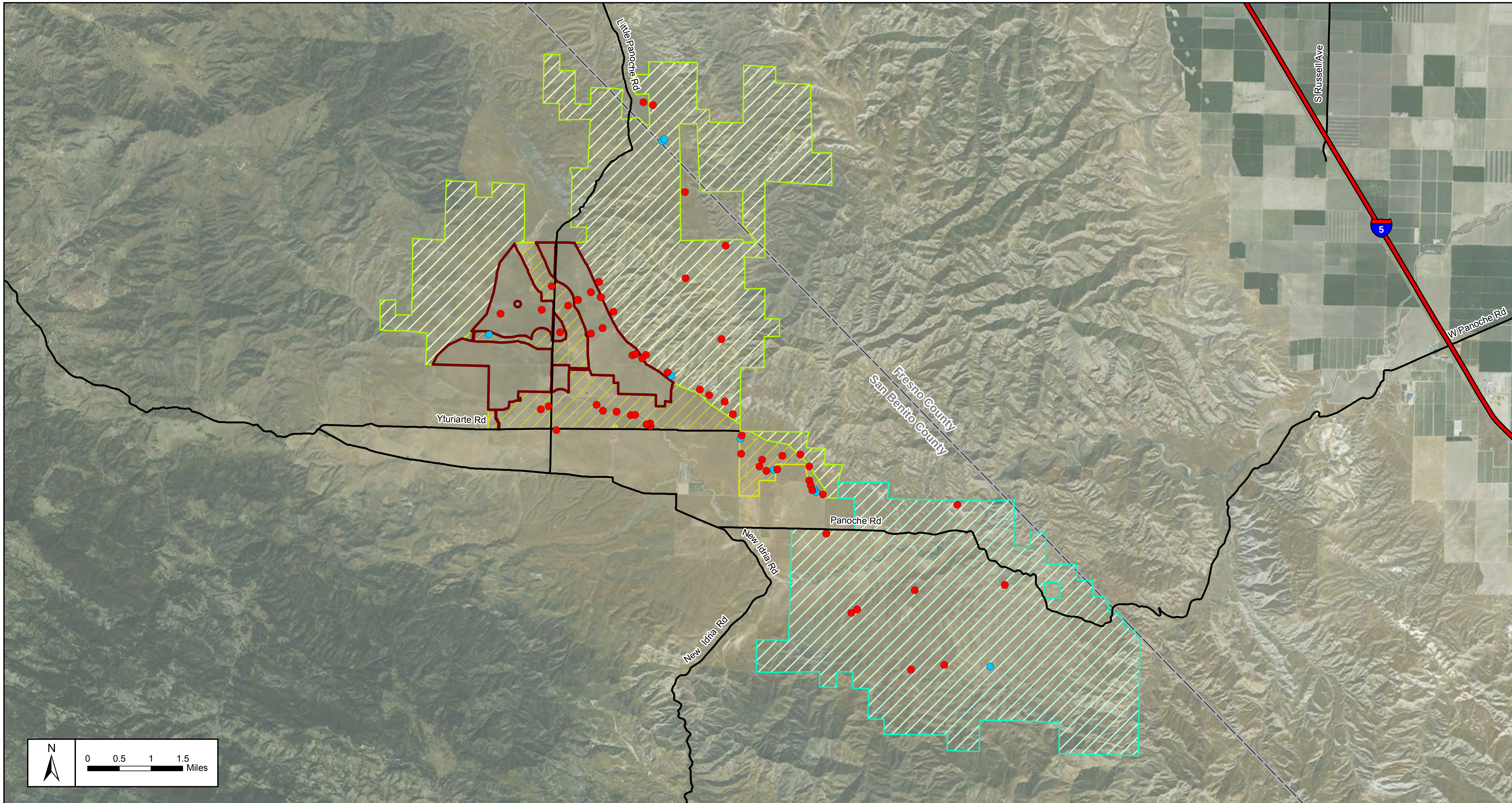
2013 Giant Kangaroo Rat Observations

Valadeao Ranch Conservation Lands

FIGURE

11

JH 2015-05-31



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Natal / Pupping Den
- Known Den

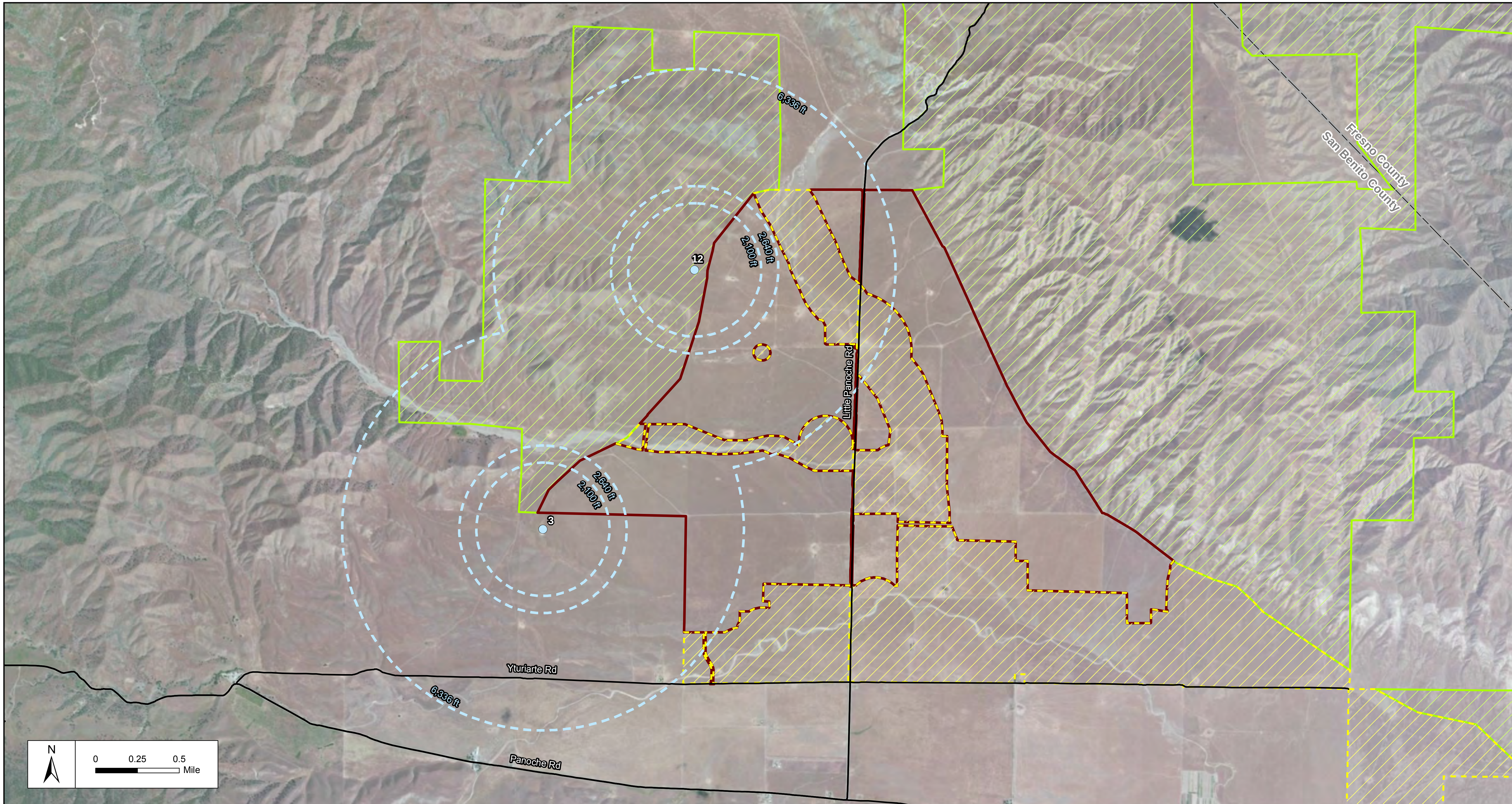
Panoche Valley Solar Project

San Joaquin Kit Fox Den Locations

FIGURE

12

JH 2015-05-31



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Known CTS Breeding Pond
- CTS Pond Buffer

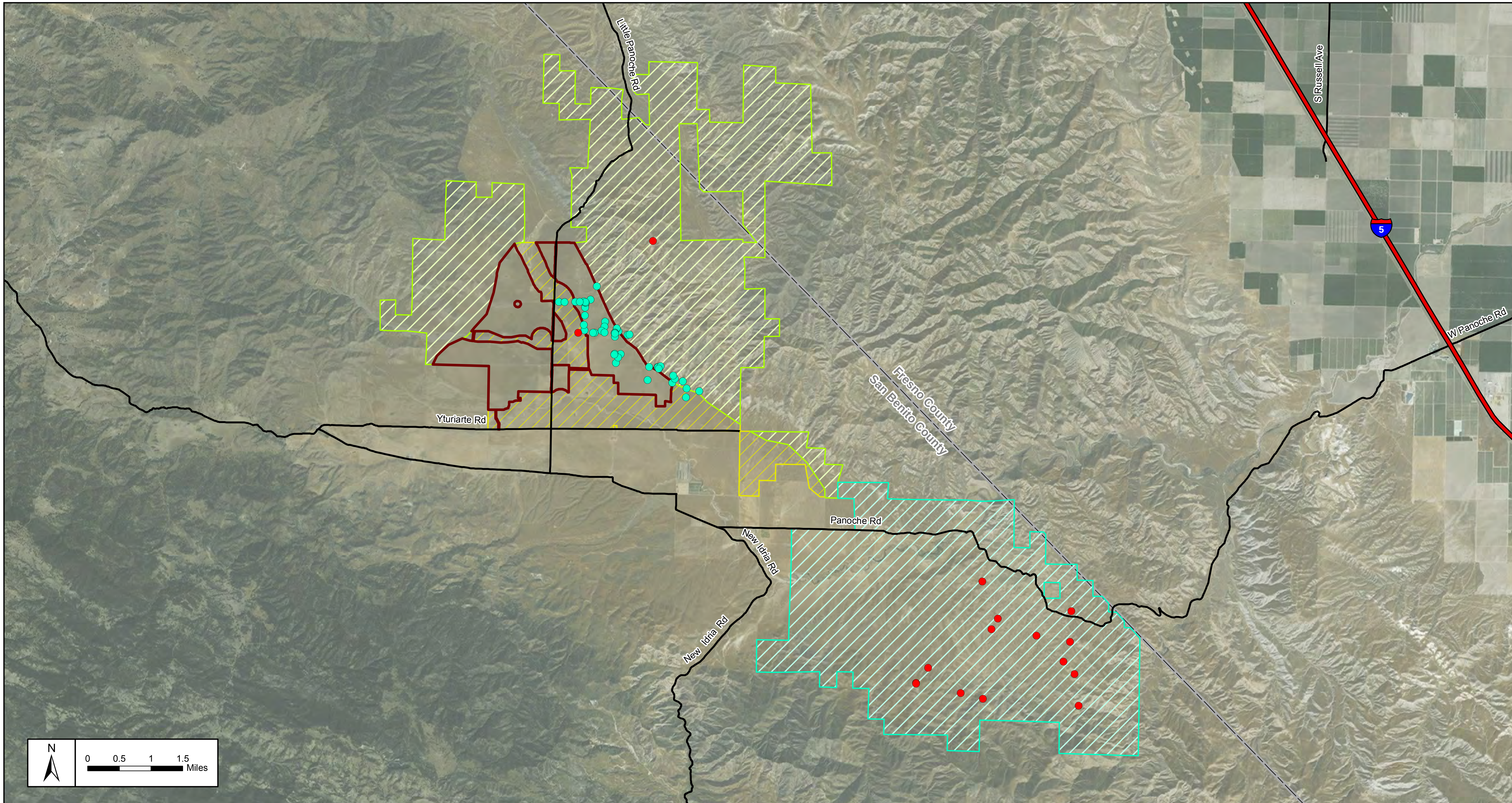
Panoche Valley Solar Project

Known California Tiger Salamander Breeding Ponds Outside Project Footprint and Valley Floor Conservation Lands

FIGURE

13

JH 2015-05-31



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Observation Location Feb - Apr
- Observation Location Jun - Sep

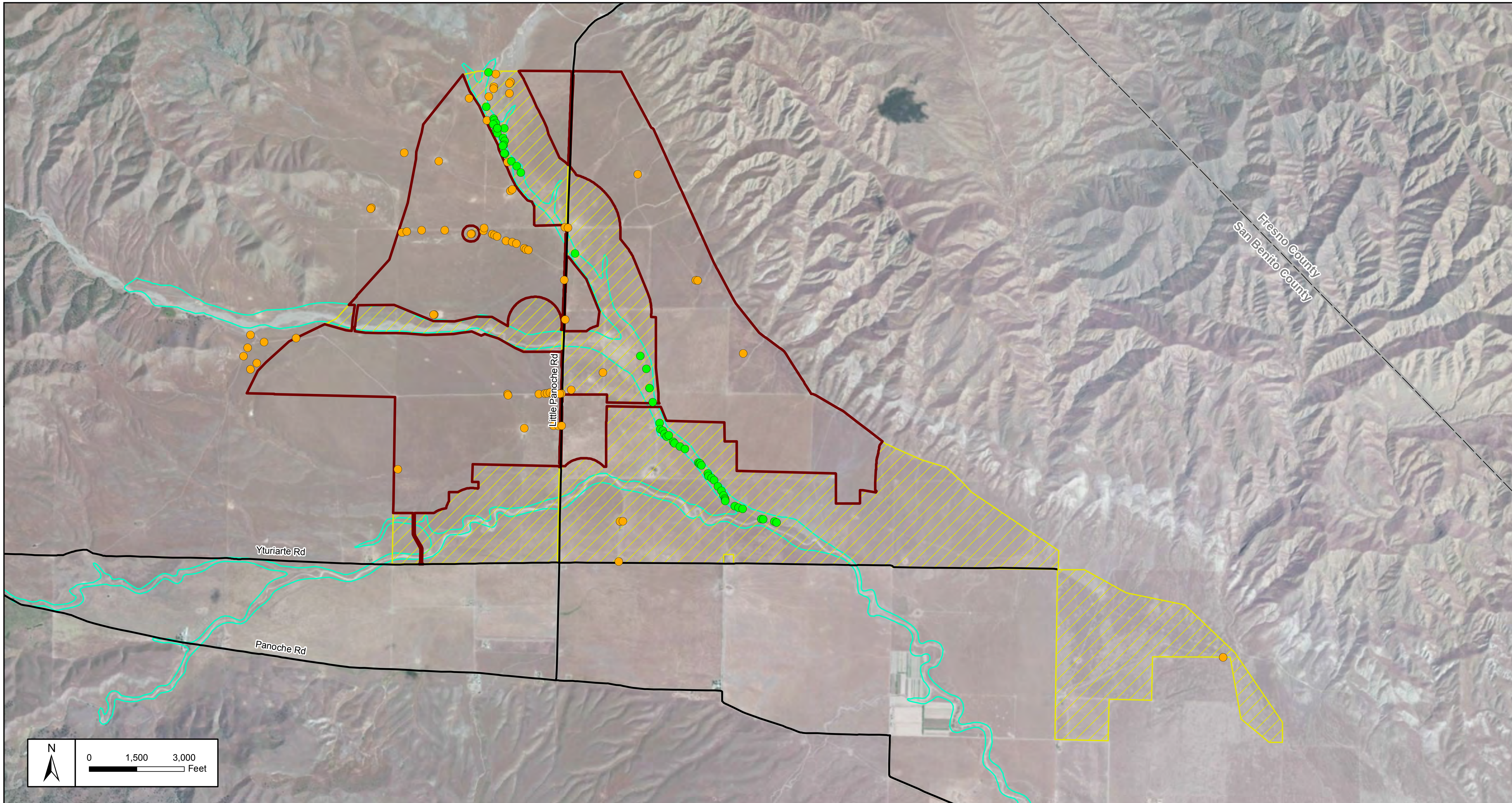
Panoche Valley Solar Project

2013 San Joaquin Antelope Squirrel Observation

FIGURE

14

JH 2015-05-31



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Legend

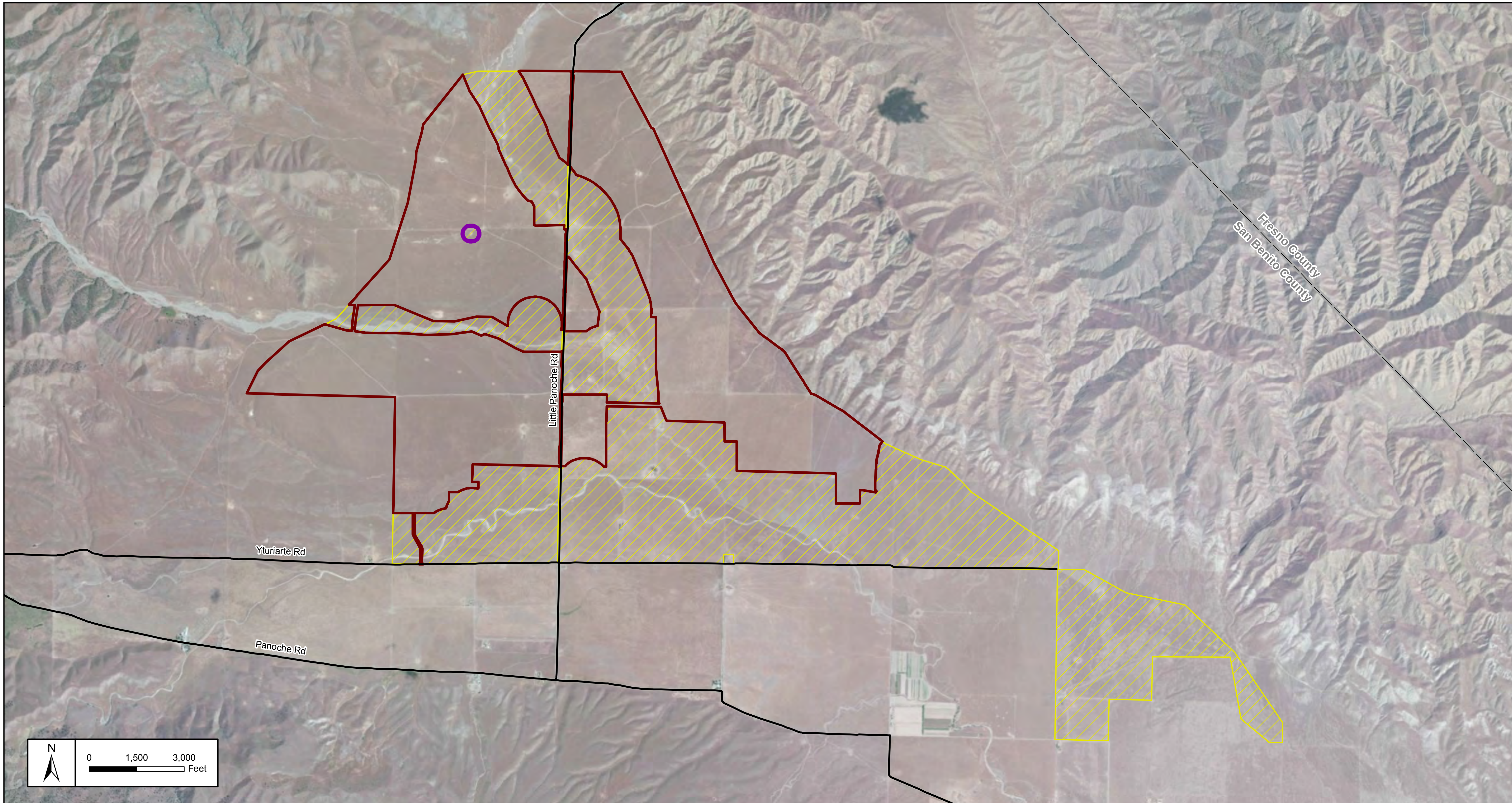
- Project Footprint
- Valley Floor Conservation Lands
- Vernal Pool within 100-Year Floodplain (56)
- Vernal Pool outside 100-Year Floodplain (71)
- 100-Year Floodplain

Panoche Valley Solar Project

Ephemeral Pool Habitat Locations

FIGURE 15

JH 2015-05-31



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Vernal Pool Fairy Shrimp Observations

Panoche Valley Solar Project

Vernal Pool Fairy Shrimp Observations

FIGURE 16

JH 2015-05-31

Appendix E – WMMP

See H.16 in Appendix H of the FEIS

Appendix F – GKR Relocation Plan

See H.5 in Appendix H of the FEIS

Appendix G – CTS Pond Creation Proposal

July 20, 2012

PANOCHE VALLEY SOLAR, LLC

Panoche Valley Solar Farm

California Tiger Salamander Mitigation Pond Proposal

PROJECT NUMBER:
127165

PROJECT CONTACT:
Ben Bainbridge
EMAIL:
ben.bainbridge@powereng.com
PHONE:
208-788-0391

POWER ENGINEERS

California Tiger Salamander Mitigation Pond Proposal

PREPARED FOR: PANOCHE VALLEY SOLAR, LLC
PREPARED BY: BEN BAINBRIDGE

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ACRONYMS AND ABBREVIATIONS

AC	alternating current
BLM	Bureau of Land Management
cm	centimeters
CNDDB	California Natural Diversity Database
Control Plan	Noxious Weed and Invasive Plant Control Plan
CTS	California tiger salamander
DC	Direct Current
ºF	degrees Fahrenheit
FEIR	Final Environmental Impact Report
kV	kilovolt
LOA	Live Oak Associates
MW	megawatts
NRCS	National Resource Conservation Service
O&M	operations and maintenance
PG&E	Pacific Gas & Electric
POWER	POWER Engineers, Inc.
Proposed Project	Panoche Valley Solar Farm Proposed Project
PV	photovoltaic
USFWS	United States Fish and Wildlife Service

1.0 PROJECT DESCRIPTION

Panoche Valley Solar, LLC proposes to construct and operate the Panoche Valley Solar Farm (Proposed Project), a 399 megawatt (MW) solar photovoltaic energy generating facility. Because the Proposed Project will be placed adjacent to occupied California tiger salamander (CTS; *Ambystoma californiense*) breeding ponds, and will impact other potential, unoccupied breeding ponds, Panoche Valley Solar, LLC will construct new additional breeding ponds located outside of the footprint of the Proposed Project. This document presents three potential locations for new breeding ponds located on conservation lands associated with the Proposed Project. Two potential locations occur on the Valadeao Ranch Conservation Lands in close proximity to a known CTS breeding pond. One potential location occurs on Silver Creek Ranch Conservation Lands in close proximity to other existing potential CTS breeding ponds.

The Proposed Project site comprises approximately 4,885 acres in the Panoche Valley of eastern San Benito County, CA. The Proposed Project will be constructed in five phases with the first phase being 20 MW, and each subsequent phase consisting of approximately 100 MW each. The Proposed Project would be located on heavily grazed rangeland and would generally include development of the following components on 2,203 of the 4,885 acres (approximately 50% of site):

- Installation of approximately three to four million photovoltaic (PV) panels
- PV module steel support structures
- Electrical inverters and transformers
- An electrical substation with switchyard
- Buried electrical collection conduit
- An operations and maintenance (O&M) building
- A septic system and leach field
- Wastewater treatment facility/demineralization pond
- On-site access roads
- Security fencing
- Transmission support towers and line(s) to interconnect with a Pacific Gas & Electric (PG&E) transmission line that passes through the Project site

The Proposed Project would be installed over an area of approximately 4,885 acres (7.6 square miles). However, the proposed design confines the solar arrays, substation (including the O&M building and transmission interconnection towers), and on-site access roads to a footprint of approximately 2,203 acres. The remaining approximately 2,682 acres within the Project boundary would be left undisturbed. Interstitial space between rows of panels, access roads, and O&M facilities would incorporate approximately 610 acres. Undisturbed areas would include on-site drainages and riparian buffer zones totaling 389 acres, as well as approximately 1,683 acres of open space in the southern portion of the Project Area. These undisturbed areas would remain as open space, and would be managed as on-site conservation areas to maintain and enhance habitat conditions for listed species. On-site conservation areas would incorporate approximately 2,072 acres.

Project construction would occur in five phases over a total of approximately five years, at one year per phase. Approximately 18 percent of the site would be temporarily disturbed at any one time during construction and would be restored in accordance with a revegetation plan. Revegetation will be conducted on areas temporarily disturbed during construction to restore vegetative cover to similar pre-construction condition or, if requested, to meet other reasonable landowner requests, once site work is completed. Disturbed areas will be reclaimed by appropriate contouring, where appropriate, and replanting with an approved seed mix. All seed mixtures will be certified “weed free.” Noxious weeds will be controlled through implementation of the Noxious Weed and Invasive Plant Control Plan (Control Plan). Within the Control Plan, herbicides will be used in accordance with the Bureau of Land Management (BLM) Approved Adjuvant and will follow federal and state regulations.

In general, each PV panel will be approximately two by four feet; however as technology changes during the life of the Project, larger panels may be used. All panels will be oriented toward the south and southwest, and angled upward at a degree that would maximize solar resource efficiency. Panel faces will be non-reflective and black or blue in color. The normal operating temperature of the PV panel face would be 10-15 degrees Fahrenheit (°F) above ambient temperature, and a typical summer day at 82°F would result in panel face temperatures of approximately 100°F. Panels will result in shading of the area below, providing a cooling effect beneath each structure. The PV solar panels will be mounted on direct-driven steel support structures that are between four and 25 feet in height. The steel support structures will be constructed of corrosion-resistant and galvanized steel. Concrete foundations will not be required for PV panel mounts.

The direct electrical current (DC) generated by the panels will be converted to alternating current (AC) by individual inverters, stepped up by transformers, and transmitted to a new substation via 34.5 kilovolt (kV) (AC) medium-voltage collection lines. The medium voltage collection lines will begin at the inverter transformers and will be located in trenches until the output from between 10 and 15 power blocks is terminated in the collection breaker of the substation. The electrical substation will convert power from 34.5 to 230 kV. The substation will be located directly adjacent to the existing PG&E transmission line.

The main access road, which will be a 24-foot-wide gravel road with a gate, will enter the site from the east or west from Little Panoche Road. The interior access roads will be 12-foot-wide gravel roads. Main site access roads will be graded and compacted using existing soil with a cover of gravel. Maintenance roads will be graded and compacted using existing soil with no gravel. Access roads will cross the onsite washes during construction and operation of the Proposed Project to provide adequate ingress and egress to and from the Project site for vehicles in the event of an emergency.

A six-foot-high smooth-top chain link fence will be placed around the blocks of panels. Fencing around the blocks of panels will be 5.5 feet of chain link with a 24 inch gap from ground surface to fence bottom to allow for wildlife movement.

Panel assembly will occur on-site. Panel components, such as the PV panels and racks, will be transported to laydown areas, where steel rack assemblies will be constructed at each block, and PV panels will be lowered onto the racks with final fastening being performed at the block. All items will be transported by container truck. A pre-fabricated racking system will arrive on site at a rate of approximately 10 to 20 MW per month to be assembled and grounded at the site. Pre-assembled PV panels will arrive on site and be placed in a staging area inside shipping containers. Panels will be put in place manually and secured to the rack per vendor specifications. The rack will be populated with panels, wired in series, and connected to a DC combiner box, which will deliver DC power to the local inverters.

1.1 Proposed Mitigation

The following identifies mitigation measures described in the Proposed Project Biological Assessment (10/26/2010) and associated Addendum (9/16/2011), and the Final Environmental Impact Report (FEIR; 9/30/2010) which the Proposed Project will utilize with the specific aim of reducing impacts to CTS:

- Project components were designed to avoid impacts to known CTS breeding ponds.
- All activities that will result in permanent or temporary ground disturbance shall be preceded by a preconstruction survey conducted by a qualified biologist. If CTS are observed during burrow excavation or during construction activities, all work will be suspended within the immediate area until such time a designated biologist with appropriate federal and state permits to handle CTS moves the individual.
- Suitable rodent burrows occurring within 0.4 mile of the four breeding ponds where CTS could reasonably be expected to aestivate, will be excavated if Project construction is to occur within 25 feet of a suitable burrow.
- CTS found during preconstruction surveys will be relocated to suitable small mammal burrows on areas of the Project site which will remain undisturbed.
- As required by the FEIR, breeding habitats and suitable upland habitat disturbed within 2,100 feet of a known or potential breeding pond will be mitigated at a 3:1 acreage ratio; suitable upland habitat located between 2,100 feet and 2,640 feet (0.5 mile) of a breeding pond will be mitigated at a 2:1 acreage ratio; and suitable upland habitat located between 2,640 feet and 6,636 feet (1.2 miles) of a breeding pond will be mitigated at a 1:1 acreage ratio. Temporary impacts will be mitigated at a 0.5:1 acreage ratio. Preserved habitat shall be the same quality or better quality than the habitat disturbed.
- Additional suitable breeding ponds within suitable aestivation habitat will be created on off-site conservation lands to mitigate the loss of potential breeding ponds on the Project Area.

One component of proposed mitigation which will have a positive effect on most species found in the vicinity of the Project Area is the permanent preservation, enhancement and management of approximately 21,000 acres of land directly adjacent to the Project Area. These 21,000 acres of off-site conservation lands are broken up into two areas. To the north, northeast and west of the Project Area is approximately 10,000 acres formerly known as the Valadeao Ranch. The Valadeao Ranch is a combination of rough, rugged hills and a portion of the Little Panoche Valley. The Little Panoche Valley is a lightly sloping valley with native grasses, and provides occupied habitat for San Joaquin kit fox, giant kangaroo rat, American badger, golden eagle, mountain plover, and burrowing owl.

To the southeast of the Project Area is approximately 11,000 acres formerly known as Silver Creek Ranch. Silver Creek Ranch is less sloped and rugged than the Valadeao Ranch, and is predominantly situated within the Panoche Valley. Full surveys have yet to be performed on Silver Creek Ranch, but previously documented surveys indicate it provides suitable habitat for blunt-nosed leopard lizard, golden eagle, mountain plover, burrowing owl, San Joaquin antelope squirrel, giant kangaroo rat, San Joaquin kit fox, and American badger. The key value of Silver Creek Ranch as conservation lands is that it is within the same valley and largely the same habitat type as the Project Area. The Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998) specifically identified the natural lands in association with Silver Creek Ranch as areas of priority for habitat protection to conserve occupied habitat for Panoche Valley populations of blunt-nosed leopard lizard and giant kangaroo rat (USFWS 1998: pp 95 and 122).

Monitoring of conservation lands will permit an adaptive management program, such as modification of grazing regime to favor species on site. These off-site lands will be managed by a third party such as the BLM or California Rangeland Trust.

In addition to the off-site conservation lands, the Proposed Project will incorporate approximately 2,000 acres of on-site conservation lands, referred to as Valley Floor Conservation Lands. These lands include the southern portion of the Project Area and the major washes purposely avoided by the Project design. The southern portion of the Project Area which will be included in the on-site conservation lands, incorporates all of the blunt-nosed leopard lizard sightings to date on the Project Area; the majority of high-suitability giant kangaroo rat habitat; a large majority of the San Joaquin kit fox sightings; and evidence found by scat-sniffing dogs.

When Valley Floor, Valadeao Ranch, and Silver Creek Ranch Conservation Lands are combined, the Proposed Project would permanently conserve over 23,000 acres of potential habitat for botanical and wildlife species. These lands would go toward meeting mitigation ratio criteria for special status species which would be impacted by the Proposed Project.

On June 28, 2012, a site visit to the Proposed Project site, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands was completed to identify potential locations to create CTS breeding ponds to comply with the final mitigation bullet point listed above. Attendees at this site visit included biologists from POWER Engineers, Inc. (POWER) and Live Oak Associates (LOA), and one hydrologist from WH Pacific to identify potential locations in the field. The site visit on the Valadeao Ranch Conservation Lands focused on the lower slopes and flatter landscape surrounding the known CTS breeding pond to the west of the Proposed Project. By placing a potential breeding pond within close proximity to the known breeding pond, the Proposed Project would create a breeding pond complex to better serve the species. The site visit to the Silver Creek Ranch Conservation Lands focused on the lower slopes and flatter landscape to the north of Panoche Creek. Results of this site visit are described in Section 3.0 below.

2.0 EXISTING CONDITIONS

2.1 CTS Species Ecology

The CTS originally inhabited most of central California, and remains in remnant populations throughout much of its original range. California Natural Diversity Database (CNDDB) records for CTS show its distribution encompasses portions on Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare, Tuolumne, and Yolo Counties (NatureServe 2009). About 80% of all extant occurrences are in Alameda, Contra Costa, Madera, Merced, Monterey, San Benito, and Santa Clara counties, with 30% of all occurrences in Alameda County (NatureServe 2009). The use of vernal pools and other temporary bodies of water for breeding limits the CTS to areas of low elevation and low topographic relief throughout their range (Stokes et al. 2008). Ephemeral vernal pools which refill with water on a yearly basis, are 40 to 80 centimeters (cm) in depth, and have a surface area of 0.2 hectare (0.5 acre) or more are optimal for breeding CTS, although small, shallower pools will also house breeding CTS (Stokes et al. 2008). Depth of the breeding pool was highly correlated with breeding CTS. Stokes et al. (2008) found no CTS larvae in pools with an average depth of less than 22 cm. Deep pools with permanent water may not be optimal for breeding populations of CTS because they often house predatory fish, crayfish, or bullfrogs that prey upon larval CTS. This creates a narrow window of pool depth where the pool will not completely dry out before CTS have metamorphosed, but also will not contain water year round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005).

Activity patterns of adult CTS are not well understood. Adult CTS live their entire lives in the burrows of small mammals such as the California ground squirrel. Adults begin moving toward breeding pools when the first fall rains begin to inundate pools. Breeding adults will continue moving to pools through the winter and spring. Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al. 2001; Trenham and Shaffer 2005). Adult CTS leave the breeding pools in late spring and return to upland habitats. Trenham and Shaffer (2005) used pitfall traps at various intervals away from a pool to determine the extent of upland use. They found that the numbers of adult CTS declined as distance from the pool increased out to 620 meters. Subadults also moved up to 600 meters away from the pools, but most were concentrated between 200 and 600 meters from the pool. This has led managers to suggest preserving upland habitats with suitable small mammal burrows out to 600 meters from breeding pools (Trenham and Shaffer 2005).

CTS may take upward of four to five years to reach sexual maturity (Trenham et al. 2000). Although individuals can live upward of ten years, less than 50% of individuals breed more than once (Trenham et al. 2000). Rainfall can significantly alter adult breeding pool attendance, and production of metamorphs tends to be a boom-or-bust scenario. Typically, greater numbers of breeding adults return to pools during years with greater rainfall (Trenham et al. 2000, 2001; Cook et al. 2006; Stokes et al. 2008). Males are often the first to arrive at breeding pools and remain in the pool longer than females (Trenham et al. 2000). Larvae remain in the pools approximately four months and emigrate from the pools as they dry. Metamorph emigration typically occurs throughout May and is directly related to the pool drying date (Trenham et al. 2000).

Often amphibian populations are used as an example for the metapopulation/source-sink models. The CTS populations at different breeding pools often act in a metapopulation fashion (Trenham et al. 2001). Mark – recapture studies found that while most breeding adults return to their natal pool, 22% dispersed to different ponds (Trenham et al. 2001). It should be noted that Trenham and Shaffer (2005) did not capture any CTS, adult or subadult, more than 620 meters from the pool. Thus, pools more than 1,240 meters from one another may limit dispersal. Breeding CTS have been known to use artificially created pools, and the creation of pools in a stepping-stone fashion has been suggested to aid dispersal between populations (Stokes et al. 2008).

2.2 Surveys Completed

In the winter of 2009 – 2010 biologists from LOA completed Protocol Vernal Pool Branchiopod Surveys in support of the Proposed Project. These vernal pool branchiopod surveys identified larval CTS while surveying other species. Protocol CTS Larval Surveys, performed in March, April and May of 2010, also noted larval CTS. Results of these two surveys identified larval CTS in two ponds. Both ponds were located off the Proposed Project. One pond is in Township 15S, Range 10E, Section 4 just outside the boundary of the Project site. This pond will be referred to as Pond 12 and is further described in Section 2.2.3 below. The second pond is located off-site in Township 15S, Range 10E, Section 17. Additionally, the CNDDB contains historical records of CTS breeding ponds located in the Las Aguillas Creek drainage within the Proposed Project. These historical breeding ponds occur on the Valley Floor Conservation Lands and will not be impacted by the Proposed Project.

It is unknown at this time to what extent the Silver Creek Ranch conservation lands support CTS. Full protocol surveys have not yet taken place on Silver Creek Ranch; however LOA herpetological experts expect several ephemeral ponds on site to be utilized by breeding CTS.

2.2.1 Pond 12

Pond 12 is a man-made pond which contains water behind a push-up dam for the purpose of providing water to cattle on the Valadeao Ranch conservation lands (Figure 1). Area calculations performed using aerial imagery determined that the maximum surface area of water capable of being retained behind the push-up dam is approximately 0.2 acre. During surveys performed for CTS larvae in Pond 12 during the winter and spring of 2010, the maximum surface area of the water was approximately 0.1 acre. Maximum depth recorded during these same surveys was 57 cm (22 inches).

The watershed area for the Pond 12 is approximately 0.63 square mile. The contributing watershed feeds to an incised channel which dissipates when it reaches the low gradient valley floor. After reaching the valley floor, the flow becomes sheet or shallow concentrated flow before reaching Pond 12. Pond 12 was constructed by excavating out the pond and using the cut material to build a berm on the downslope side. The berm is of unknown height, but is assumed to be approximately four feet.

Pond 12 survey data from LOA's CTS surveys in late 2009/early 2010 were analyzed with actual monthly precipitation data from the same period (Appendix A). WH Pacific created a water budget model for potential mitigation ponds using the aforementioned data along with mean monthly evaporation rates, and adjusted the assumed infiltration rate and assumed fraction of rainfall that will reach the pond as runoff to find the best match of the model to known data. The results of this analysis showed that the pond was both filling and emptying much slower than expected, indicating slower infiltration in the pond and a small fraction of rainfall reclaimed as runoff. The infiltration rate, which coupled with mean evaporation rate, created slower than expected emptying of the pond –

approximately 2.5% of the published Natural Resource Conservation Service (NRCS) rate for the soil in the area. The assumed fraction of rainfall that is collected as runoff was approximately 0.2%. The reason for this is likely due to two reasons. The first is that the runoff originates of the hills in a concentrated flow in an incised channel. When it hits the valley floor, the flow goes to sheet flow for approximately 1,000 feet where it can be lost to infiltration and evapo-transpiration before reaching the pond. The second potential reason for the low fraction of rainfall collected is caused by the potential direction of the sheet flow. From examination of vegetation patterns on aerial imagery, it appears as though half of the sheet flow may bypass the pond.

3.0 PROPOSED MITIGATION PONDS

The following goals were placed on potential mitigation pond locations during the water budget analysis:

- Mitigation ponds will be ephemeral, filling in late fall, winter, and spring, and drying out by early June. Critical months of inundation are March – May.
- Mitigation ponds will be approximately three feet deep.
- Mitigation ponds ideal footprint will be equal to that of Pond 12.
- Mitigation ponds are desired to be inundated five out of every ten years, with a minimum of three out of every ten years.

The following sources of data were used to develop water budget parameters for potential mitigation pond locations:

- Pan evaporation rates were obtained for the Little Panoche Detention Dam, 1963 – 1975, from *NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States*.
- Rainfall data was obtained for the Panoche 2W Weather Station from the Western Regional Climate Center website, December of 1949 through April 2012.
- Soil hydrological ratings and infiltration rates were obtained from the NRCS Web Soil Survey website.
- Observations of existing pond depth and surface area obtained from LOA's 2010 CTS survey data.

The water budget analysis utilized to determine the depth, surface area, and inundation period of potential mitigation ponds was based over a year-long timeframe with one month increments using median precipitation values for each month. NRCS Soil Survey data was obtained to determine average exfiltration rates of the various soil types in the areas of pond construction. These soil types showed extremely quick draining soils which would present difficulties in keeping a mitigation pond saturated for the appropriate duration. The Pond 12 depth/surface area ratio was used to make an estimate of infiltration. The pool demonstrated infiltration rates approximately 2.5% of the published NRCS soil data. This is a common scenario in ephemeral ponds where fine silts and clays washed in over time reduces the infiltration rate.

The runoff coefficient described in Panoche Valley Hydrological Study, SolarGen Panoche Valley Solar Farm, Panoche Valley, California prepared by Geologica in mid-2010 was 0.55. This means that approximately 55% of rainfall in the Panoche Valley can be expected to runoff. A HydroCAD analysis performed by WH Pacific showed that this is a reasonable assumption during a large, 100-year type of rainfall event; however, approximately 25% can be expected as runoff during smaller 1-year rainfall events and 15% for six month events. The data for Pond 12 demonstrated a very low runoff capture rate, capturing an estimated 0.2% of the total precipitation for the watershed. Runoff in the Pond 12 watershed progresses from an incised channel at higher, steeper elevations, to a shallow, spread-out sheet flow where much of the water is lost prior to entering the pool. For the purposes of this analysis, it was assumed that 5% of the monthly rainfall can be retained if the mitigation pond is placed near the outlet of an incised channel, and 0.2% when the pond is located far from the incised channel.

Six potential mitigation pond locations were marked during the June 28 site visit. After a preliminary water budget analysis, three potential pond locations were carried forward for a more detailed analysis described below. Sections 3.1 through 3.3 below describe the potential breeding pond locations: two on Valadeao Ranch, one on Silver Creek Ranch. These potential ponds are Valadeao Pond Site 3, Valadeao Pond Site 4, and Silver Creek Pond Site 1. As per the mitigation measures described in the Biological Assessment and associated Addendum, and the FEIR, the Proposed Project proposes to construct one mitigation pond on the Valadeao Ranch in close proximity to Pond 12, and one mitigation pond on the Silver Creek Ranch at a later date depending on the results of future CTS surveys on that property. The mitigation ponds may require the construction of shallow diversion canals perpendicular to the slope to capture sheet flow and direct it to the ponds to ensure that the ponds will remain inundated for a sufficient length of time. Exfiltration rates are the ruling factor in sizing the ponds, as these are many times higher than the evaporation rates during winter and spring. To reduce the amount of exfiltration, the rate of the in-situ native soil could be reduced by amending the native soil with a less permeable material such as bentonite or clay.

3.1 Valadeao Ranch Pond Site 3

Valadeao Ranch Pond Site 3 is located at approximately 2,300 feet (720 meters) west-northwest of Pond 12 at Easting 0687567, Northing 4058555 (UTM Zone 10; Figure 1). Valadeao Ranch Pond Site 3 is located near where an incised channel ends and the runoff converts to sheet flow. Based on this location, the pond would expect to collect a higher percentage of the monthly rainfall as runoff. For purposes of the analysis, it was assumed that the pond would capture 5% of the runoff. Valadeao Ranch Pond Site 3 has a drainage area of approximately 0.44 square mile. This area is 70% of the area of Pond 12; therefore, a pond surface area that is 70% of the existing pond surface area, or 0.14 acre would initially be anticipated. However, since we anticipate a higher rainfall as runoff capture ratio for this location, we ran the water budget model using the same size of pond as Pond 12. The water budget analysis shows Valadeao Ranch Pond Site 3 will fill to 0.14 acre, and a bypass spillway would be required to pass water over the dam. Appendix A provides the water budget analysis performed for Valadeao Ranch Pond Site 3.

From examination of aerial imagery, it appears that nearly all the sheet flow coming from the contributing area for Valadeao Ranch Pond Site 3 bypasses the existing breeding pond established in Pond 12, and therefore installation of a mitigation pond at this location would not detrimentally affect Pond 12. Additionally, the model shows that Valadeao Ranch Pond Site 3 will have excess water, assuming the 5% capture rate is correct, and provisions can be made to focus spillway discharge water toward the existing pond.

The NRCS mapping indicates that Valadeao Ranch Pond Site 3 is located in Yolo Gravelly Loam, and has a hydraulic conductivity rating of 12.0 micrometers per second, or 1.7 inches per hour. For purposes of the modeling, 2.5% of the NRCS rate was utilized, which is 0.0425 inch per hour. This was based on the infiltration rate demonstrated by Pond 12.

3.2 Valadeao Ranch Pond Site 4

Valadeao Ranch Pond Site 4 is located approximately 2,000 feet (630 meters) south-southwest of Pond 12 at Easting 0687975, Northing 4057754 (UTM Zone 10; Figure 1). Valadeao Ranch Pond Site 4 is located approximately 1,000 feet down slope of where an incised channel transitions to sheet flow. Therefore, the water budget analysis used the same capture rate as Pond 12 (0.2%). Because the drainage area of Valadeao Ranch Pond Site 4 is approximately half that of Pond 12, it was assumed that the drainage would support a pond of approximately 0.1 acre. The water budget analysis found that the drainage would support a pond of approximately 0.1 acre, with a maximum depth of just over one foot occurring in February. Appendix A provides the water budget analysis performed for Valadeao Ranch Pond Site 4.

A potential design component of Valadeao Ranch Pond Site 4 could include extending the incised channel to the pond location in order to retain water potentially lost as sheet flow, while still capturing sheet flow from surrounding hills which does not accumulate in an incised channel. Another potential design component of Valadeao Ranch Pond Site 4 could include creating diversion dams perpendicular to the direction of sheet flow to better direct flow to the pond location.

Currently, a stock watering trough which is filled by gravity fed piped spring water is located near Valadeao Ranch Pond Site 4. This piped spring water could potentially be used to augment natural runoff collected in the pond during the winter and spring. The piped water could be diverted back to the water trough to ensure that the mitigation pond would dry out in late spring or early summer.

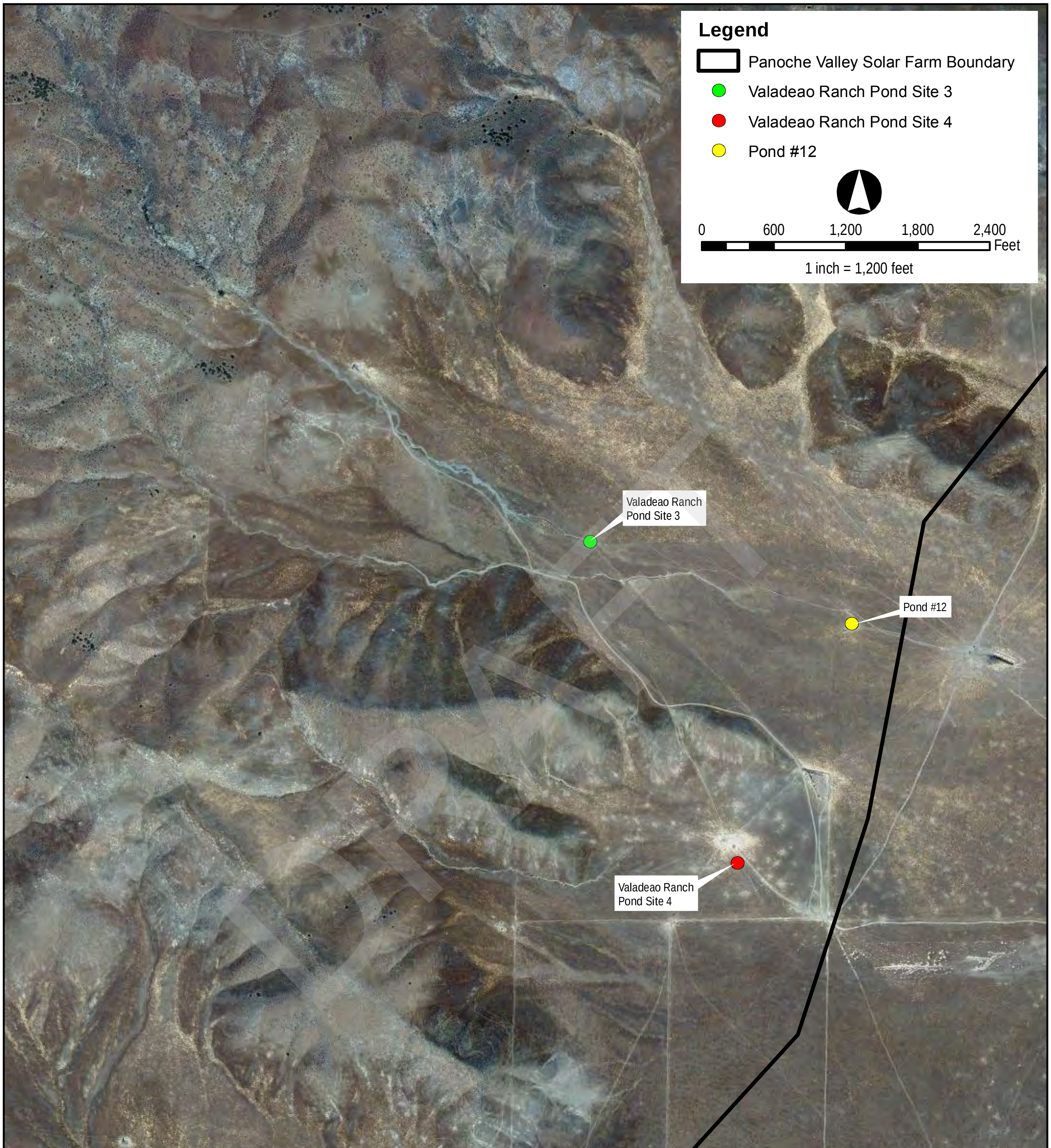
The NRCS mapping indicates that Valadeao Ranch Pond Site 4 is located in Yolo Gravelly Loam, and has a hydraulic conductivity rating of 12.0 micrometers per second, or 1.7 inches per hour. For purposes of the modeling, 2.5% of the NRCS rate was utilized, which is 0.0425 inch per hour. This was based on the infiltration rate demonstrated by Pond 12.

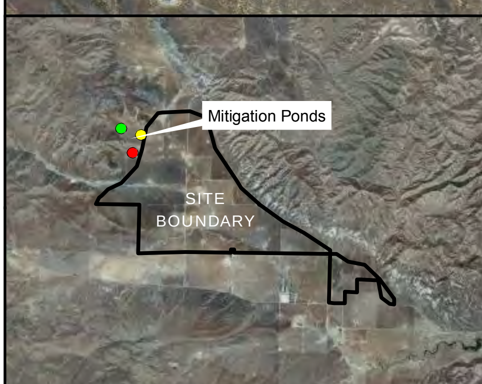
3.3 Silver Creek Pond Site 1

Silver Creek Pond Site 1 is located at the bottom of an incised drainage at Easting 0698859, Northing 4050925 (UTM Zone 10; Figure 2). Based on the June 28, 2012 site visit, Silver Creek Pond Site 1 was identified as a favorable location for a CTS mitigation pond due to the character of the incoming drainage. The drainage basin for Silver Creek Pond Site 1 encompasses approximately 0.2 square mile. Based on the June 28, 2012 site visit, the channel is fully vegetated and is not as deeply incised as those on the Valadeao Ranch. Silver Creek Pond Site 1 is located near the outlet of the vegetated channel; however, due to the unknowns of the watershed characteristics, a conservative rainfall as runoff capture rate of 0.5% was used in the water budget analysis. This runoff capture rate is just over twice the value of Pond 12. The use of a 0.5% runoff capture rate is based on the fact that there will be very little flow which will bypass the pond, and is conservative considering that the pond will be located closer to a concentrating channel.

The water budget for Silver Creek Pond Site 1 was initially modeled using a footprint of 0.06 acre, or 32% of existing Pond 12. The water budget analysis for a pond of 0.06 acre at Silver Creek Pond Site 1 showed that the pond would go dry in June and have maximum depth of approximately two feet in February. Appendix A provides the water budget analysis performed for Silver Creek Pond Site 1.

The NRCS mapping indicates that Silver Creek Ranch Pond Site 1 is located in Panoche Sandy Loam, and has a hydraulic conductivity rating of 12.3109 micrometers per second, or 1.74 inches per hour. For purposes of the modeling, 2.5% of the NRCS rate was utilized, which is 0.0425 inch per hour. This was based on the infiltration rate demonstrated by Pond 12.





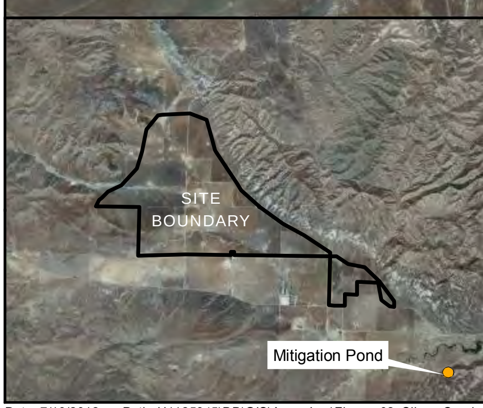
Panoche Valley Solar Farm

Figure 1
Valadeao Ranch Mitigation Ponds

POWER ENGINEERS

Duke Energy Renewables

Date: 7/26/2012 Path: H:\125845\DD\GIS\Apps_Lax\Figure_01_Valadeao_Ranch_Mitigation_Ponds.mxd



Panoche Valley Solar Farm

Figure 2
Silver Creek Pond Site 1

POWER ENGINEERS

Duke Energy Renewables

4.0 CONCLUSIONS

The Proposed Project proposes to construct one mitigation pond on the Valadeao Ranch in close proximity to Pond 12, and one mitigation pond on the Silver Creek Ranch at a later date depending on the results of future CTS surveys on that property. This is consistent with mitigation measures described in the Biological Assessment and associated Addendum, and the FEIR prepared on behalf of the Proposed Project. By creating a new potential CTS breeding pond in close proximity to the existing breeding pond at Pond 12, the Proposed Project will create a breeding pond complex which may support increased genetic diversity and will provide multiple breeding pond options (Trenham et al. 2001; Trenham and Shaffer 2005). Which Valadeao Ranch pond location would best conserve CTS populations in and around the Proposed Project will be determined through consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

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APPENDIX A MITIGATION POND AND POND 12 WATER BUDGET ANALYSIS

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Monthly Precipitation[1], in	2.00	1.93	1.50	0.67	0.30	0.06	0.02	0.03	0.25	0.50	1.01	1.58	9.85
Median Monthly Precipitation[2], in	1.65	1.59	1.06	0.53	0.14	0.00	0.00	0.00	0.01	0.29	0.75	1.20	9.00
Average Monthly Pan Evaporation[3], in	1.77	2.87	5.79	8.62	13.66	15.83	17.09	15.65	11.65	7.09	2.95	1.81	104.78

[1]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center

[1]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center, Median value calculated by WHPacific

[2]Data for Little Panoche Detention Dam, 1963-1975, from NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States

Projected Monthly Water Budgets

Valadeo Ranch

Pond #12 (existing)

Watershed Area= 0.63 mi^2
= 403.2 acres
Assumed fraction of rainfall that will reach pond[4]= 0.00273
Pond soil NRCS unit symbol= YvB
NRCS saturated infiltration rate= 1.7 in/hr
Projected pond infiltration rate= 0.0425 in/hr

Full Surface Area= 0.2 acres = 0.081 Ha
Full Depth Estimate= 3.92 ft
Full Vol Estimate= 0.392 ac-ft
Area x coeff= 0.051
Volume x^2 coeff= 0.0255

[4]Runoff going to existing pond travels as overland sheet flow approximately 1000LF prior to reaching the pond and it is assume it loses quite a bit of volume in order to match the model with observed results.

Month	Runoff Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Exfiltration Volume (ac-ft)	Cumulative stored volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Volume at stage	Solver
September	0.001	0.000	0.001	0.000	0.01	0.000	0.0000	0.0000
October	0.027	0.005	0.021	0.001	0.16	0.008	0.0006	0.0000
November	0.069	0.006	0.059	0.005	0.45	0.023	0.0052	0.0000
December	0.110	0.006	0.097	0.013	0.72	0.037	0.0132	0.0000
January	0.151	0.007	0.132	0.025	0.98	0.050	0.0247	0.0000
February	0.146	0.013	0.129	0.029	1.06	0.054	0.0288	0.0000
March	0.097	0.018	0.096	0.013	0.71	0.036	0.0129	0.0000
April	0.049	0.013	0.046	0.003	0.35	0.018	0.0031	0.0000
May	0.012	0.005	0.011	0.000	0.08	0.004	0.0002	0.0000
June	0.000	0.000	0.001	0.000	0.01	0.000	0.0000	0.0000
July	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000
August	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000

Valadeo Site 3

Watershed Area=	0.44	mi^2
=	281.6	acres
Assumed fraction of rainfall that will reach pond[5]=	0.05	
Pond soil NRCS unit symbol=	YvB	
NRCS saturated infiltration rate=	1.7	in/hr
Projected pond infiltration rate=	0.0425	in/hr

Full Surface Area=	0.2	acres =	0.081	Ha		
Full Depth Estimate=	3.92	ft		Full Vol Estimate=	0.392	ac-ft
Area x coeff=	0.051					
Volume x^2 coeff=	0.0255					

[5]Runoff coefficient described in Panoche Valley Hydrological Study, SolarGen Panoche Valley Solar Farm, Panoche Valley, California by Geologica, June 1, 2010 IS 0.55. HydroCAD anaylsis performed by WHPacific shows approximately 15% can be expected during smaller 6-month frequency storms. Note that the pond is located proximally to the end of the incised channel. To be conservative a value of 0.05 is used.

Month	Runoff Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Exfiltration Volume (ac-ft)	Cumulative stored volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Volume at stage	Solver
September	0.012	0.003	0.008	0.000	0.06	0.003	0.0001	0.0000
October	0.340	0.050	0.221	0.069	1.65	0.084	0.0692	0.0000
November	0.880	0.049	0.509	0.391	3.91	0.200	0.3908	0.0000
December	1.408	0.030	0.527	0.392	3.92	0.200	0.3918	0.0000
January	1.936	0.029	0.527	0.392	3.92	0.200	0.3918	0.0000
February	1.866	0.048	0.476	0.392	3.92	0.200	0.3918	0.0000
March	1.244	0.096	0.527	0.392	3.92	0.200	0.3918	0.0000
April	0.622	0.140	0.499	0.375	3.83	0.196	0.3746	0.0000
May	0.158	0.125	0.290	0.118	2.15	0.110	0.1183	0.0000
June	0.000	0.038	0.073	0.008	0.56	0.029	0.0080	0.0000
July	0.000	0.003	0.005	0.000	0.04	0.002	0.0000	0.0000
August	0.000	0.000	0.001	0.000	0.00	0.000	0.0000	0.0000

Valadeo Site 4

Watershed Area=	0.3	mi^2						
=	192	acres						
Assumed fraction of rainfall that will reach pond[6]=	0.00273		Full Surface Area=	0.1	acres =	0.040	Ha	
Pond soil NRCS unit symbol=	YvB		Full Depth Estimate=	4.00	ft	Full Vol Estimate=	0.200	ac-ft
Projected pond infiltration rate=	1.7	in/hr	Area x coeff=	0.025				
Projected pond infiltration rate=	0.0425	in/hr	Volume x^2 coeff=	0.0125				

[6]Pond site is approximately 1000LF from incised channel, similar to existing. Used same proportionality as existing.

Month	Runoff Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Exfiltration Volume (ac-ft)	Cumulative stored volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Volume at stage	Solver
September	0.000	0.000	0.000	0.000	0.01	0.000	0.0000	0.0000
October	0.013	0.002	0.010	0.000	0.15	0.004	0.0003	0.0000
November	0.033	0.003	0.028	0.002	0.44	0.011	0.0024	0.0000
December	0.052	0.003	0.046	0.006	0.70	0.017	0.0061	0.0000
January	0.072	0.004	0.063	0.011	0.96	0.024	0.0115	0.0000
February	0.069	0.006	0.061	0.013	1.03	0.026	0.0133	0.0000
March	0.046	0.008	0.045	0.006	0.69	0.017	0.0059	0.0000
April	0.023	0.006	0.022	0.001	0.34	0.008	0.0014	0.0000
May	0.006	0.002	0.005	0.000	0.08	0.002	0.0001	0.0000
June	0.000	0.0002	0.0003	0.000	0.01	0.000	0.0000	0.0000
July	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000
August	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000

Silver Creek Ranch

Silver Creek Pond1

Watershed Area=	0.2	mi^2				
=	128	acres				
Assumed fraction of rainfall that will reach pond[4]=	0.005		Full Surface Area=	0.06 acres =	0.024 Ha	
Pond soil NRCS unit symbol=	PkA		Full Depth Estimate=	4.00 ft	Full Vol Estimate=	0.120 ac-ft
Projected pond infiltration rate=	1.74	in/hr	Area x coeff=	0.015		
Projected pond infiltration rate=	0.0435	in/hr	Volume x^2 coeff=	0.0075		

[4]Due to unknown specifics of the watershed, a conservative value that is roughly double that of the existing Valadeo Ranch pond was used.

Month	Runoff Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Exfiltration Volume (ac-ft)	Cumulative stored volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Volume at stage	Solver
September	0.001	0.000	0.000	0.000	0.01	0.000	0.0000	0.0000
October	0.015	0.003	0.012	0.001	0.30	0.004	0.0007	0.0000
November	0.040	0.003	0.032	0.005	0.83	0.012	0.0052	0.0000
December	0.064	0.003	0.053	0.013	1.32	0.020	0.0130	0.0000
January	0.088	0.004	0.073	0.024	1.80	0.027	0.0243	0.0000
February	0.085	0.007	0.072	0.029	1.98	0.030	0.0295	0.0000
March	0.057	0.011	0.059	0.016	1.47	0.022	0.0161	0.0000
April	0.028	0.009	0.031	0.005	0.79	0.012	0.0047	0.0000
May	0.007	0.003	0.008	0.000	0.20	0.003	0.0003	0.0000
June	0.000	0.0002	0.0004	0.000	0.01	0.000	0.0000	0.0000
July	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000
August	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000

Appendix H – Listed Vernal Pool Crustaceans Routine Monitoring Protocol for Preserved Areas

DRAFT
PANOCHE VALLEY SOLAR PROJECT
HABITAT RESTORATION AND REVEGETATION PLAN

Prepared for:
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August 2015
Amec Foster Wheeler Project No. 1455500013
Document Control Number: R0515-080.R1

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1.0 INTRODUCTION

1.1 Project Description

Panoche Valley Solar, LLC (PVS) proposes to build and operate a 246 megawatt (MW) solar photovoltaic (PV) electricity generation facility in the Panoche Valley of eastern San Benito County, California (Figure 1). The Panoche Valley Solar Facility (Project) is proposed to occupy approximately 2,506 acres (Figure 2) of privately held land, with an additional 24,176 acres of permanent conservation lands being preserved and managed contiguous with the Project footprint. The Project will construct and operate solar array complexes consisting of PV panels mounted on steel or aluminum structures, equipment pads, an operations and maintenance (O&M) building, an electrical substation and switchyard, direct current (DC) to alternating current (AC) power inverters, electrical collection lines, Pacific Gas & Electric telecommunication upgrades, and associated infrastructure such as perimeter and access roads, fencing, and tie-ins to adjacent power transmission lines.

General Mitigation Measures for Impacts to Biological Resources (MM BR) were adopted as part of the Final Environmental Impact Report (EIR) approved for the Project by the San Benito County Board of Supervisors in November 2010 (San Benito County, 2010). Measure MM BR-G.3 requires preparation of a Habitat Restoration and Revegetation Plan (HRRP) addressing restoration of anticipated construction impacts to the project site. A Draft Supplemental EIR was prepared by the County in December 2014 and finalized in April 2015 (San Benito County 2014, 2015) to address project changes and included clarifications to some of the Mitigation Measures. Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) was retained to prepare this HRRP in accordance with MM BR-G.3 as revised per the 2015 Supplemental EIR. It includes a soil restoration plan, a revegetation plan, and a monitoring plan. Although the revegetation principles outlined in this plan can be applied to treatment of the site during decommissioning, a detailed facilities closure restoration plan is not provided. In accordance with milestones outlined in BR-G.3, the Final Closure Plan will be prepared by the project owner for County review and approval one year prior to the start of ground disturbance associated with Project decommissioning.

1.2 Project Area

1.2.1 Physical Setting

The Project site is situated on the northwest side of the Panoche Valley, roughly 60 miles west of Fresno, California and approximately 3.4 miles northwest of the unincorporated community of Panoche in San Benito County, California. It is bordered on the east by the Panoche Hills and on the west by the mountains of the Gabilan Range/Las Aguilas Mountains. The Griswold Hills border the south side of the valley. Las Aguilas Creek bisects the Project site from west to east and Panoche Creek lies just to the south of the site. San Benito County Road J1, also known as Little Panoche Road after it turns northward toward the Little Panoche Valley, bisects the Project site north to south.

Geographically, the valley and associated hills surrounding the Project are within the Diablo Range, one of the interior California Coast Ranges that border the San Joaquin Valley. The Project area is mapped on the Cerro Colorado, Llanada, Panoche, and Mercey Hot Springs, California United States Geological Survey 7.5 minute quadrangle maps, and located within Township 15S, Range 10E, sections 3, 4, 8 to 11, and 13 to 16, and Township 15S, Range 11E, section 19, Mount Diablo Principal Meridian. The site is contained within the valley, and is characterized by relatively low relief, gently sloping to the south and southeast with elevation varying from approximately 1,440 feet in the north to 1,280 feet above mean sea level (amsl) in the southeast. A number of small ephemeral washes and drainages occur in the area, with Las Aguilas Creek and Panoche Creek being the most significant streams.

Climate in the region is typically the common Mediterranean pattern found in much of California, with dry hot summers and relatively mild, moist winters. The region is considered high desert, and receives about 8 to 10 inches of precipitation, mostly as rainfall, with the majority falling from October to April (Western Regional Climate Center, 2015). Average daily temperature is about 64 degrees Fahrenheit, but ranges from average lows in the mid-thirties in the winter to nearly 100 in the summer months.

Soils are generally alluvial or fluvial in their origins, with alluvial fans and fluvial deposits derived from the surrounding hills. These were classified into three categories based upon likely origins of the component sediments (ENGEO, 2010). Franciscan alluvium is derived from the western hills and are generally somewhat reddish in color and represent a heavy, dense clayey or silty sand with gravels, cobbles and boulders. Panoche alluvium is derived from parent material in the Panoche hills to the east, and were olive to yellowish brown hard silty clays. No significant depth of topsoil or organic soils were observed in test pits (Kleinfelder, 2014). Fluvial deposits were variable assemblages or sand, silt, clay or gravel, mostly deposited along Panoche Creek to the south of the Project area. These general classes are consistent with the six soil mapping units defined by the Natural Resources Conservation Service (NRCS, 2015; Figure 3). These are generally loams with Panhill and Panoche loams on the alluvial fan at the base of the Panoche Hills; Panoche loam and sandy loam in the central part of the valley, including Panoche Creek; and Yolo loam and gravelly loam on the fan on the west side of the Project site. All of these soils are classified as slightly susceptible to wind and sheet and rill water erosion, and are well-drained with low runoff potential. Test pits evaluating subsurface conditions at the Project site found soils on west side to be generally silty to clayey (Kleinfelder, 2014).

1.2.2 Biological Setting

Historically, the site has been used primarily for grazing over the past 100 years, but has also supported field crops at times in the past, most notably in the 1950s to 1970s, with a small portion of the Project site supporting irrigated row crops into the 1990s. Crops included cotton, potatoes, turnips, cucumbers, watermelons, sugar beets, and lettuce.

The Project site is characterized as a non-native grassland sparsely dissected by ephemeral or intermittent washes (San Benito County, 2010). This can be further classified as an annual brome or red brome grassland semi-natural herbaceous stand (Sawyer *et al.* 2009), depending upon local species dominance at the time of botanical or vegetation surveys. According to data collected in support of the 2010 Final EIR, dominant graminoids include non-native bromes such as ripgut (*Bromus diandrus*), red brome (*B. madritensis* ssp. *rubens*), and soft chess (*B. hordeaceus*), along with other non-native annual grasses such as rattail grass (*Festuca myuros*) and foxtail barley (*Hordeum murinum* ssp. *leporinum*). Dominant or common forbs are also primarily non-native, including two filarees (*Erodium botrys* and *E. cicutarium*), shepherd's purse (*Capsella bursa-pastoris*), and bur clover (*Medicago polymorpha*), though some natives were also common including shining peppergrass (*Lepidium nitidum*), vinegarweed (*Trichostema lanceolatum*), turkey mullein (*Eremocarpus* [*Croton*] *setigerus*), and fiddlenecks (*Amsinckia menziesii, A. tesellata*]. These natives generally favor more ruderal, disturbed habitats in the Project area.

Native spring wildflowers are also found in areas that have not been heavily impacted by grazing or historical agriculture (San Benito County, 2010), including Kern brodiaea (*Brodiaea terrestris* ssp. *kerniensis*), blue dicks (*Dichelostemma capitatum*), blow wives (*Achyrachaena mollis*), California goldfields (*Lasthenia californica*), coastal tidytips (*Layia platyglossa*), Great Valley phacelia (*Phacelia ciliata*), and paintbrushes (*Castilljea brevistyla* and *C. exserta*).

Stock ponds, seasonal depressions and vernal pools are also found onsite supporting flora commonly associated with seasonally wet areas including slender woolyheads (*Psilocarphus tenellus*), fine-branched popcornflower (*Plagiobothrys leptocladus*), and white-tip clover (*Trifolium variegatum*) (San Benito County, 2010).

Amec Foster Wheeler Restoration Ecologist Clayton Kraft visited the site in March 2015 and documented the following plant species, including California Invasive Plant Council (Cal-IPC) designation (for invasive species), and approximated the absolute cover (which can be more than a total of 100% based on the strata or different layers of vegetation overlapping) of each species for the site:

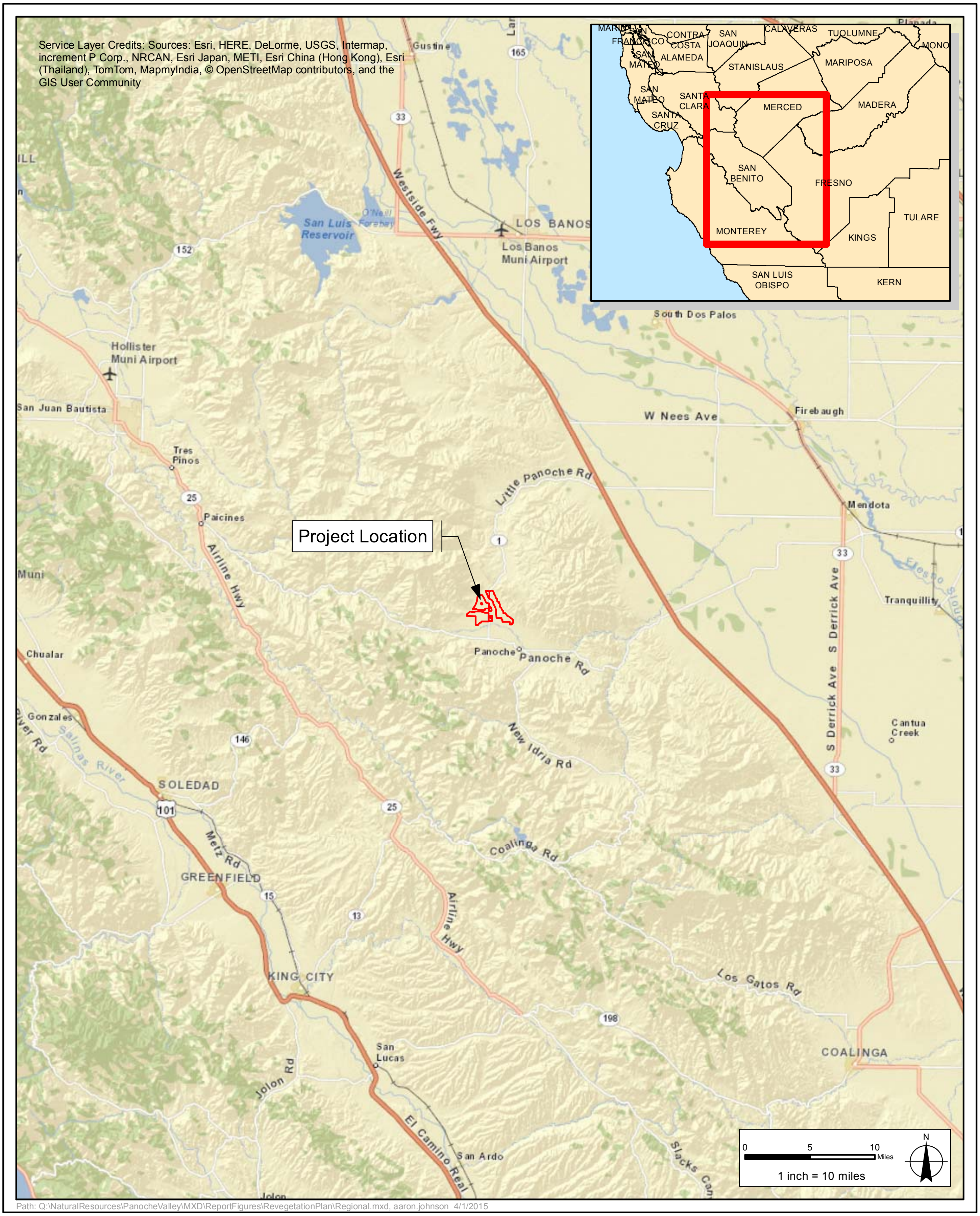
Nonnative:

1. Cheeseweed (*Malva parviflora*), 1-2%
2. False Dandelion (*Hypochaeris glabra*), CAL-IPC Limited, 1-2%
3. Mediterranean Barley (*Hordeum murinum*), CAL-IPC Moderate, 10% - 15%
4. Red Brome (*Bromus madritensis* ssp. *rubens*), CAL-IPC High, 15% - 25%
5. Red Stem Fillaree (*Erodium cicutarium*), CAL-IPC Limited, 80% - 95%
6. Bur Clover (*Medicago polymorpha*), CAL-IPC Limited, 1-2%
7. Pineapple Weed (*Matricaria discoidea*), <1%
8. London Rocket (*Sisymbrium irio*), CAL-IPC Moderate, 1-2%

Native:

1. Popcorn flower (*Plagiobothrys collinus*) or (*P. acanthocarpus*), <1%
2. Ranchers Fiddleneck (*Amsinckia intermedia*), <1%
3. Shining Pepper weed (*Lepidium nitidum*), 10% - 15%
4. Owl's Clover (*Castilleja exerta*) or (*C. densiflora*), <1%
5. Miniature Lupine (*Lupinus bicolor*), 1-2%
6. Common Muilla (*Muilla maritime*), <1%
7. Tidy Tips (*Layia platyglossa*), <1%
8. Nevada Gilia (*Gilia brecciarum*), <1%
9. Purple Sanicle (*Sanicula bipinnatifida*), <1%
10. Seed Plantain (*Plantago erecta*), <1%
11. California Goldfields (*Lasthenia californicus*), 1-2%

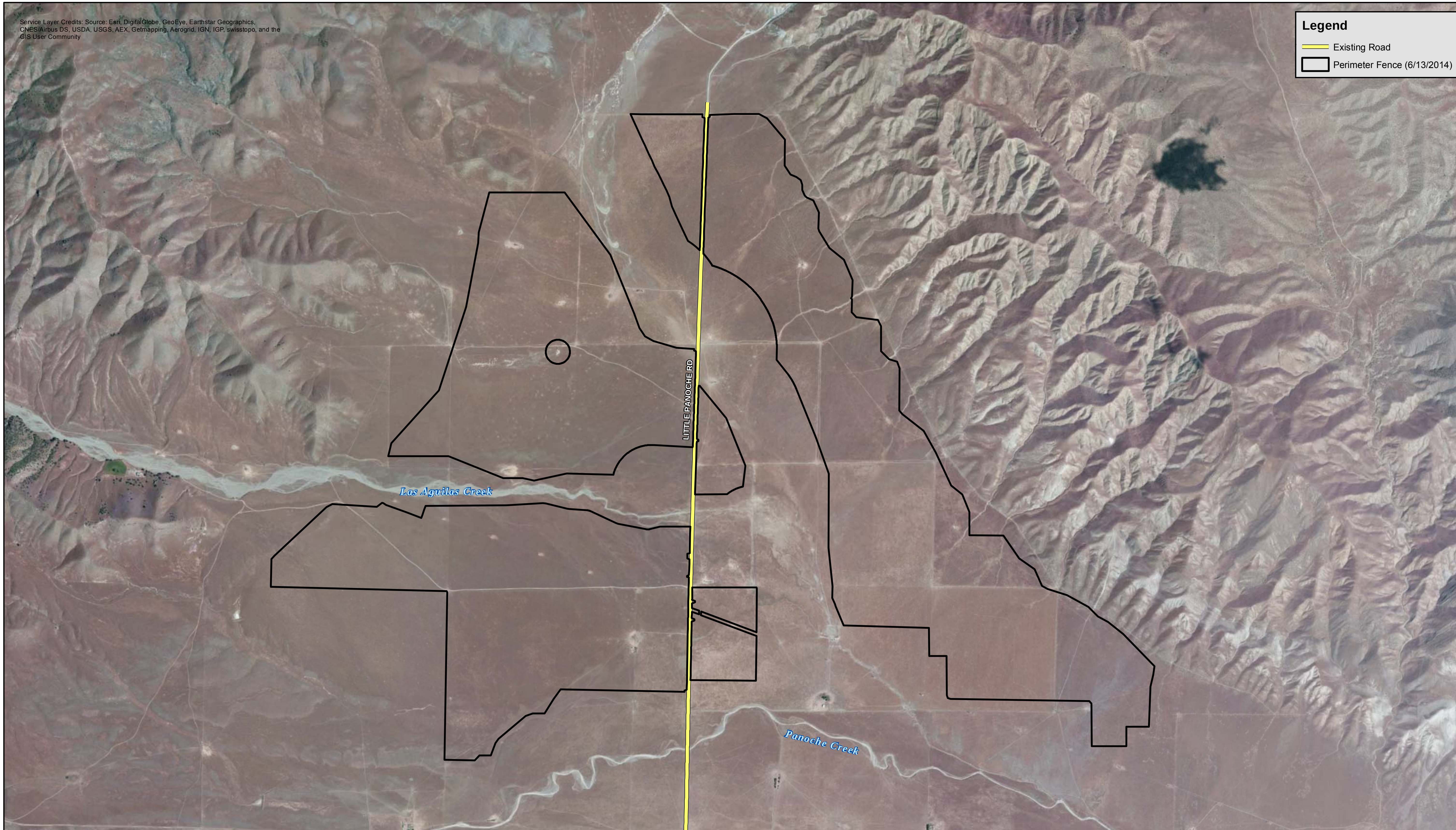
Based on this 2015 visit, red stem fillaree is the dominant species present on the site and most native species represent less than 1% of the vegetative cover.



amec foster wheeler

Regional Map
Panoche Valley Solar Project
San Benito County, CA

FIGURE
1



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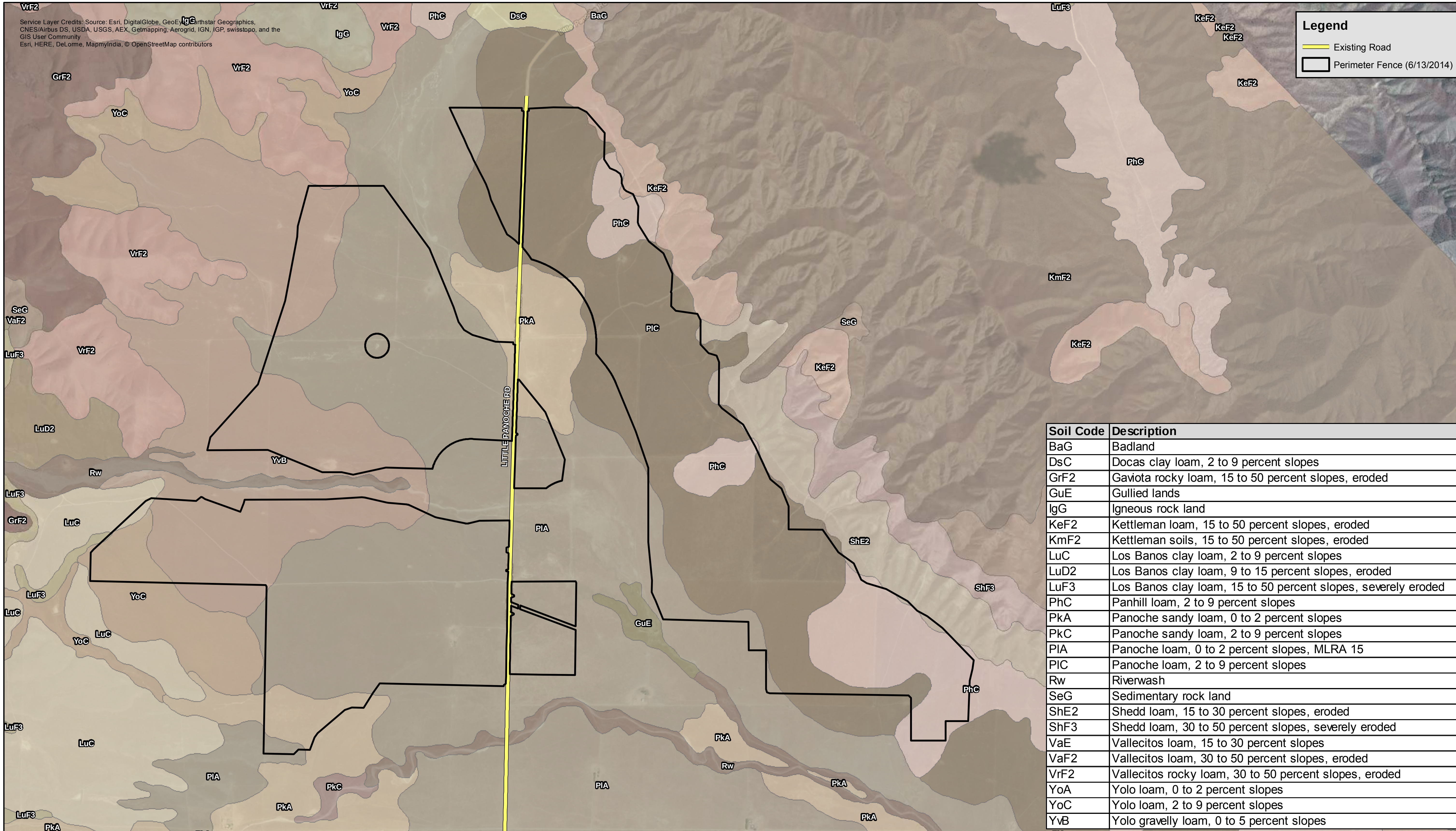
Site Vicinity
Panoche Valley Solar Project
San Benito County, CA

1 inch = 2,000 feet
0 500 1,000 2,000 Feet

N

FIGURE
2



Soil Code	Description
BaG	Badland
DsC	Docas clay loam, 2 to 9 percent slopes
GrF2	Gaviota rocky loam, 15 to 50 percent slopes, eroded
GuE	Gullied lands
IgG	Igneous rock land
KeF2	Kettleman loam, 15 to 50 percent slopes, eroded
KmF2	Kettleman soils, 15 to 50 percent slopes, eroded
LuC	Los Banos clay loam, 2 to 9 percent slopes
LuD2	Los Banos clay loam, 9 to 15 percent slopes, eroded
LuF3	Los Banos clay loam, 15 to 50 percent slopes, severely eroded
PhC	Panhill loam, 2 to 9 percent slopes
PkA	Panoche sandy loam, 0 to 2 percent slopes
PkC	Panoche sandy loam, 2 to 9 percent slopes
PlA	Panoche loam, 0 to 2 percent slopes, MLRA 15
PlC	Panoche loam, 2 to 9 percent slopes
Rw	Riverwash
SeG	Sedimentary rock land
ShE2	Shedd loam, 15 to 30 percent slopes, eroded
ShF3	Shedd loam, 30 to 50 percent slopes, severely eroded
VaE	Vallecitos loam, 15 to 30 percent slopes
VaF2	Vallecitos loam, 30 to 50 percent slopes, eroded
VrF2	Vallecitos rocky loam, 30 to 50 percent slopes, eroded
YoA	Yolo loam, 0 to 2 percent slopes
YoC	Yolo loam, 2 to 9 percent slopes
YvB	Yolo gravelly loam, 0 to 5 percent slopes

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Soil Map
Panoche Valley Solar Project
San Benito County, CA

1 inch = 2,000 feet
0 500 1,000 2,000 Feet
N

FIGURE
3

2.0 REVEGETATION AREAS

Subsurface and temporary disturbance areas proposed at the Project site are described in Table 1 below and shown in Figure 4. Of the approximately 2,506 acres of the Project site, active grading and revegetation will occur in approximately 504 acres and include the following categories: Graded Areas, Detention Ponds, Channel and Slope Revegetation Areas, AC and DC Trenching, Laydown Areas (considered temporary disturbance), and Temporary Water Ponds. The remaining portions of the Project site will not require subsurface disturbance to accomplish site construction. It is expected that equipment driving over these areas for installation of facilities will not disrupt the seed bank to a level that will require revegetation in the interstitial space around panels.

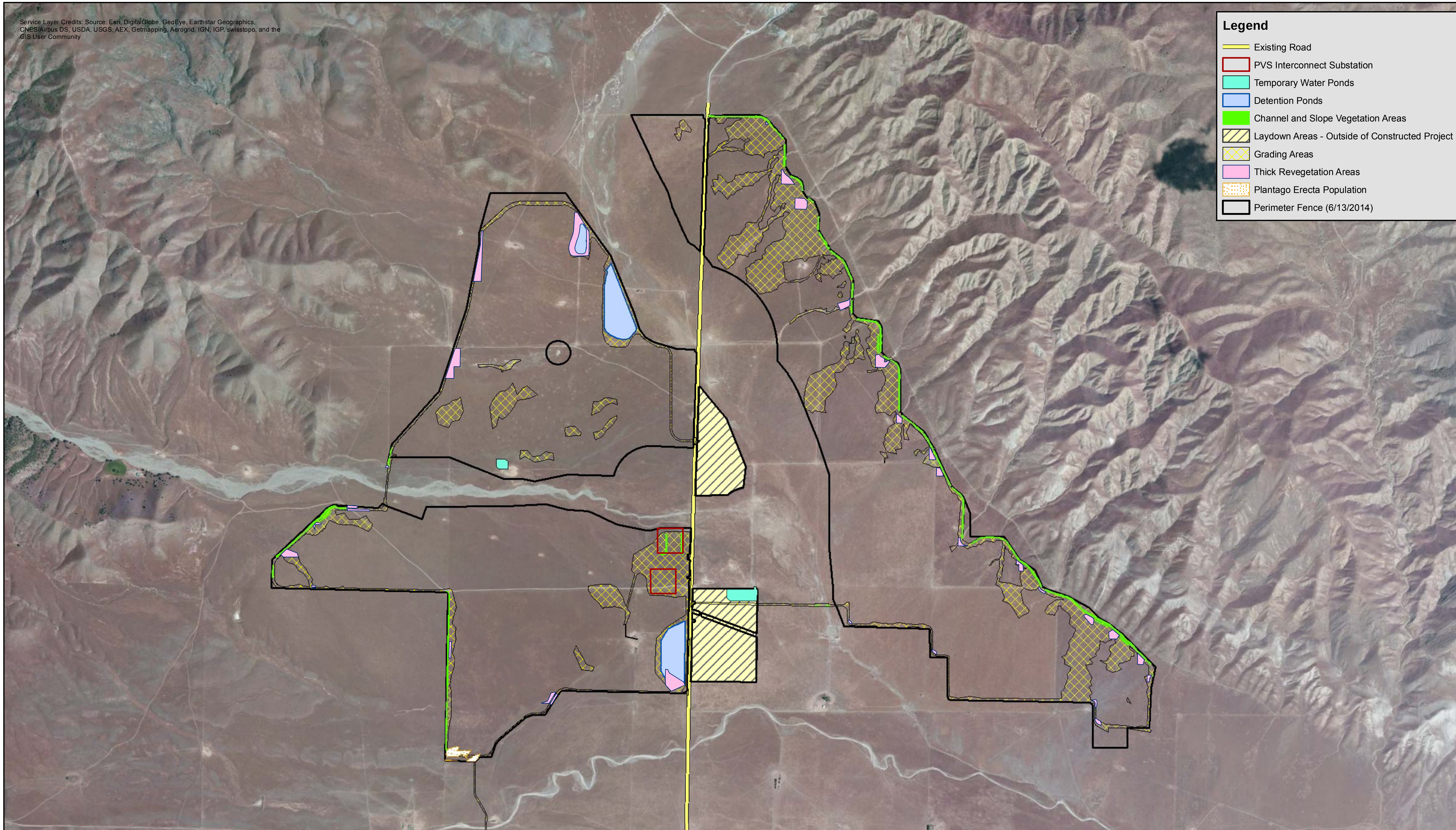
Graded Areas describe primarily where elevation changes are required to allow for construction of PV cells and other Project related structures and include approximately 316.1 acres of grading. Detention Ponds will be constructed to periodically contain stormwater during the operational phase of the Project and include approximately 33.6 acres. Temporary Water Ponds include approximately 5.1 acres and will be used during construction to contain short term stormwater flows. These temporary ponds will then be restored to pre-construction contours when complete. Laydown Areas include approximately 100.4 acres and will be used during construction for equipment and material staging. The Laydown Areas will be returned to preconstruction contours after construction and are considered temporary disturbance areas, (Figure 4). After completion of Project construction, the Laydown Areas will not be considered part of the constructed Project area and will be returned to natural habitat per methods outlined in this HRRP. Channel and Slope Revegetation Areas are portions of the Graded Areas that will require a different revegetation approach to the rest of the Graded Areas to control erosion, as described below in Sections 3.4.5.4 and 3.4.5.5.

Trenching will occur where cables are buried between panel rows and between panel blocks and the substation. These areas are not shown in Figure 4 due to the small scale of proposed impacts scattered throughout the site (approximately 35 acres combined for AC and DC trenching). Trenches will be backfilled and revegetated similar to Graded Areas as described in Section 3.4.5.3 below.

This HRRP details the necessary actions to revegetate these areas to a level equivalent to or better than pre-project conditions as described in MM BR-G.3. The revegetation actions will incorporate seed mixes that meet the goals of the revegetation activity to stabilize soil, manage drainage and erosion, and for habitat value (i.e. minimizing invasive weed populations).

Table 1.
Revegetation Areas

Disturbance	Acres
Graded Areas	316.1
Detention Ponds	33.6
Temporary Water Ponds	5.1
Laydown Areas (Temporary Disturbance)	100.4
Channel and Slope Revegetation Areas	13.9
AC and DC Trenching	35.2
Total	504.3



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Revegetation Areas
Panoche Valley Solar Project
San Benito County, CA

1 inch = 2,000 feet
0 500 1,000 2,000 Feet

N

FIGURE
4

3.0 SOIL RESTORATION PLAN

As discussed in Section 1.2.1, a soils report was prepared by ENGEO in 2010 and updated by Kleinfelder in 2014. Kleinfelder observed no significant depth of topsoil or organic soils in test pits. This observation was confirmed by Amec Foster Wheeler Restoration Ecologist Clayton Kraft during the March 2015 site visit. He also observed the surface of the site to be so compacted that any large scale salvage of soils containing the existing seed bank would not be feasible. Additionally, non-native species predominate the existing plant species composition and the sites are not characterized as Grade One agricultural soils. Given these factors, topsoil salvage is not anticipated to occur on the majority of the Project site. The potential exception is a 2.2 acre area in the southwest corner of the site which contains a native stand of dot seed plantain (*Plantago erecta*) (Figure 4). Substantial disturbances to soils in this area are not anticipated, however if they occur the following measures will be taken as described in MM BR-G.3 to attempt to salvage the seed bank: soil will be salvaged to a depth of 3-12 inches and stockpiled until construction is complete (not more than 2 years), then replaced and recontoured to pre disturbance conditions. The area will then be reseeded with dot seed plantain as described in Section 3.4.5.6 of this document. In addition, soils will be treated as follows to maximize revegetation efforts:

- Where compaction, rutting, or crushing occurs, soil will be worked with a harrow, disc, spring, tooth, chisel plow, or similar implement as appropriate prior to seeding.
- Where cables are buried, trenching will occur. Removed soils will be placed next to trenches, and trenched areas will be refilled with the excavated soil as cables are buried.

4.0 PLANT RESTORATION AND REVEGETATION PLAN

4.1 Introduction

The potential for successful revegetation at the Project site is enhanced by identifying soil plant growth potential, selecting appropriate plant species, using appropriate site preparation techniques, amending the soil if needed, and implementing an arid-land revegetation strategy. This revegetation plan addresses these evaluative measures, and specifies the methods and techniques to be implemented to optimize success of the revegetation efforts.

4.2 Goals

MM BR-G.3 outlines the following goals for the HRRP:

Develop and Implement an HRRP
The Applicant shall restore disturbed areas to pre-construction conditions or better. Prior to the issuance of a building permit and removal of any soil or vegetation, the Applicant shall retain a County-approved, qualified biologist(s), knowledgeable in the area of annual grassland habitat restoration, to prepare an HRRP. The biologist would also be responsible for monitoring the initial implementation of the plan as the Applicant's attainment of the established success criteria. The purpose of the HRRP will be to explicitly identify the process by which all disturbed areas shall be restored to at least pre-construction conditions.

Plant Restoration and Revegetation Plan
The species palate proposed for restoration/revegetation shall include a combination of native and non-native (based on current species composition in the restoration/revegetation areas) annual grasses and annual herbaceous species known to occur in the area. Due to the large nonnative annual grass component currently present within most of Project area the intent of the HRRP is to introduce as many native species as possible recognizing that the colonization of the site by non-native annual grasses is likely. Areas subject to restoration/revegetation shall be monitored to assess conditions and to make recommendations for successful habitat establishment.

Monitoring Plan
Monitoring shall be performed by County-approved, qualified biologist(s) knowledgeable in the area of annual grassland habitat restoration. Criteria for successful restoration/revegetation of temporarily disturbed areas shall be percent cover equal to that of preconstruction levels or better. This percentage shall include no more than a 10 percent non-native component, with the exception of intentionally/or naturally seeded non-native grasses that occurred in the area prior to site disturbance.

This HRRP incorporates these requirements, and also addresses the unique challenges of a revegetation action that is to be self-sustaining in the context of the on-going operation of a solar array.

Specifically, these challenges include selection of seed blends that are formulated to include species that:

- are native to the specific site or region
- will establish quickly to help curtail wind and water erosion
- can tolerate little or no irrigation
- can tolerate shading if under solar panels
- be somewhat maintenance free with a low stature
- meets the criterion of achievement of applying revegetation actions as needed to establish pre-project conditions

4.3 Determination of Appropriate Soil Characteristics

Most of the soils on site currently support healthy, albeit non-native plant communities, so it is assumed that there are no soil-related obstacles to revegetation (i.e., excessive salinity). This is supported by the soil and geotechnical reports (ENGEO, 2010; Kleinfelder, 2014).

4.4 Revegetation Methods

4.4.1 Overview and Timing of Revegetation Activities

Revegetation will consist of seeding on areas of subsurface disturbance only, which is anticipated to be approximately 504 acres of the Project site. The remaining area will be relatively undisturbed, leaving any organic material, the existing seed bank, and the roots of vegetation intact, thus re-seeding in these areas will not be necessary. Seeding will be accomplished at a point in the construction schedule that optimizes access to disturbed portions of the site for seed distribution and optimizes the use of natural rains to aid in germination and growth. Revegetation in the disturbed areas will consist of soil preparation and the introduction of additional seed to the site. The method of seeding will be broadcasting or hydroseeding, depending on the area to be revegetated.

4.4.2 Seed Procurement and Storage

A reputable supplier will provide seed for the Project. As described in MM BR-G.3:

- Seed should be sourced from the project region or from within a 25 mile radius, if possible, and within 1,000 feet elevation of the Project site.
- Seed must be tested for purity, germination percentage, number of live seed per pound, and weed seed content by the supplier.
- The seed supplier must provide three references with a bid proposal including the name and year of projects as well as contact name and telephone number.

Seed should be delivered to the site as near to the time of seeding as possible. When storing seed it should be kept in a cool, dry location free from rodents.

Potential native seed suppliers identified in preparation of this HRRP include:

S&S Seeds
Po Box 1275
Carpinteria, CA 93104-1275
Phone: (805) 684-0436
Fax: (805) 684-2798

Pacific Coast Seed
533 Hawthorne Place
Livermore, CA 94550
Phone: (925) 373-4417
Fax: (925) 373-6855

Given the remoteness of the site, it is not a typical seed collection area for native seed suppliers and obtaining enough locally collected seed may not be feasible given the predominance of non-natives. Thus, it may be necessary to utilized seed grown in the native seed supplier's nursery to obtain the native species mix and quantities recommended in this HRRP.

4.4.3 Site Preparation

Site soil preparation could be necessary where excessive compaction may occur from heavy equipment and vehicle traffic. On areas that do not receive heavy traffic either prior to or during construction, no decompaction is necessary. For heavily used areas that are to be seeded, such as Laydown Areas or temporary roads, decompaction may be required. A qualified Restoration Ecologist will determine where decompaction is necessary prior to the seeding efforts.

Ripping or disking may be used on compacted areas to allow for good plant establishment through loosening of the soil and improving soil to seed coat contact. Along temporary access routes and constructed Channel/Slope Areas, soil treatment may improve revegetation; even in such a linear fashion, a good establishment of plants can reduce wind erosion, and can ameliorate water erosion from the edges of the compacted roadways. Installation of ground-mounted solar arrays should not result in compaction and no surface treatment is proposed for Graded Areas that are not heavily traveled by equipment.

Where possible and necessary as determined by the Restoration Ecologist, soils will be disked or ripped to a depth below where the compaction occurred in order to increase water infiltration and provide a firm seedbed for good soil-to-seed contact.

4.4.4 Seeding Methods

4.4.4.1 Broadcast Seeding

Broadcast seeding is a technique widely used in turf applications or land restoration over large areas and will be used here on Laydown Areas and trenched surfaces. During broadcast seeding, seed and carrier is thrown out of the bottom of a large hopper as a tractor pulls the seeder. Broadcast seeding of a seed mix requires a carrier to enhance even spreading of seeds of various size as well as providing organic material to cover the seed which offers some protection from wind erosion and predation. Sterile rice hulls are commonly used as a seed carrier at two parts rice hulls per one part of seed per unit volume. Broadcast seeders can be adjusted for seed size, desired seeding rate, and width of seed spread. Broadcasting should be done in late fall or early winter, as close as possible to the start of the winter wet season. If broadcast seeding is used on Graded Areas it should be performed before panel installation, as the pulling vehicle and seeder have minimal maneuverability. Therefore, this seeding method may not be feasible on large portions of the site.

Broadcast seeding is cost effective and can be performed quickly, however it leaves the seed unprotected until precipitation imbeds the seed in the soil for germination. A seed bed can be prepared with a dethatcher to scarify, or, create small furrows to contain the seed, and the seeded area can be dethatched again, rolled, or dragged to incorporate seed into the soil, maximizing soil to seed coat contact and reducing predation from rodents and birds.

4.4.4.2 Hydroseeding

During hydroseeding, seed is mixed into a slurry with water, fiber mulch, and tackifier and is pumped under pressure through a nozzle and sprayed over bare ground. The slurry dries and sticks to the soil holding the seed in place for a time. The seed is mostly covered by the fiber mulch which simulates contact with the soil. Hydroseeding should be performed as close to the onset of the wet season as possible, however the timing is not as critical as that of broadcast seeding.

Hydroseeding is more costly than broadcasting and can be performed relatively quickly. It does offer the seed some protection against wind and water erosion for a short time, as well as predation. An added benefit is that the slurry can be directed where needed, such as under panels, or on the banks of ponds and channels.

Hydroseeding however reduces the chance of the seed making contact with the soil before germination, thus reducing overall germination rates. Hydroseeded areas should be kept free of disturbances like foot and vehicle traffic as these activities disrupt the mulch and tackifier bonding and leaves seed and mulch subject to wind and water erosion. For this reason hydroseeding is a good revegetation method for areas such as under panel arrays where disturbance is unlikely.

4.4.5 Plant Palettes and Planting Methodologies

The species composition for the seed mixes in the following Tables is based on local expert knowledge, a review of applicable documents, and of consideration of the revegetation Project goals. The seed palettes specified in the Tables thus include species found on the site or nearby, as well as incorporating local native species that are known colonizers and soil builders that have low stature and will likely result in adequate ground coverage. Per the goals of the HRRP, emphasis is placed on revegetating with native species.

4.4.5.1 Graded Areas

Graded Areas will be subject to permanent subsurface disturbance as soil will be removed and redistributed to provide a more level surface for Project construction (Figure 4). Graded Areas will be especially susceptible to erosion and re-invasion by non-natives since it will be left essentially bare, therefore a moderate seed duty of 15 pounds live seed (PLS) is suggested per acre. Table 2 recommends a seed mix that contains a variety of perennial grasses for long term stability, as well as annual species for more immediate short term vegetative coverage, while keeping the mature height below 2 feet to minimize the maintenance needs below panels. Substitute species, when included, may replace seeds that are not available, or are exorbitantly costly as approved by a qualified Restoration Ecologist.

Table 2.
Seed Mix 1.

Botanical Name	Common Name	Life Cycle	Mature Height	Duty - PLS
Distichlis spicata	saltgrass	perennial	1.1 feet	3
Heliotropium curassivicum	salt heliotrope	perennial	0.5 feet	1
Poa secunda	one sided bluegrass	perennial	1.5 feet	2
Croton setigerus	dove weed	annual	1.5 feet	2
Deschampsia danthonioides	annual hairgrass	annual	1.5 feet	0.5
Eschscholzia caespitosa	tufted poppy	annual	1 feet	0.5
Lasthenia californica	goldfields	annual	0.5 feet	0.5
Lotus wrangelianus	California lotus	annual	1.5 feet	2
Lupinus succulentis	arroyo lupine	annual	2 feet	1
Triclostema lanceolata	vinegarweed	annual	1.5 feet	1
Vulpia microstachys	annual fescue	annual	1.5 feet	1.5
Total Seed Weight PLS per acre				15
Substitute Species				
Bromus carinatus	California brome	perennial	3 feet	
*Cynadon dactylon***	bermuda grass	perennial	1 feet	
*Lolium multiflorum***	Italian rye grass	annual	2 feet	

Notes:
** denotes non-native species
PLS – pounds live seed

It is recommended that Graded Areas be hydroseeded prior to panel installation, but hydroseeding can also be performed around support structures. Since the Graded Areas will be relatively flat, a minimum rate of hydromulch and tackifier can be used. A rate of 500 pounds of mulch and 125 pounds of tackifier per acre will be sufficient to keep seed in place. As a secondary seeding method broadcasting can be employed on Graded Areas if the activity can be timed to be performed at the onset of the wet season, and if space allows for efficient maneuvering of the vehicle and seeder to be used.

4.4.5.2 Laydown Areas

Laydown Areas will be disturbed temporarily (except where permanent O&M facilities will be constructed) but will be especially susceptible to erosion and re-invasion by invasive species since subsurface disturbance and heavy vehicle traffic will leave these areas essentially bare. Therefore a moderate seed duty of 15 PLS is suggested per acre of Seed Mix 1, Table 2. It is important to perform seeding activities at a time just prior to the wet season in the late fall to protect seeds from erosion and predation for extended periods. Since these areas will be open and free of obstacles broadcast seeding should be utilized, however hydroseeding is an acceptable secondary method if future disturbance while seeds become established is not anticipated.

4.4.5.3 Trenched Areas

Trenching for underground infrastructure will leave small areas essentially bare post construction. Due to the linear nature of trenched areas hand broadcasting is the most effective method of reseeding using Seed Mix 1, Table 2. As the trench is backfilled and smoothed a dedicated person can spread seed manually and track in by foot or use a small lawn roller to imbed seed into the softened soil. Hydroseeding could also be used along the trenched areas with the minimum slurry mix as stated for Graded Areas.

4.4.5.4 Channel and Slope Areas

Drainage channels with sloped banks will be constructed around the perimeter of portions of the Project site. They will be constructed along the entire eastern boundary of the Project where the foothills reach the valley floor to capture runoff anticipated during the wet season. Drainage channels will also be constructed in shorter segments along the western site boundary. These Channels and Slope Areas will require a heavier seed burden as described in Seed Mix 2, Table 3 to help reduce flow velocities and trap sediments. They are expected to receive more water than areas treated with Seed Mix 1 but still be subject to a maintenance regime. The same species can be used as in Seed Mix 1 with the addition of purple needlegrass (*Nassella pulchra*) and higher rates per acre of some species to provide increased stability where erosion is more likely to occur from water and wind.

Table 3.
Channel and Slope Areas, Seed Mix 2

Botanical Name	Common Name	Life Cycle	Mature Height	Duty - PLS
Distichlis spicata	saltgrass	perennial	1.1 feet	2
Heliotropium curassivicum	salt heliotrope	perennial	0.5 feet	1
Nassella pulchra	Purple needlegrass	perennial	3 feet	5
Poa secunda	one sided bluegrass	perennial	1.5 feet	3
Croton setigerus	dove weed	annual	1.5 feet	2
Deschampsia danthonioides	annual hairgrass	annual	1.5 feet	1
Eschscholzia caespitosa	tufted poppy	annual	1 feet	1
Lasthenia californica	goldfields	annual	0.5 feet	0.5
Lotus wrangelianus	California lotus	annual	1.5 feet	2
Lupinus succulentis	arroyo lupine	annual	2 feet	1.5
Triclostema lanceolata	vinegarweed	annual	1.5 feet	1
Vulpia microstachys	annual fescue	annual	1.5 feet	2.5
Total Seed Weight PLS per acre				22.5
Substitute Species				
Bromus carinatus	California brome	perennial	3 feet	
*Cynadon dactylon***	bermuda grass	perennial	1 feet	
*Lolium multiflorum***	Italian rye grass	annual	2 feet	

Notes:
** denotes non-native species
PLS – pounds live seed

Channel and Slope Areas are best revegetated utilizing hydroseeding as the seed slurry can be directed onto banks with minimal impact to the constructed features. The hydromulch and tackifier will help to control erosion until vegetation growth occurs. Channel slopes will require more hydromulch and tackifier than level areas. A recommended rate of 1,000 pound of mulch and 150 pounds of tackifier per acre are suggested.

4.4.5.5 Thick Revegetation Areas for Water Crossings and Detention Pond Bank Areas

Thick Revegetation Areas are proposed where ephemeral streams and jurisdictional waters cross the site perimeters. Seeding at these areas will provide stabilization from water erosion and will remain undisturbed by maintenance practices once seeded. Detention Ponds will impound stormwater temporarily. These areas will be graded and their banks require revegetation for stability. Both types of areas require a unique seed mix that will thrive in wetter areas and create a denser more natural vegetation stand (Seed Mix 3, Table 4). Perennial grasses will stabilize pond banks without adding a large amount of biomass, while annual species adapted for wet areas will provide vegetative cover to further protect against erosion. A high seed duty of 32 PLS per acre is suggested to create dense cover in these areas. Hydroseeding is the recommended method of seed dispersal due to the directional ability of this method. The same slurry mix as used for Graded Areas (500 pounds of mulch and 125 pounds of tackifier per acre) is suitable for these areas. Broadcast seeding could also be performed by hand or by a small maneuverable broadcaster.

Table 4.
Thick Revegetation Areas for Water Crossings and Detention Pond Bank Areas, Seed Mix 3

Botanical Name	Common Name	Life Cycle	Mature Height	Duty - PLS
Distichlis spicata	saltgrass	perennial	1.1 feet	6
Melica imperfecta	California melic	perennial	3 feet	5
Nassella pulchra	purple needlegrass	perennial	3 feet	10
Amaranthus blitoides	prostrate pigweed	annual	1 feet	1
Deschampsia danthonioides	annual hairgrass	annual	1.5 feet	3
Juncus bufonius	toad rush	annual	1 feet	4
Trifolium variegatum	few flowered clover	annual	1 feet	1
Total Seed Weight PLS per acre				32
Substitute Species				
Artemisia douglasiana	mugwort	perennial	4 feet	
Iva axillaris	poverty weed	perennial	4 feet	

Notes:
PLS – pounds live seed

4.4.5.6 Dot Seed Plantain Area

Dot seed plantain (*Plantago erecta*) is a native plant species and a small, 2.2 acre, patch occurs in the southwest corner of the facility (Figure 4). If this area is subject to disturbance that does not entail installation of permanent Project features, it can be revegetated by salvaging topsoil and seeding with dot seed plantain. A rate of 10 PLS per acre is suggested to revegetate this species once topsoil is replaced. If no disturbance occurs in this area, no action is suggested.

4.4.6 Timing of Seeding

The timing of seed dispersal is important to prevent undue damage to seed resources by erosion, predation, and degradation. Broadcast seeding methods need to be performed at the onset of the wet season to avoid prolonged exposure to the elements and predators. The wet season normally occurs from November through April in the region. Hydroseeding can be performed out of season, but it is preferable to carry out as close to the onset of the wet season as construction schedules allow to protect seed resources and maximize germination rates.

4.4.7 Irrigation Contingencies and Fertilizer

Adequate seasonal rainfall is an important factor in seeding success. If the region does not receive close to average rainfall quantities over the course of the wet season, a qualified Restoration Ecologist will make a thorough site assessment and determine if supplemental irrigation is necessary. If deemed necessary, water trucks will be employed to deliver water via side sprayers to wet revegetated areas enough to foster seed germination and plant development, about 3 inches in depth. All areas will require assessment for irrigation in well below average precipitation years for the first year of vegetation development.

No fertilization is suggested due to the non-native dominance throughout the sites and the ability of non-native annuals to utilize excess nutrients much faster than native species. However, based on an assessment by a qualified Restoration Ecologist, should vegetation growth be delayed after seeding, and rapid development of vegetation cover is needed for erosion control in specific areas, fertilizer could be used in conjunction with weed control efforts to provide cover in those areas.

4.4.8 Erosion Control

Soil should be maintained on the site using temporary erosion control devices such as silt fences, fiber rolls, and check dams as necessary to prevent sediment from leaving the site as specified in the Stormwater Pollution Prevention Plan. Adequate vegetative cover will control erosion on a large scale, however isolated areas may develop rills or gullies due to site modification such as grading. Erosion control inspections would be made before and after large storm events and areas identified as erosive would be stabilized with an appropriate method as designated by a Certified Inspector of Sediment and Erosion Control and as designated in the Stormwater Pollution Prevention Plan.

4.4.9 Non-Native and Invasive Species Control

Despite native species seeding and the expected re-invasion of existing weedy species on the Project area, care is needed to prevent establishment of weeds that may be more invasive t than those currently present. More vigorous weed invasions are likely with disturbance and could cause severe problems by shading panels, restricting access, and spreading with direct or indirect irrigation. A qualified Restoration Ecologist will inspect the site in accordance with the Project Weed Control Plan. The Cal-IPC designates classes of invasiveness as low, moderate, and high. Moderate and highly invasive species should be identified and treated per the Project Weed Control Plan.

5.0 MONITORING PLAN

Revegetated areas will be monitored to assess conditions and to make recommendations as necessary for successful habitat establishment. Monitoring will be conducted by a qualified Restoration Ecologist or Biologist knowledgeable in annual grassland habitat restoration. Monitoring will consist of both qualitative and quantitative monitoring methods and will continue for five years or until success criteria have been met.

5.1 Qualitative Monitoring

Qualitative monitoring will be conducted to assess the overall conditions of the revegetation sites, both within and outside of the permanent Project area, and to identify any problems that may prevent successful vegetation establishment. Qualitative monitoring of revegetated areas will be conducted, at a minimum, on a monthly basis for the first year following distribution of seed and will continue on a quarterly basis thereafter, until final approval of the revegetation effort. Qualitative monitoring will include observations of growth and survival, germination success, reproduction, plant fitness and health, pest problems, herbivory problems, invasive species presence, and wildlife use.

Qualitative monitoring reports will include a description of site conditions and progress and summarize findings. Reports will also indicate any issues or problems that may impede the success of the revegetation effort and include recommendations regarding remedial work or maintenance necessary to correct problems.

5.2 Quantitative Monitoring

Quantitative monitoring will be conducted annually for revegetation areas that lie outside of the permanent Project area (Figure 4 - Laydown Areas) to measure development of vegetation within the habitat restoration sites and determine if they are progressing toward ultimate success criteria by year five. Quantitative monitoring will be conducted during the spring months of each year (dependent on optimal weather conditions) to coincide with the blooming periods of the greatest number of plant species. If success criteria are met prior to year five, quantitative monitoring may conclude in prior years per MM BR-G.3.

Quantitative monitoring will consist of sampling a series of one-square-meter quadrats along transect lines that have been placed randomly in each of the revegetation areas. Transect lines and quadrat locations will be established and recorded with GPS coordinates in year one for repeatable data collection in subsequent years. Five 100-meter transects will be established randomly per Laydown Area, and five quadrats will be sampled along the transects at end points and at 25, 50, and 75 meter intervals. Total percent cover and percent cover of each plant species present in the quadrats will be estimated and recorded. This data will be used to determine growth performance, native and non-native species cover, seed germination, native species recruitment and reproduction, and species diversity. Species observed during the quadrat sampling that fall outside of a quadrat will be recorded and included on the list of species observed at each transect location. Based on these results, any necessary recommendations for maintenance and/or remedial work will be made by the Restoration Ecologist.

5.3 Success Criteria

Success criteria shall be based on the following: 1) Cover shall be equal to that of pre-construction conditions or better, and 2) Cover shall include no more than 10% non-native invasive species with the exception of intentionally seeded or naturally seeded non-native grasses or forbs that were present prior to site disturbance. Since moderate to highly invasive species, such as red brome, are present in some quantity (15% to 25% based on 2015 assessment) on site prior to construction, no contingency is needed to eliminate this or similar species. Invasions by new species, not previously documented on site, and species that are of concern per the Project Weed Control Plan will be considered as “non-native cover” for determining success criteria and for determining the necessity for implementing control measures to achieve success criteria. Invasive species control measures will be carried out per the Project Weed Control Plan.

5.4 Reporting

Quarterly reporting will include progress reports that summarize site status and recommended remedial measures as necessary. The reports will include estimated species coverage and diversity, species health and vigor, the establishment of volunteer native species, topographical and soil conditions, problem weed species, site use by wildlife species, evidence of drought stress, and any recommended remedial measures needed to achieve performance criteria. These reports will be submitted on a quarterly basis with the exception of the quarter immediately preceding the annual report.

Annual reporting will include species coverage and diversity as measured during the quantitative monitoring event, attainment or non-attainment of success criteria, species health and vigor, the establishment of volunteer native species, hydrological and topographical conditions, site use by wildlife species, and the presence of invasive weed species. The annual reports will also include remedial measures deemed necessary to achieve future compliance with success criteria. Annual reports will be submitted by December 31st of each year, following implementation of this HRRP, for the duration of the monitoring period.

Annual reports will include, at minimum, the following:

1. The name, title, and company name of all personnel involved in restoration monitoring and report preparation,
2. Maps or aerials showing restoration areas, transect locations, and photo documentation locations,
3. A description of the methods used to perform the work, including the number of acres treated for removal of non-native plants, and
4. An assessment of non-native treatment success.

6.0 FINAL CLOSURE PLAN

6.1 Final Infrastructure Removal

Removal of all above ground infrastructure is expected to occur upon decommissioning of the facility. Additionally all infrastructure below ground to a depth of 3 feet would be removed, including utilities, concrete pads, and any other foreign items.

6.2 Restoration

After removal of infrastructure, the sites will be recontoured to pre-construction conditions restoring natural topography and hydrology to the area.

6.3 Revegetation

After recontouring of the sites, revegetation will take place on any soils left bare or vulnerable by infrastructure removal activities. Seeding methods and mixes such as those proposed for revegetation post construction should be used in the appropriate areas. Since this activity will occur several years from now, a qualified Restoration Ecologist will prepare a more detailed Final Closure Plan including recommendations for seed mixes and duties based on the current site conditions and what is needed to restore vegetation. In accordance with milestones outlined in BR-G.3, the detailed Final Closure Plan (separate plan from this HRRP) will be prepared for County review and approval one year prior to the start of ground disturbance associated with Project decommissioning.

Based on current cost models, it is anticipated that the costs of restoration, revegetation, and monitoring to fully restore impacted soil and vegetation communities will be 100% offset by the cost recovery for recycling the panels, steel, and other equipment at the solar facility.

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Panoche Valley Solar

San Joaquin Antelope Squirrel Relocation and Translocation Plan

Panoche Valley Solar Project
San Benito County, California
April 26, 2014
Revised December 1, 2015

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DEFINITIONS

Biological Monitor	Observers that work onsite to perform biological surveys and provide oversight of ground disturbing activities as needed; receive instruction from and reports to the Designated Biologist(s). Minimum education level of four-year degree in biological sciences, environmental sciences, or equivalent combination of education and experience.
Conservation Lands	Three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels (Valley Floor Conservation Lands, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands).
Designated Biologist	Biologist knowledgeable and experienced in the biology, and natural history of the special-status species on the Project and shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the incidental take of individual species and to minimize disturbance of special-status species' habitat. This biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place.
Project Footprint	The portion of the project that includes the solar arrays and associated roads and equipment, totaling 2,492 acres.
PVS	Panoche Valley Solar Facility; name of the proposed project.
Study Area	Project Footprint and Conservation Lands are collectively referred to for this relocation and translocation plan.

ACRONYMS

BNLL	Blunt-nosed Leopard Lizard
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
FEIR	Final Environmental Impact Report
GPS	Global Positioning System
GKR	Giant Kangaroo Rat
MW	megawatt
PV	photovoltaic
PVC	Polyvinyl chloride
SCRCL	Silver Creek Ranch Conservation Lands
SJAS	San Joaquin Antelope Squirrel
USFWS	U.S. Fish and Wildlife Service
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands

1.0 Introduction

Panoche Valley Solar, LLC proposes to construct and operate a solar photovoltaic (PV) energy generating facility located in San Benito County, California that will generate approximately 247-megawatt (MW) (Figure 1). This project is called the Panoche Valley Solar Facility (PVS) Project (Proposed Project). The Proposed Project will include some unavoidable impacts on San Joaquin antelope squirrels (*Ammospermophilus nelsoni*; SJAS); located within the boundaries of the Proposed Project Footprint. This relocation and translocation plan has been developed to minimize the unavoidable impacts due to the construction of the Proposed Project on recommendations from the California Department of Fish and Wildlife (CDFW).

The proposed solar site construction footprint (Project Footprint) contains approximately 2,153 acres of presently grazed (cattle and sheep) land in the Panoche Valley of eastern San Benito County, California (Figure 2). The Proposed Project would also include approximately 25,618 acres of high quality Conservation Lands that are primarily contiguous with the approximately 2,153-acre Project Footprint (Figure 3). These high quality lands are the Valley Floor Conservation Lands (VFCL), Valadeao Ranch Conservation Lands (VRCL), and Silver Creek Ranch Conservation Lands (SCRCL). The Project Footprint and Conservation Lands are collectively referred to for this relocation and translocation plan as the “Study Area”.

2.0 Species Description

The SJAS is currently listed as threatened by the California Endangered Species Act (CESA [Fish and Game Code §§ 2050 et seq]). The species does not have its own recovery plan, but is included in the Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998).

2.1 Historical Distribution of SJAS

The historic distribution of the SJAS included the San Joaquin Valley and the contiguous areas to the west in the upper Cuyama Valley and on the Carrizo and Elkhorn Plains (USFWS 1998). SJAS range in elevation from about 50 meters (165 feet) in the San Joaquin Valley to about 1,100 meters (3,600 feet) in the Temblor Mountains (USFWS 1998). The CNDDB has historic records of the SJAS occurring in the following USGS quadrangle maps: Cerro Colorado (1940), Hammonds Ranch (1958), Idria (1936), Mercey Hot Springs (1994), Panoche Pass (1929), Panoche (1994), and Tumey Hills (2006).

2.2 Characteristics of SJAS

The SJAS is one of five species of antelope squirrels. The SJAS retains a typical ground-squirrel shape with small, rounded ears and a streamlined body with relatively short legs. Average individuals range in size from about 218 to 240 mm in length and weigh 130 to 170 grams. The tail has fringes of hair that project laterally, giving it a flat appearance. It is usually held cocked or curled over the back exposing a light colored underside. Coloration is generally described as tan with a light stripe along the sides. Relatively smaller size, appearance of the tail and light stripe along the side distinguish this species from the co-occurring California ground squirrel (USFWS 1998).

SJAS live in burrows that vary in complexity and length, but generally have two to six openings and are between roughly 30 and 50 centimeters (12 to 20 inches) deep. They may live in burrows of their own construction or take over and enlarge those dug by kangaroo rats.

The SJAS live in relatively arid annual grassland and shrubland communities (i.e., *Atriplex* and *Ephedra*) in areas receiving less than 23 centimeters (10 inches) of mean annual precipitation. This species is found in higher numbers in sparse to moderate cover of shrubs. In the project area they are associated with plants such as red brome, red-stemmed filaree and California ephedra. SJAS construct burrows in predominantly loam and sandy loam soils such as those that are found in the project area (i.e., Panoche loam soil series), typically in areas that do not flood. In areas of low shrub cover, the SJAS are closely associated with GKR, including living in the burrow systems constructed by GKR (USFWS 1998).

SJAS are predominantly diurnal, with activity peaking early or late in the day. Less activity is observed when ambient temperatures drop below approximately 10 degrees Celsius (50 degrees Fahrenheit) and when higher ambient temperatures are reached, though the critical temperatures at which activity is reduced are unclear. At some locations, such as the Elkhorn Plain Ecological Reserve, observations of SJAS have been recorded during the entire day, even when ambient temperatures exceeded 42 degrees Celsius (108 degrees Fahrenheit) during July and August. Daytime activity above ground extends to most of the day during spring when temperatures are between approximately 20 to 30 degrees Celsius (68 to 86 degrees Fahrenheit).

According to the Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS, 1998) there is one breeding period for the SJAS during late winter lasting through early spring. SJAS do not breed until their second year. The gestation period is around 26 days with embryos present in late January. The number of embryos ranges from 6 to 11, averaging 8.9. After birth between March and April, young may be seen above ground roughly 30 days after birth. Young are weaned from late April to mid- or late-May (USFWS 1998).

SJAS are omnivorous, taking advantage of food and forage that is available. Green vegetation, fungi, and insects are preferred while seeds are less important in the diet. Vegetation and seeds from plants such as filaree and red brome and seeds of ephedra and saltbush are important food sources. The primary insect consumed is grasshoppers when available. In the absence of seeds and grasshoppers, SJAS will eat harvester ants. During spring SJAS will eat large quantities of ephedra seeds, particularly during severe drought (USFWS 1998).

Predators of the SJAS include hawks, falcons, eagles, snakes, kit foxes, coyotes, badgers, as well as others (USFWS 1998).

2.3 Site Survey Background - SJAS

Multiple biological surveys performed in the Study Area between 2009 and 2012 (total of over 20,000 survey hours) that documented the presence of SJAS in multiple locations. These surveys included: protocol-level rare plant surveys, abridged 2009 protocol-level blunt-nosed leopard lizard (*Gambelia sila*; BNLL) surveys, distance sampling, occupancy sampling, and surveys specific to GKR. Many of these surveys were conducted under conditions suitable for observation of SJAS.

A 100 % coverage survey of the Study Area was conducted and a systematic stratified sampling effort was completed on the Conservation Lands in February and March 2013 primarily targeting GKR. Field surveyors used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR sign. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Evidence of other special status species, including SJAS, was recorded if observed.

Within the Project Footprint, the survey grid accounted for 100% coverage, plus a 500 foot buffer (in areas where landowner access was granted). The VFCL are interlaced within the Project Footprint. For this reason, the VFCL was surveyed using the same grid system as the Project Footprint and was subject to 100 percent coverage.

The SCRCL and VRCL were surveyed using the same methodology described above but with wider transects. No buffers were surveyed for the Conservation Lands since surveyors did not have landowner access outside these areas. Transects were systematically distributed across the Project Footprint and included areas previously identified as high and low suitability habitats in past studies. The SCRCL and VRCL surveys were designed to cover approximately 20-30 % of the Conservation Lands, therefore, transect spacing was approximately 148 meters.

BNLL protocol surveys were conducted during 2013 over the entire project footprint, the VFCL and a portion of the VRCL lands (approximately 500-foot buffer in suitable BNLL habitat along boundary with project footprint). Conditions were suitable for observation of SJAS during all BNLL surveys and many of the other surveys conducted for Requested Take Species associated with the PVS and Conservation Lands.

3.0 SJAS Occurrence Results

3.1 SJAS Results within Project Area

SJAS were regularly observed in the more diverse habitats on the VRCL and SCRCL during surveys conducted in 2009, 2010, and 2012 by Live Oak Associates, Inc. The entire acreage of the Conservation Lands is considered suitable mitigation for this species. Based on these results, SJAS are expected to occur on the Project Footprint in relatively numbers. Three individuals were observed within the Project Footprint during various surveys conducted in 2009, two individuals were detected on the VFCL, and seven on the VRCL during 2010 surveys. The overall population levels of this species on the VFCL and the VRCL is considered low; however, on the SCRCL, SJAS populations are considered high, with hundreds observed throughout most of the SCRCL during 2010 reconnaissance surveys, in addition, 119 were observed incidentally in a two-week period in September of 2012 (Table 1).

During the BNLL protocol surveys between June and September 2013, SJAS observations were recorded as follows: Project Footprint (30); VFCL (5) and VRCL (14) (Figure 4; Table 1). Many of these observations that were likely the same individual observed multiple times over the survey period.

Table 1: SJAS Observations on Panoche Valley Solar Project

Survey Period	Project Footprint	VFCL	SCRCL	VRCL
2009	3			
2010		2	>100	7
2012			119	
2013*	30	5		14

*Based on 17 site visits during BNLL surveys; therefore, observations may not represent individuals. SCRCL was not visited during BNLL surveys

4.0 Discussion of Results

SJAS observations were the highest on SCRCL followed by the Project Footprint, VRCL and VFCL. Observations on the Project Footprint were only made east of Little Panoche Road. Within this portion of the Project Footprint, many of the observations were made along interior site roads. The Project Footprint contains very little typical habitat for this species as it is nearly devoid of shrubs. Potential candidate relocations sites could include areas where similarly suitable habitat is present in the adjacent VFCL and VRCL lands that have not been found to be occupied. In addition, the variable topography in potential candidate relocation sites would provide cover initially after relocation.

5.0 SJAS Relocation

The following SJAS conservation measures are pertinent to this plan and are consistent with those required in the Final Environmental Impact report (FEIR) (San Benito County 2010), Supplemental Environmental Impact Report (SEIR) (San Benito 2014), and the Final Incidental Take Permit 2081-2014-035-04 (CDFW 2015) for the project:

- No more than 30 days prior to the commencement of ground disturbance activities the Applicant shall retain a County-approved, Designated Biologist to supervise completion of pre-construction surveys for each phase of the project with assistance from Biological Monitors. If present, active SJAS burrows shall be flagged and ground-disturbing activities shall be avoided within a minimum of 50 feet surrounding each active burrow. If avoidance is not possible, the Applicant shall take the following sequential steps when working in such areas:

    1. Allow for one night without disturbance to the burrow and surrounding area to allow the SJAS to vacate the burrow;
    2. Antelope squirrels shall be live trapped and relocated out of impacted areas in the same manner as described in the GKR Relocation and Translocation Plan.
    3. Methods shall be taken to prevent reentry to the burrow by SJAS (and other small mammal species) until construction is complete in these areas.
    4. Once construction activities are complete access to the burrows shall be restored. If construction-related impacts would result in the crushing or destruction of a burrow then the burrow shall be excavated (either by hand or mechanized equipment under the direct supervision of the biologist, removing no more than 4 inches at a time.

Relocation and translocation procedures to implement these measures are described in Section 5.1. All individuals detected will be relocated to suitable nearby habitat as described below or allow to escape to the adjacent natural habitat. This SJAS Relocation Plan will implement methodology consistent with successful kangaroo rat relocations, with appropriate adjustments given the different requirements of this antelope squirrel species (Bender et al. 2010; Germano 2001, 2010; Germano and Saslaw 2007; Germano et al. 2009; Tennant et.al. 2013). Procedure adjustments were also developed based on experience from trapping and relocation projects in the southern portion of the species' range. The relocation methodology includes trapping to remove SJAS from the Project Footprint that will be impacted by construction activities; verification that all individuals have been detected; and hand or mechanical excavation (as appropriate) of burrows that will be unavoidably destroyed by construction activities. The SJAS will be relocated to suitable areas adjacent to the Project Footprint including unoccupied areas within the VFCL and potentially in the VRCL. It is not anticipated that the SCRCL will be used given the relatively high numbers of individuals observed on the SCRCL. Specific relocation site criteria are detailed herein.

The ultimate goal and objective of relocating SJAS is to preserve and minimize harm, injury, or death of individual SJAS during Project build-out and to possibly recolonize nearby locations where SJAS are no longer found but suitable habitat is present.

The release of or letting the SJAS to escape into nearby suitable habitat that is not occupied will create opportunities to increase the distribution of the species beyond its current locations and occupancy levels. The relocated/translocated SJAS individuals and/or populations will be monitored after the end of the construction on the Project to determine success of the relocation. Post-release trapping will be used to assess and report success of the relocation efforts.

Conducting successful relocations requires careful consideration for each animal's well-being during capture, transport, release, and successive monitoring. Risk to the animal should be minimized and acclimation and survival at the release site will be maximized by implementing accepted practices. At a minimum, the following procedures will be implemented:

5.1 Relocation and Translocation Procedures

Relocation and Translocation Procedures will be implemented subsequent to preconstruction surveys and will be based on survey results and any incidental observations during Project site preparation.

I. Project Site Preparation
    A. PVS or their contractor will mark work area limits with stakes and flagging;
    B. All potential SJAS burrows within the Project Footprint and a 50-foot buffer will be documented (size, location and aspect) and staked and/or flagged;
    C. Prior to any excavation, trenching, or digging associated with this Relocation Plan, the party or parties responsible for such activities will contact the Project safety personnel to ensure all safety requirements are followed (e.g. location of underground utilities);
    D. A Biological Monitor who is under the direct supervision of a Designated Biologist and that has been trained, will be present for the installation of buried wildlife exclusion fencing along the marked work area boundary intended to exclude SJAS from the Project Footprint. Fence installation will be overseen by the Designated Biologist who does not need to be present during all installation activities but should inspect fence locations prior to trenching. At the discretion of the Designated Biologist, temporary exclusion fencing that is not buried may be used to enclose areas targeted for trapping that are in the direct path of construction phase exclusion fence installation (e.g., from trenching);
    E. Exclusion fencing will consist of smooth material (such as aluminum flashing or polyvinyl chloride [PVC] jacket material) or of a design that deters SJAS from climbing over the fence. Construction-phase exclusion fence will be buried at least 24 inches deep with at least 36 inches above ground level. The buried wildlife exclusion fence will avoid all remaining covered species burrow entrances by a buffer of at least 50 feet;
    F. If determined to be necessary to minimize impacts to SJAS outside of the project perimeter, wildlife exclusion fencing will be installed along the Project boundary adjacent to SJAS occupied areas and for a distance extending for approximately 500

feet from the nearest active burrow (additional exclusion fencing may be required beyond necessary SJAS fencing to exclude other covered species);

G. If burrows potentially occupied by SJAS or other covered species cannot be avoided by at least 50 feet, the following measures to remove SJAS from such burrows prior to installation of wildlife exclusion fencing requiring trenching will be implemented at the discretion of the Designated Biologist;
    1. For SJAS occupied areas, trapping following SJAS trapping methods (below in Section II) will be conducted prior to fence installation requiring trenching. Subsequent to trapping, burrows potentially occupied by SJAS will be excavated following excavation procedures.
    2. For other covered species, avoidance and minimization measures specific to that species will be implemented prior to fence installation requiring trenching.

H. Release locations will be identified subsequent to preconstruction surveys and prior to trapping and removal activities subject to the following criteria:
    1. Captured SJAS will be relocated in neighbor groups. A SJAS will be considered within a "neighbor group" if they are within 20 meters of the nearest neighbor. Neighbor release configuration will be determined based on relative locations of captured individuals (see II.B, below).
    2. Release locations must be able to accommodate all SJAS potentially captured that are within each neighbor group.
    3. Release locations will be chosen based on the following, in order:
        a. The nearest high quality habitat in the VFCL that is unoccupied and with microtopographic features that will provide cover such that the relocated group will be at least 100 feet (approximately 30 meters) from the nearest suspected active burrow, if any are present. Former agricultural land will be targeted;
        b. If there are no candidate release locations on the VFCL within one mile of the capture location, unoccupied high quality habitat in within VRCL will be utilized. No relocations of SJAS will be completed in the SCRCL unless approved by CDFW.
        c. Subject to approval by CDFW, captured SJAS may be used to further recovery efforts for this species at locations in the greater Panoche-Ciervo area. If individual SJAS are relocated outside of PVS Conservation Lands, monitoring of relocation success would be the responsibility of the wildlife agencies.

II. SJAS Detection and Removal

The following methods are intended to result in as close to 100% depletion rates as possible with the goal of avoiding mortality of SJAS.

A. The Designated Biologist, a Biological Monitor under the direction of the Designated Biologist, or a supervised trapping crew will conduct five consecutive days of trapping with live traps (e.g. Sherman live traps or similar live traps) to capture SJAS at burrows identified during preconstruction surveys using 20% more traps then the number of identified burrows in the trapping area, or at least one trap per 200 square foot area.

B. Data to be collected on all SJAS captured will include: (1) the locations (Global Positioning System [GPS] coordinates and maps) and the time of capture and/or observation as well as release; (2) sex; (3) approximate age (adult/juvenile); (4) weight; (5) general condition and health, noting all visible conditions including gait and behavior, diarrhea, emaciation, salivation, hair loss, ectoparasites, and injuries; and (6) ambient temperature when handled and released. Any non-listed small mammals that are captured will be documented and release outside of the Project Footprint boundary.

C. If a lactating female SJAS is captured (potentially January – May), one of two procedures below will be implemented:

   1. The female will be released immediately with follow-up trapping conducted within approximately 30 days (or less at the discretion of the Designated Biologist and depending on the condition of the female). The purpose of follow-up trapping will be to capture the female and any of her young that are venturing aboveground. If she still appears to lactating and young are not captured, it may be necessary to release her with additional follow-up trapping conducted.
   2. As an alternative, excavation of SJAS burrows within 100 feet of the capture location will be commenced immediately and trapping in that location will continue until completion of the fifth night session. If dependent young are encountered during burrow excavation, they will be placed with the female and held until the Designated Biologist determines that the young are capable of surviving either with or independent of the adult female.

D. Project minimization and avoidance measures will be implemented during all SJAS trapping and relocation/translocation activities.

E. Captured SJAS will be released into pre-identified release locations identified in Section I.H.3 above, following the procedures in Section IV, below. If new evidence of SJAS (individuals/burrows) is found in an active construction area, construction will be halted within a 50-foot avoidance area or greater if deemed necessary. Procedures A through D (above) will then be implemented.

III. Burrow excavation

Upon completion of five consecutive nights of live trapping, the following will be implemented:

A. Small mammal burrows suitable for SJAS that are present within the trapping grid will be excavated using hand tools if possible. If soil conditions or burrow depths make manual excavation impractical or unsafe, hand-held power tools may be used to assist in direct excavation of burrows. At no time will the hand-held power tool be used without a protective barrier (such as PVC tube, or similar) to prevent injury/mortality to small mammals that may attempt to escape burrows during excavation procedures. With the Designated Biologist and/or Biological Monitor present, additional mechanized equipment (e.g., backhoe) may be used to expand, slope, and/or terrace excavations for safety; however, this type of equipment will not be used for direct burrow excavation.

B. If any SJAS are detected during burrow excavation, they will be captured (either through additional trapping or by hand) and release procedures (see below in Section IV) shall be followed; unless the individuals move into burrows that are greater than 50 feet from the construction boundary; or the SJAS will be allowed to escape to the adjacent natural habitat.
C. No SJAS burrow excavation will occur within any BNLL buffer avoidance area.

IV. SJAS Release

A. Subject to the direction of a Designated Biologist or Biological Monitor, captured SJAS will be released into the designated release location.
B. Relocation sites with both high quality habitat and the presence of shrubs, suitable topography or other cover in the vicinity will be given high priority.
C. The high quality habitat for the relocation sites will typically lack dense, non-native grass cover, or will be managed to reduce dense, non-native grass cover that occurs during years when herbaceous growth is high.
D. If necessary due to weather, time, or site preparation at release locations, captured SJAS will be held in captivity by a properly permitted small mammal trapping specialist. Captive SJAS would be subject to holding for no more than 30 days.
E. SJAS in captivity would be held in separate plastic, glass, or other rigid non-toxic container measuring at least five gallons in size in an onsite climate controlled room (between 60°F and 85°F). Individuals SJAS will be provided with non-tinted, unbleached paper towels and enough suitable substrate (soil, sand, or similar) to cover the bottom of the container. Each SJAS will be provided with approximately one cup of bird seed mix (e.g. mixture of approximately 75% proso white millet and 25% oats groats) initially that will be maintained until release.
F. Individuals will be released into existing suitable small mammal burrows or artificial burrows constructed within the designated release location based on relative location of individuals using the capture map of neighbors (Section II B).
G. If artificial burrows are created, no SJAS will be relocated within 50 feet of small mammal burrows that may be occupied by BNLL in BNLL buffer avoidance areas in the VFCL. Artificially created SJAS burrows in areas of the VRCL will be located at least 50 feet from small mammal burrows that may be occupied by BNLL unless protocol BNLL surveys have been conducted with no detections of BNLL.
H. Artificial burrows will be excavated with an approximately three-inch diameter soil auger. Regardless of method, a hole at least three feet in length extending at least two feet in depth shall be created.

I. Each artificial burrow relocation site in which a SJAS is released will be provisioned with four cups of seed (e.g. mixture of approximately 75% proso white millet and 25% oats groats) upon release. The area in the vicinity of each individual released will be provisioned with four cups of seed once per week continuing until green-up of vegetation or until provisioning is deemed to be unnecessary by the designated biologist.

V. Post-Release Monitoring

A. Released individuals will be temporarily marked using a permanent marker or other form (e.g. passive integrated transponder [PIT]) at the discretion of a Designated Biologist. A Designated Biologist or Biological Monitor will monitor release locations by conducting trapping between 60 and 90 days following release and after completion of all SJAS relocation for each construction phase (two phases anticipated).

B. Data to be collected on all SJAS recaptured will include: (1) the locations (Global Positioning System [GPS] coordinates and maps) and the time of capture and/or observation as well as release; (2) sex; (3) approximate age (adult/juvenile); (4) weight; (5) general condition and health, noting all visible conditions including gait and behavior, diarrhea, emaciation, salivation, hair loss, ectoparasites, and injuries; and (6) ambient temperature when handled and released.

C. The results of the trapping session will be included in the following year's CESA ITP annual report submitted to CDFW.

6.0 References

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U.S. Fish and Wildlife Service [USFWS]. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, Oregon. 319 pp.

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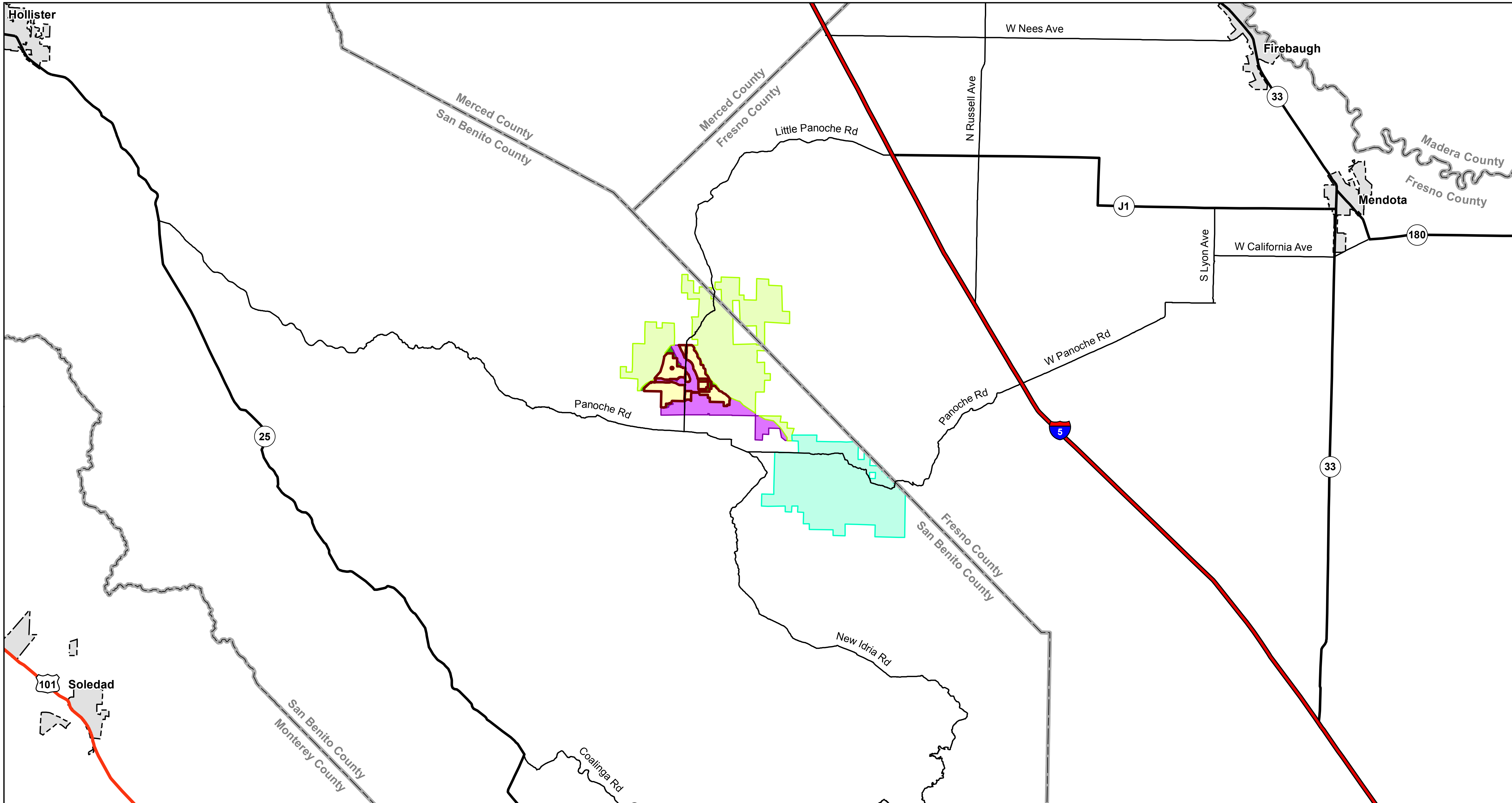
FIGURES



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www.energyrenewalpartners.com

Energy Renewal PARTNERS, LLC

Legend

- Project Footprint
- On-site Conservation Lands
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- City

Panoche Valley Solar Project

Project Location

Project Location: San Benito County, California

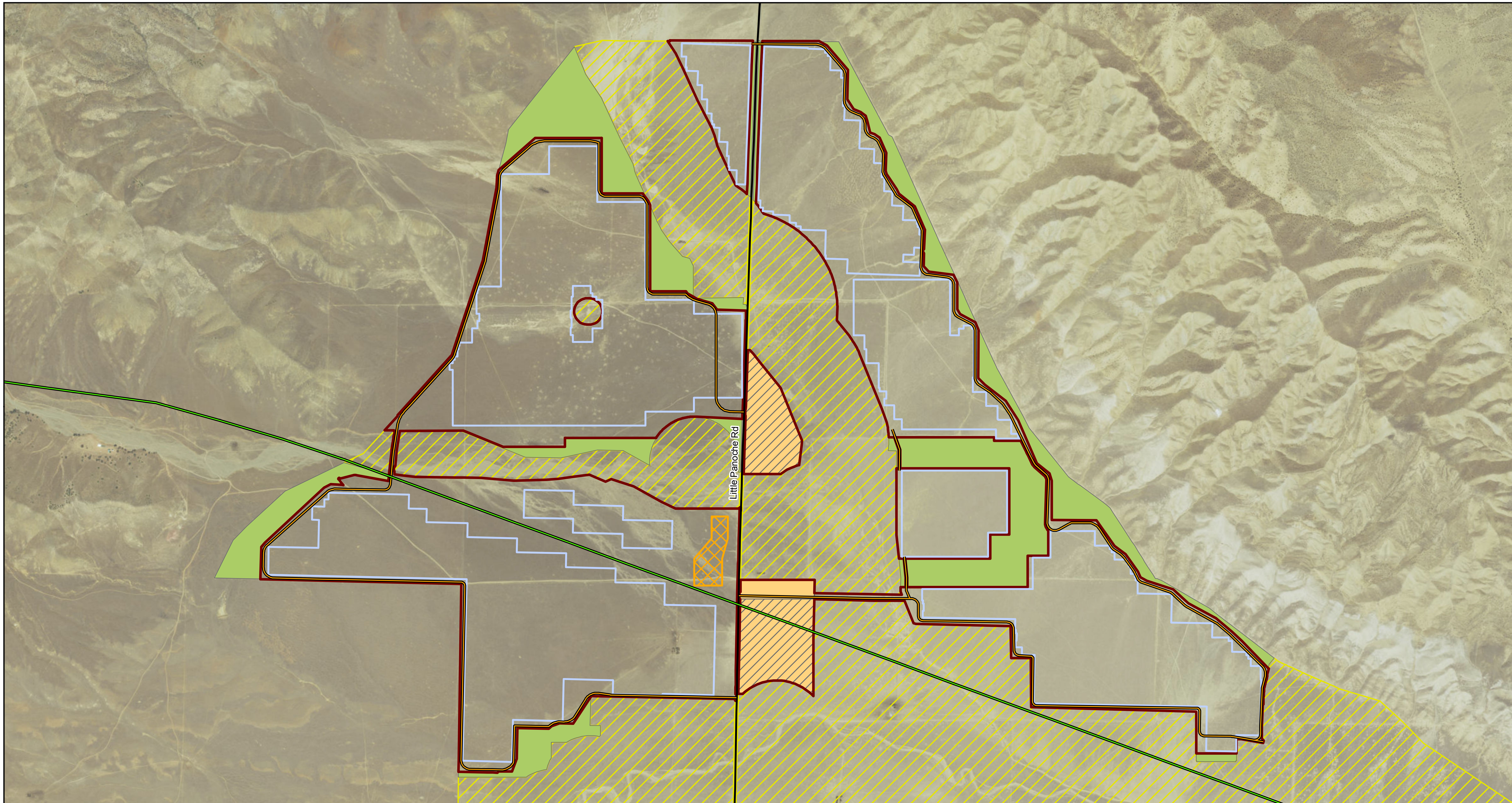
N

0 2 4 Miles

FIGURE 1

Prepared by: J. Hobbs

Date: 2015-12-01



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Legend

- Project Footprint
- On-site Conservation Lands
- Valley Floor Conservation Lands
- Proposed Panel Block
- Existing Transmission Line
- Perimeter Road
- Substation, Switchyard, O&M Building
- Temporary Laydown Yard
- Temporary Laydown Yard *(converted to on-site conservation land after construction)*

Panoche Valley Solar Project

Proposed Layout

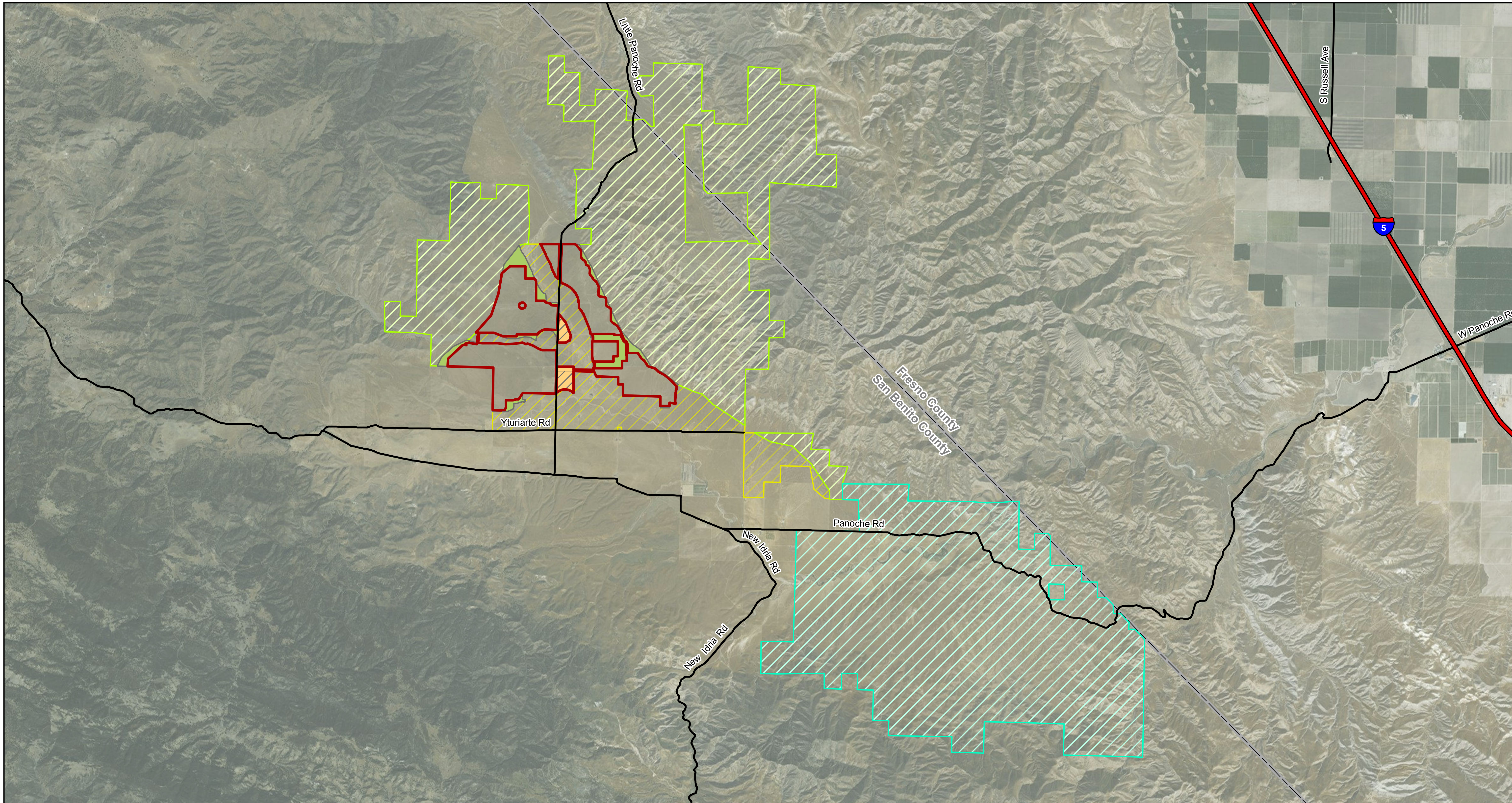
Project Location: San Benito County, California

N

0 900 1,800 Feet

FIGURE 2

Prepared by: J. Hobbs | Date: 2015-12-01



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Legend

- Project Footprint
- On-site Conservation Lands
- Temporary Laydown Yard
- Temporary Laydown Yard *(To be converted to on-site conservation lands after construction)*
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

Panoche Valley Solar Project

Project Footprint and Conservation Lands

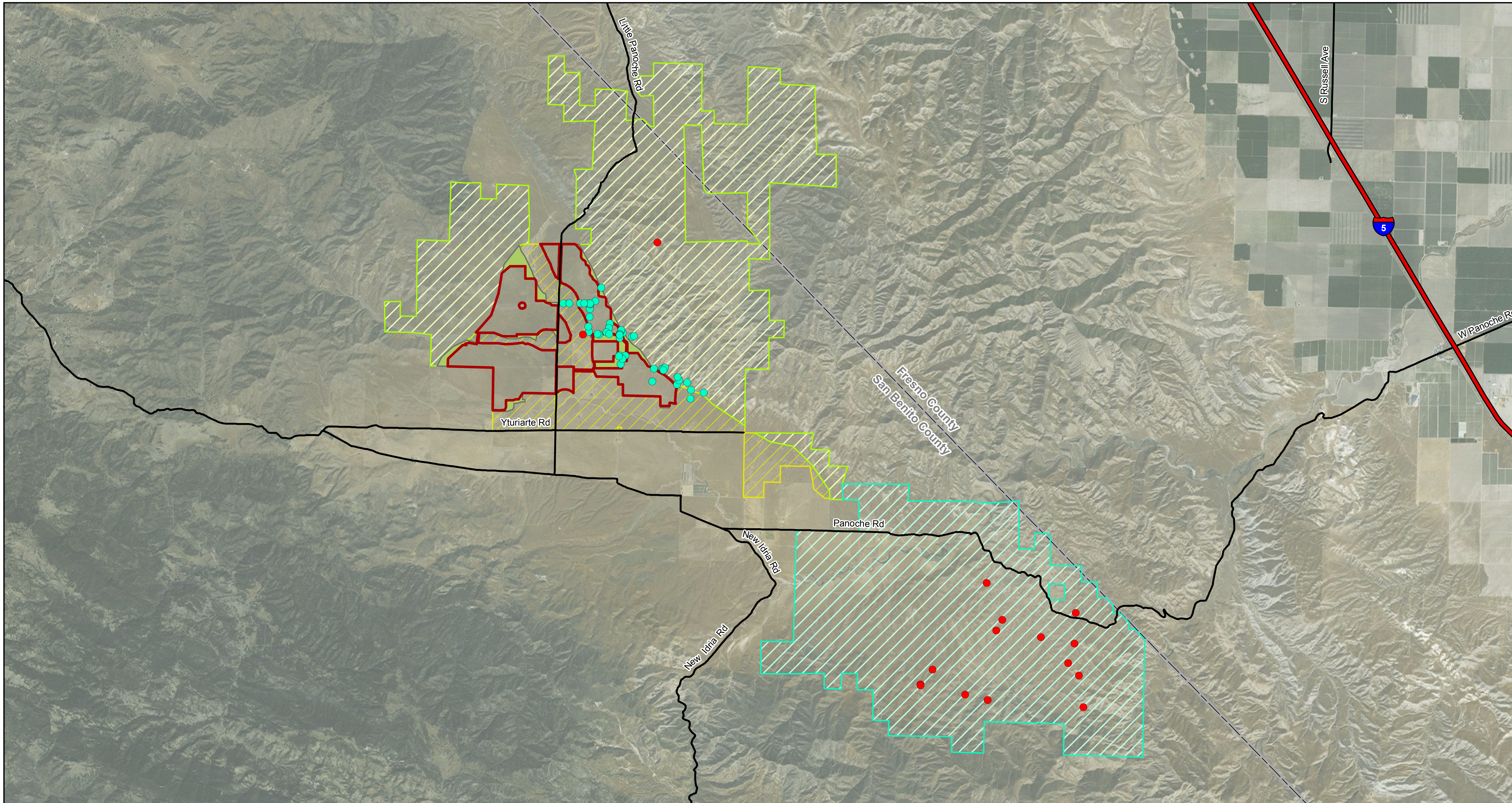
Project Location: San Benito County, California

N

0 0.5 1 1.5 Miles

FIGURE 3

Prepared by: J. Hobbs | Date: 2015-12-01



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Legend

- Project Footprint
- On-site Conservation Lands
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- Observation Location (Feb-Apr)
- Observation Location (Jun-Sep)

Panoche Valley Solar Project

2013 San Joaquin Antelope Squirrel Observations

Project Location: San Benito County, California

N

0 0.5 1 1.5 Miles

FIGURE 4

Prepared by: J. Hobbs

Date: 2015-12-01

Spill Prevention Plan

PANOCHE VALLEY

SOLAR PROJECT

Panoche Valley Solar LLC

Panoche Valley Solar Facility
San Benito County

August 28, 2015

Spill Prevention Plan

prepared for

Panoche Valley Solar LLC
Panoche Valley Solar Facility
San Benito, California

August 28, 2015

prepared by

AMEC Foster Wheeler PLC

Document Number: R-PLN-000-004
Revision: 0 – Issued for Use

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1.0 INTRODUCTION

The purpose of the Spill Prevention Control Plan is to identify preventive measures and minimize spills or accidental releases of hazardous materials, address proper handling of hazardous wastes that may be generated during construction, and review the appropriate response to emergency situations that may arise in association with hazardous materials. All hazardous materials spills will be cleaned up immediately, in accordance with this Plan.

2.0 HAZADOUS MATERIAL RELEASE PREVENTION

As provided by Section 25501(o) of the California HSC, hazardous materials include any material that poses a significant present or potential hazard to human health, safety, or the environment because of its quantity, concentration, or physical or chemical characteristics. Materials and waste may be considered hazardous if they exhibit hazardous characteristics (i.e., toxicity, ignitability, corrosivity, or reactivity), which may include petroleum products, lubricants, and extremely hazardous substances.

Hazardous Material Storage Areas (HMSAs) will be staged in a manner to prevent releases, explosions, or other chemical reactions. Designated HMSAs on the Project will be properly signed, secured, and will follow all storage restrictions, container management rules, and reporting as required by local, state, and federal requirements. Materials stored at or above the local, state, and or federal thresholds will be subject to a Hazardous Materials Business Plan (HMBP) and a Spill Prevention Control and Countermeasure (SPCC) Plan per 40 Code of Federal Regulations (CFR) 112; CCR Title 19, Sections 2620-2732, CCR Title 24, Part 9, Section 80.115; and California HSC, Division 20, Chapter 6.95.

During construction, hazardous materials will be used as common work practice. Typical materials used during construction include petroleum-based products, such as diesel, gasoline, lubricating oils, transformer oil, grease, and universal wastes. Accidental releases may occur as a result of mishandled materials, improper storage practices, leaking vehicles and equipment, or equipment failures. PVS and its contractors will implement the following measures to prevent and minimize release of hazardous materials:

- Storage, handling, and transportation of flammable and combustible liquids, including gasoline, diesel fuel, and gas cylinders will be performed in accordance with rules developed under state and federal regulations Title 8 CCR Section 1740 and 29 CFR 1910.106, respectively. These regulations include use of a licensed hazardous material transporter, fire protection requirements, storage quantity limitations, and spacing and location requirements.
- Containers of hazardous materials will remain closed unless adding or removing material.
- Hazardous materials will be stored in a secured location to prevent the risk of damage, vandalism, or theft. A secured location shall mean and area that is gated, locked, guarded or otherwise under the control of Project personnel.

- Incompatible materials will be stored in segregated areas. Materials that are incompatible will not be placed in the same container or in an unwashed container that previously held such material.
- Personnel responsible for managing hazardous materials will be trained in proper handling, storage, and transportation requirements, as well as appropriate emergency response procedures.
- Equipment containing petroleum or other hazardous substances will be inspected on a regular basis for leaks or signs of deterioration that could cause a leak or release.
- Hazardous materials will be stored in Department of Transportation (DOT)-approved containers or other compatible containers. When appropriate, hazardous materials will be stored in designated hazardous material storage areas and managed in accordance with this Plan.
- Storage locations of portable pumps, stationary equipment, and requirements for secondary containment will be coordinated on site with the Qualified Storm Water Practitioner (QSP) for the Project to protect water resources. Secondary containment will be used for storage tanks containing 55-gallons or more of oil.
- Only compatible containers designated for storing hazardous materials will be used. If a container is found to be damaged or leaking, the damaged container will be transferred to an overpack drum or the contents will be transferred to a container that is in good condition, and the damaged container will be disposed of properly. The overpack drum will also be clearly labeled with the type of material and hazard classification.
- Containers will be clearly labeled with the content and hazard classification.
- Containers will be maintained in good condition, with no leaks, ruptures, bulges, etc.
- Project personnel will adhere to manufacturer's recommendations on use, storage, and disposal of chemical products used during construction activities.
- Measures to prevent overfilling of fuel storage containers will be implemented. This may include use of a fuel gauge, fuel level alarms, or other devices as appropriate.
- Spill kits containing absorbent material and other spill response equipment sufficient to contain anticipated release scenarios will be clearly marked and readily accessible near designated hazardous material and waste storage areas, as well as jack-and-bore locations.
- Reasonable spill prevention measures, such as the use of spill-safe fuel cans and drip pans will be implemented, as appropriate, when transferring or using hazardous materials.
- All construction equipment and vehicles will be maintained in accordance with the manufacturer's recommendations to help prevent fluid leaks.
- Equipment repairs and refueling will be performed in a manner to prevent impact to waterbodies or groundwater (e.g., performing operations outside of resources when feasible, not leaving fueling activities unattended unless a pump shut-off valve is utilized, and utilizing drip pans).

In addition, the HMBP and SPCC Plans will be implemented during construction to address safe handling of hazardous materials.

3.0 HAZARDOUS RELEASE RESPONSE

Although all efforts will be taken to prevent an inadvertent release of hazardous materials during construction of the Project, if a release does occur, effective and prompt response will be implemented to help reduce the potential for exposure of hazardous materials to human health and the environment. In the event of a release or discovery of contaminated material, the following procedures will be implemented:

- Once discovery of a release has been made, the observer will contact the designated field representative and the site Site Safety Manager (SSM).
- The appropriate Project personnel, along with the field representative or SSM will work together to determine proper containment, cleanup, storage, and disposal of the release as described in the Containment and Cleanup Procedures of this Plan.
- The field representative or SSM will contact the Owner Environmental Compliance Lead as needed to notify them of the release.
- If a release is reportable, notification will be made to the County and other agencies as required by law, and described in the HMBP.

It is the responsibility of the Owner or Operator (i.e., PVS) to make agency notifications if a reportable release occurs.

Containment and Cleanup Procedures

Containment of a hazardous material release will be performed by authorized Project personnel trained in spill response procedures. Cleanup personnel must wear the appropriate personal protective equipment (PPE) and be familiar with the waste storage procedures. Containment procedures that may be implemented during construction include, but are not limited to, the following:

- If the release is relatively small, absorbent pads and material will be applied to the surface of the release to absorb all of the liquid.
- Incidental releases of hazardous materials that can be absorbed, neutralized, or otherwise controlled safely at the time of release by employees in the immediate release area, will be immediately cleaned.
- Discharge into storm drains or other storm water conveyance systems will be prevented by obstructing those features that are located in the area of the release with plastic, booms, and/or earthen dikes.
- Releases will be secured and covered with plastic sheeting to protect the contamination from spreading during rainfall.
- The risk of a large release could occur during transformer filling and fueling operations. Fuel trucks containing transmission oil or diesel fuel typically contain a volume of approximately 10,000 gallons. If a large release of a

petroleum-based product occurs, earthen ditches or dikes will be constructed around the release site to prevent the discharge from flowing off site or into waterways, and Project personnel will determine if a licensed emergency spill response contractor should be utilized. The licensed emergency spill response contractor that will be utilized in the event of a large release will be identified before to the start of construction.

- If it is determined that the release cannot be safely contained by Project personnel, the field representative, or SSM will determine if work should cease in the area, if emergency assistance is necessary, and if containment procedures can be implemented safely. If it is decided that emergency assistance is necessary, the field representative or SSM will contact 911.
- Appropriate signage will be placed around spill to prevent individuals and vehicles from entering larger release areas until the field representative or SSM is able to assess the situation for safety.

Once the release of hazardous material has been contained, cleanup personnel will clean the contaminated area by implementing the following measures:

- Appropriate absorbent materials will be used to thoroughly clean the spill area to the extent possible.
- Spills will not be diluted with water or other liquids for purposes of mitigating the spill. If the use of water or other liquids is necessary for final cleaning or dust control, the water or other liquids will be collected and disposed of in accordance with all local, state, and federal regulations.
- All contaminated material, including rocks, mulch, soil, and cleanup material, will be removed, stored, and disposed of as a hazardous waste in accordance with all local, state, and federal regulations.

STORMWATER POLLUTION PREVENTION PLAN

For

PANOCHE VALLEY SOLAR PROJECT

C-RPT-000-001

RISK LEVEL ***1***

Legally Responsible Person (LRP):

Panoche Valley Solar LLC
100 Summit Lake Drive
Suite 410
Valhalla, NY 10595
Mark Noyes, President
(914) 419-6701

Project Address:

721 Little Panoche Road
Paicines, CA 95043
San Benito County, CA

SWPPP Prepared by:

amec

1979 Lakeside Parkway
Suite 400
San Diego, CA. 92123
Mr. Lester Crigler, PE, QSD

SWPPP Preparation Date

September 16, 2015

Estimated Project Dates:

Start of Construction:	Completion of Construction:
Oct 2015	Jan 2017

Table of Contents

Qualified SWPPP Developer

Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name:	*Panoche Valley Solar*
Project Number/ID	*AMEC Project # 176055*

"This Stormwater Pollution Prevention Plan and Attachments were prepared under my direction to meet the requirements of the California Construction General Permit (SWRCB Orders No. 2009-009-DWQ as amended by Order 2010-0014-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

QSD Signature	*Date*
Lester E. Crigler	23580
QSD Name	*QSD Certificate Number*
Amec Foster Wheeler Sr. Civil Engineering Specialist	770-688-2602
Title and Affiliation	*Telephone Number*
Gene.crigler@amecfw.com	
Email	

Legally Responsible Person

Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name: Panoche Valley Solar

Project Number/ID AMEC Project# 176055

"I certify under penalty of law that this document and all Attachments were prepared under my direction or supervision in accordance with a system designed to assure 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."

Mark Noyes

Legally Responsible Person

Signature of Legally Responsible Person or Approved Signatory	Date
Mark Noyes	(914) 419-6701
Name of Legally Responsible Person or Approved Signatory	Telephone Number

Amendment Log

Project Name: Panoche Valley Solar

Project Number/ID AMEC Project #176055

Amendment No.	**Date**	**Brief Description of Amendment, include section and page number**	**Prepared and Approved By**
			Name: QSD#
			Name: QSD#
			Name: QSD#
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Section 1 SWPPP Requirements

1.1 INTRODUCTION

The Panoche Valley Solar project comprises approximately 6,291 acres and is located at Panoche Valley in San Benito County, California. The property is owned by Panoche Valley Solar LLC and is being developed by Panoche Valley Solar LLC. The project location is shown on the Site Maps in Appendix B.

This Stormwater Pollution Prevention Plan (SWPPP) is designed to comply with California's General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002) issued by the State Water Resources Control Board (State Water Board). This SWPPP has been prepared following the SWPPP Template provided on the California Stormwater Quality Association Stormwater *Best Management Practice Handbook Portal: Construction* (CASQA, 2010). In accordance with the General Permit, Section XIV, this SWPPP is designed to address the following:

- Pollutants and their sources, including sources of sediment associated with construction, construction site erosion and other activities associated with construction activity are controlled;
- Where not otherwise required to be under a Regional Water Quality Control Board (Regional Water Board) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated;
- Site 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 Best Available Technology/Best Control Technology (BAT/BCT) standard;
- Calculations and design details as well as BMP controls are complete and correct, Appendix A.
- Provide stabilization BMPs and post construction BMPs which are detailed in Section 3.2.

1.2 PERMIT REGISTRATION DOCUMENTS

Required Permit Registration Documents (PRDs) will be submitted to the State Water Board via the Stormwater Multi Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP), or authorized personnel (i.e., Approved Signatory) under the direction of the LRP. The project-specific PRDs include:

1. Notice of Intent (NOI);
2. Risk Assessment (Construction Site Sediment and Receiving Water Risk Determination);
3. Site Map;
4. Annual Fee;
5. Signed Certification Statement (LRP Certification is provided electronically with SMARTS PRD submittal); and
6. SWPPP.
7. Post-construction water balance calculator.

Site Maps can be found in Appendix B. A copy of the submitted PRDs will also be kept in Appendix C along with the Waste Discharge Identification (WDID) confirmation.

1.3 SWPPP AVAILABILITY AND IMPLEMENTATION

The discharger will make the SWPPP available at the construction site during working hours (see Section 7.5 for working hours) while construction is occurring and will 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 map/drawing will be left with the field crew and the original SWPPP will be made available via a request by radio/telephone. (CGP Section XIV.C)

The SWPPP will be implemented concurrently with the start of ground disturbing activities.

1.4 SWPPP AMENDMENTS

The SWPPP will be revised when:

- If there is a General Permit violation.
- When there is a reduction or increase in total disturbed acreage (General Permit Section II Part C).
- BMPs do not meet the objectives of reducing or eliminating pollutants in stormwater discharges.

Additionally, the SWPPP will be amended when:

- 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);
- When there is a change in the project duration that changes the project's risk level; or
- When deemed necessary by the QSD. The QSD has determined that the changes listed in Table 1.1 can be field determined by the QSP. All other changes will be made by the QSD as formal amendments to the SWPPP.

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; and
- The new BMP proposed.

Amendment will be logged at the front of the SWPPP and certification kept in Appendix D. The SWPPP text will be revised replaced, and/or hand annotated as necessary to properly convey the amendment. SWPPP amendments must be made by a QSD. The following changes have been designated by the QSD as "to be field determined" and constitute minor changes that the QSP may implement based on field conditions.

Table 1.1 List of Changes to be Field Determined

Candidate changes for field location or determination by QSP[1]	**Check changes that can be field located or field determined by QSP**
Increase quantity of an Erosion or Sediment Control Measure	✓
Relocate/Add stockpiles or stored materials	✓
Relocate or add toilets	✓
Relocate vehicle storage and/or fueling locations	✓
Relocate areas for waste storage	✓
Relocate water storage and/or water transfer location	✓
Changes to access points (entrance/exits)	✓
Change type of Erosion or Sediment Control Measure	
Changes to location of erosion or sediment control	✓
Minor changes to schedule or phases	✓
Changes in construction materials	✓
(1) Any field changes not identified for field location or field determination by QSP must be approved by QSD	

1.5 RETENTION OF RECORDS

Paper or electronic records of documents required by this SWPPP will be retained for a minimum of three years from the date generated or date submitted, whichever is later, for the following items:

- Notice of Intent (NOI)
- Risk Assessment (Construction Site Sediment and Receiving Water Risk Determination)
- Site Map and Other Drawings Related to SWPPP
- Annual Fee Receipts
- Signed Certification Statement
- SWPPP
- Records of all visual monitoring inspections.
- Annual Reports

These records will be available at the Site until construction is complete. Records assisting in the determination of compliance with the General Permit will be made available within a reasonable time, to the Regional Water Board, State Water Board or U.S. Environmental Protection Agency (EPA) upon request. Requests by the Regional Water Board for retention of records for a period longer than three years will be adhered to.

1.6 REQUIRED NON-COMPLIANCE REPORTING

If a discharge violation occurs the QSP will immediately notify the LRP and the LRP will file a violation report electronically to the Regional Water Board within 30 days of identification of non-compliance using SMARTS. Corrective measures will be implemented immediately following the discharge or written notice of non-compliance from the Regional Water Board. Discharges and corrective actions will be documented on the NAL/NEL Exceedance Site Evaluation Report Form in CSMP Attachment 3 "Example Forms."

The report to the LRP and to the Regional Water Board will contain the following items:

- The date, time, location, nature of operation and type of unauthorized discharge.
- The cause or nature of the notice or order.
- The control measures (BMPs) deployed before the discharge event, or prior to receiving notice or order.

The date of deployment and type of control measures (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.

1.7 ANNUAL REPORT

The General Permit requires that permittees prepare, certify, and electronically submit an Annual Report no later than September 1st of each year. Reporting requirements are identified in Section XVI of the General Permit. Annual reports will be filed in SMARTS and in accordance with information required by the on-line forms. Annual reports will include

1.8 CHANGES TO PERMIT COVERAGE

The General Permit allows for the reduction or increase of the total acreage covered under the General Permit when: a portion of the project is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the project is purchased by a different entity; or when new acreage is added to the project.

Modified PRDs will be filed electronically within 30 days of a reduction or increase in total disturbed area if a change in permit covered acreage is to be sought. The SWPPP will be modified appropriately, will be logged at the front of the SWPPP and certification of SWPPP amendments are to be kept in Appendix D. Updated PRDs submitted electronically via SMARTS can be found in Appendix E.

1.9 NOTICE OF TERMINATION

A Notice of Termination (NOT) must be submitted electronically by the LRP via SMARTS to terminate coverage under the General Permit. The NOT must include a final Site Map and representative photographs of the project site that demonstrate final stabilization has been achieved. The NOT will be submitted within 90 days of meeting all General Permit requirements for termination and final stabilization. The Regional Water Board will consider a construction site complete when the conditions of the General Permit, Section II.D have been met. Final stabilization BMPs as shown in Table 3.1 and detailed in Section 3.4.

Section 2 Project Information

2.1 PROJECT AND SITE DESCRIPTION

2.1.1 Site Description

The Panoche Valley Solar project site area comprises approximately 6,291 acres and is located at Panoche Valley, in San Benito County, California. Approximately 2,524 acres of the overall site will be developed into a Photovoltaic Power Plant. Conservation areas consisting of approximately 3,767 acres is also included in the overall site. The project site is located approximately 20 miles West of Interstate-5 (Exit 379), along Little Panoche Road. The project site is located near the convergence of Las Aquilas Creek and Panoche Creek. The project is located at Latitude 36º37’01”N and Longitude 120º52’36” W and is identified on the Site Map in Appendix B.

2.1.2 Existing Conditions

As of the initial date of this SWPPP, the project site is undeveloped and is currently an active pasture for livestock. Historic sources of contamination potential include Fecal coliform from the existing livestock onsite, but other than that potential, there are no known historic sources of contamination at the site.

2.1.3 Existing Drainage

The project site is relatively level at the bottom of the valley with slopes encircling the valley. The elevation of the project site ranges from 1250 to 1480 feet above mean sea level (msl). Surface drainage at the site currently flows to Panoche Valley from all directions, towards Las Aquilas Creek and Panoche Creek. Stormwater is conveyed through surface runoff. Stormwater discharges from the site are considered direct discharges, as defined by the State Water Board into Las Aquilas and Panoche Creeks upstream of Griswold Creek. Existing site topography, drainage patterns, and stormwater conveyance systems are shown on the Pre-Development Hydrology Plan, Drawing No. D-000-C-0201.

The project discharges to Las Aquilas and Panoche Creek upstream of Griswold Creek which are not listed for water quality impairment on the most recent 303(d)-list.

2.1.4 Geology and Groundwater

The site is underlain by shallow alluvium underlain by Quaternary non-marine terrace deposits and Plio-Pleistocene non-marine sediments. Groundwater occurs beneath the site at approximately 30-100 feet below ground surface. The groundwater gradient is northwest to southeast.

2.1.5 Project Description

Project grading will occur on approximately 500 acres of the project, which comprises approximately 7.95 percent of the total area. The limits of grading are shown on the Grading, Drainage and Sediment/Erosion Control Plans, Drawing No. D-000-C-0011 through D-000-C-0026 in Appendix B. Grading will include both cut and fill activities, with the total graded material estimated to be 330,000 cubic yards. Approximately 15,000 cubic yards of select fill material will be imported during trenching activities. Graded materials are expected to be balanced onsite. Soil will be stockpiled as indicated on the drawings shown in Appendix B. Construction activities will not be phased.

2.1.6 Developed Condition

Post construction surface drainage will be directed to the existing creeks as surface flow through stormwater conveyance systems and sheet flow. The overall project site will then discharge through Panoche Creek.

Post construction drainage patterns and conveyance systems are presented on Grading, Drainage and Sediment/Erosion Control Plans, Drawing No. D-000-C-0011 through D-000-C-0026 in Appendix B. The details are also discussed in section 3.4 of this SWPPP.

Table 2.1 Construction Site Estimates

Construction site area (Construction Limits)	2,524	acres
Percent impervious before construction	0.29	%
Runoff Curve Number before construction	74.6	
Percent impervious after construction	2.47	%
Runoff Curve Number after construction	75.1	

2.2 PERMITS AND GOVERNING DOCUMENTS

In addition to the General Permit, the following documents have been taken into account while preparing this SWPPP

- Regional Water Board requirements
- Contract Documents
- Air Quality Regulations and Permits
- Federal Endangered Species Act
- National Historic Preservation Act/Requirements of the State Historic Preservation Office
- State of California Endangered Species Act
- Clean Water Act Section 401 Water Quality Certifications and 404 Permits
- CA Department of Fish and Game 1600 Streambed Alteration Agreement

2.3 STORMWATER RUN-ON FROM OFFSITE AREAS

Run-on to the site is generated by point source discharges from upgradient swales, undeveloped land uses, and upgradient non-point source stormwater runoff.

The stormwater runoff drainage area contributing to offsite run-on is estimated to be approximately 34,835 acres. The anticipated runoff curve numbers range from 60 to 89. See Appendix A for all hydraulic calculations for the entire drainage basin.

The General Permit requires that temporary BMPs be implemented to direct offsite run-on away from disturbed areas through the use of runoff controls. Due to the size of the site, the size of the upstream drainage areas, and the existing topography it is not practical to divert the run-on from offsite around the disturbed areas. Therefore the run-on will be included in the discharge from the site and shall collectively be in compliance with the effluent limitations in the General Permit. The off-site drainage areas and associated stormwater conveyance facilities or BMPs are shown on Post-Development Hydrology Plan, Drawing No. D-000-C-0202 in Appendix B.

2.4 FINDINGS OF THE CONSTRUCTION SITE SEDIMENT AND RECEIVING WATER RISK DETERMINATION

A construction site risk assessment has been performed for the project and the resultant risk level is Risk Level 1.

The risk level was determined through the use of the Sediment Risk Factor Worksheet. The risk level is based on project duration, location, proximity to impaired receiving waters and soil conditions. A copy of the Risk Level determination is included in Appendix C.

Table 2.2 and Table 2.3 summarize the sediment and receiving water risk factors and document the sources of information used to derive the factors.

Table 2.2 Summary of Sediment Risk

RUSLE Factor	Value	Method for establishing value	
R	33.77	Site Location (California Isoerodent R Value Map) Included in Appendix C	
K	0.43	Site Location (Google Earth KMZ file)	
LS	1.02	Site Location (Google Earth KMZ file)	
Total Predicted Sediment Loss (tons/acre)			**14.938716**
Overall Sediment Risk Low Sediment Risk < 15 tons/ acre Medium Sediment Risk >= 15 and < 75 tons/acre High Sediment Risk >= 75 tons/acre			☒ **Low** ☐ **Medium** ☐ **High**

Runoff from the project site discharges via sheet flow that are intercepted by moderately defined channels that discharge into Las Aquilas Creek and Panoche Creek then eventually into Panoche Creek upstream of Griswold Creek.

Table 2.3 Summary of Receiving Water Risk

Receiving Water Name	303(d) Listed for Sediment Related Pollutant[1]	TMDL for Sediment Related Pollutant[1]	Beneficial Uses of COLD, SPAWN, and MIGRATORY[1]
Panoche Creek (Upstream of Griswold Creek)	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Overall Receiving Water Risk			☒ **Low** ☐ **High**
(1) If yes is selected for any option the Receiving Water Risk is High			

Risk Level 1 sites are subject to the narrative effluent limitations specified in the General Permit. The narrative effluent limitations require stormwater discharges associated with construction activity to minimize or prevent pollutants in stormwater and authorized non-stormwater through the use of controls, structures, and best management practices. This SWPPP has been prepared to address Risk Level 1 requirements (General Permit Attachment C).

2.5 CONSTRUCTION SCHEDULE

The site sediment risk was determined based on construction taking place between October 2015 and December 2016. Modification or extension of the schedule (start and end dates) may affect risk determination and permit requirements. The LRP will contact the QSD if the schedule changes during construction to address potential impact to the SWPPP. The estimated schedule for planned work can be found in Appendix F. General schedule is as follows:

- October 2015 – March 2016 Sitework / Grading
- October 2015 – July 2016 Substation Construction
- December 2015 – December 2016 System Install
- November 2015 – June 2016 Security Fence Install
- October 2015 – February 2017 Site Stabilization

2.6 POTENTIAL CONSTRUCTION ACTIVITY AND POLLUTANT SOURCES

Appendix G includes a list of construction activities and associated materials that are anticipated to be used onsite. These activities and associated materials will or could potentially contribute pollutants, other than sediment, to stormwater runoff.

The anticipated activities and associated pollutants were used in Section 3 to select the Best Management Practices for the project. Location of anticipated pollutants and associated BMPs are shown on the Site Map in Appendix B.

For sampling requirements for non-visible pollutants associated with construction activity please refer to Section 7.7.1. For a full and complete list of onsite pollutants, refer to the Material Safety Data Sheets (MSDS), which are retained onsite at the construction trailer.

2.7 IDENTIFICATION OF NON-STORMWATER DISCHARGES

Non-stormwater discharges consist of discharges which do not originate from precipitation events. The General Permit provides allowances for specified non-stormwater discharges that do not cause erosion or carry other pollutants.

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the General Permit and listed in the SWPPP, or authorized under a separate NPDES permit, are prohibited.

Non-stormwater discharges that are authorized from this project site include the following:

- None

Activities at this site that may result in unauthorized non-stormwater discharges include:

- Runoff from dust control applications of water or dust palliatives.

- Vehicle and equipment cleaning, fueling and maintenance operations.
- Sanitary and septic wastes.
- Chemical leaks and/or spills of any kind including but not limited to petroleum, paints, curing compounds, etc.

Steps will be taken, including the implementation of appropriate BMPs, to ensure that unauthorized discharges are eliminated, controlled, disposed, or treated on-site.

Discharges of construction materials and wastes, such as fuel or paint, resulting from dumping, spills, or direct contact with rainwater or stormwater runoff, are also prohibited.

2.8 REQUIRED SITE MAP INFORMATION

The construction project's Site Map(s) showing the project location, surface water boundaries, geographic features, construction site perimeter and general topography and other requirements identified in Attachment B of the General Permit is located in Appendix B. Table 2.6 identifies Map or Sheet Nos. where required elements are illustrated.

Table 2.6 Required Map Information

Included on Map/Plan Sheet No. (1)	Required Element
D-000-C-0001	The project's surrounding area (vicinity)
C-0101	Overall Site layout
C-0101	Construction site boundaries
C-0201 & C-0202	Drainage areas
C-0011 – C-0026	Discharge locations
C-0011 – C-0026	Sampling locations
C-0011 – C-0026	Areas of soil disturbance (temporary or permanent)
C-0011 – C-0026	Active areas of soil disturbance (cut or fill)
C-0011 – C-0026	Locations of runoff BMPs
C-0011 – C-0026	Locations of erosion control BMPs
C-0011 – C-0026	Locations of sediment control BMPs
N/A	ATS location (if applicable)
C-0011 – C-0026	Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
C-0205 & 4107348	Locations of all post construction BMPs (Detention basins)
N/A	Waste storage areas
C-0011 – C-0026	Material storage areas
C-0011 – C-0026	Entrance and Exits
C-0011 – C-0026	Fueling Locations
	Loading / Unloading Areas
	Water Transfer Areas

Notes: (1) Indicate maps or drawings that information is included on (e.g., Vicinity Map, Site Map, Drainage Plans, Grading Plans, Progress Maps, etc.)

Section 3 Best Management Practices

3.1 SCHEDULE FOR BMP IMPLEMENTATION

Table 3.1 BMP Implementation Schedule

	BMP	Implementation	Duration
Erosion Control	EC-1, Scheduling	Prior to Construction	Entirety of Project
	EC-2, Preservation of Existing Vegetation	Start of Construction	Entirety of Project
	EC-4, Hydroseeding	Completion of Roads/Utilities	Final Landscaping
	EC-5 Soil Binders	Start of Construction	Entirety of Project
	EC-7 Geotextile and Mats	Completion of Grading	Entirety of Project
	EC-9 Earth Dikes and Drainage Swales	Start of Construction	Permanent
	EC-10 Velocity Dissipation Devices	Start of Construction	Permanent
	EC-11 Slope Drains	Start of Construction	Permanent
	EC-15, Soil Preparation / Roughening	Start of Construction	During Grading
Sediment Control	SE-1 Silt Fence	Prior to Disturbance	Entirety of Project
	SE-4 Check Dams	Prior to Disturbance	Entirety of Project
	SE-5 Fiber Rolls	Prior to Disturbance	Entirety of Project
	SE-7 Street Sweeping	Start of Construction	Entirety of Project
Tracking Control	TC-1, Stabilized Construction Entrance/Exit	Prior to Disturbance	Entirety of Project
	TC-2, Stabilized Construction Roadway	Start of Construction	Permanent
Wind Erosion	WE-1, Wind Erosion Control	Start of Construction	Entirety of Project

3.2 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls are required by the General Permit to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the Site. Applicable BMPs are identified in this section for erosion control, sediment control, tracking control, and wind erosion control. Sufficient quantities of temporary sediment control materials will be maintained on-site throughout the duration of the project. Allowing for implementation of temporary sediment controls in the event of predicted rain and for rapid response do to failures or emergencies, in conformance with other General Permit requirements and as described in this SWPPP.

3.2.1 Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protect the soil surface by covering and/or binding soil particles.

This construction project will implement the following practices to provide effective temporary and final erosion control during construction:

1. Preserve existing vegetation where required and when feasible.
2. The area of soil disturbing operations will be controlled such that the Contractor is able to implement erosion control BMPs quickly and effectively.
3. Stabilize non-active areas within 14 days of cessation of construction activities or sooner if stipulated by local requirements.
4. Control erosion in concentrated flow paths by applying erosion control blankets, check dams, erosion control seeding or alternate methods.
5. Prior to the completion of construction, apply permanent erosion control to remaining disturbed soil areas.

Sufficient erosion control materials will be maintained onsite to allow implementation in conformance with this SWPPP.

The following temporary erosion control BMP selection table indicates the BMPs that will be implemented to control erosion on the construction site. Fact Sheets for temporary erosion control BMPs are provided in Appendix H.

Table 3.2 Temporary Erosion Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement (1)	BMP Used		If not used, state reason
			YES	NO	
EC-1	Scheduling	✓	x		
EC-2	Preservation of Existing Vegetation	✓	x		
EC-3	Hydraulic Mulch	✓(2)		x	Using EC-4 and EC-7 instead.
EC-4	Hydroseed	✓(2)	x		
EC-5	Soil Binders	✓(2)	x		
EC-6	Straw Mulch	✓(2)		x	Using EC-4 and EC-7 instead.
EC-7	Geotextiles and Mats	✓(2)	x		
EC-8	Wood Mulching	✓(2)		x	Using EC-4 and EC-7 instead.
EC-9	Earth Dike and Drainage Swales	✓(3)	x		
EC-10	Velocity Dissipation Devices		x		
EC-11	Slope Drains		x		
EC-12	Stream Bank Stabilization			x	No stream bank disturbance
EC-14	Compost Blankets	✓(2)		x	Using EC-4 and EC-7 instead.
EC-15	Soil Preparation-Roughening		x		
EC-16	Non-Vegetated Stabilization	✓(2)		x	Using EC-4 and EC-7 instead.
WE-1	Wind Erosion Control	✓	x		
Alternate BMPs Used:					**If used, state reason:**

(1) Applicability to a specific project will be determined by the QSD.
(2) The QSD will ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the Risk Level requirements.
(3) Run-on from offsite will be directed away from all disturbed areas, diversion of offsite flows may require design/analysis by a licensed civil engineer and/or additional environmental permitting

These temporary erosion control BMPs will be implemented in conformance with the following guidelines and as outlined in the BMP Factsheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Scheduling (EC-1)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H.

Preservation of Existing Vegetation (EC-2)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. All existing vegetation within the 100’ buffers along each side of the jurisdictional washes will be preserved as well as the vegetation located in areas not planned to be disturbed.

Hydroseed (EC-4)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. The entire disturbed area of the site, except for roads and equipment, is to be hydroseeded.

Soil Binders (EC-5)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. The entire disturbed area of the site, except for roads and equipment, will need to be treated to prevent erosion until permanent vegetation is established.

Geotextiles and Mats (EC-7)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. To be used in any cut or fill areas greater than 6’ high or steeper than 3:1. Also may be used in any areas where new erosion may occur that requires additional measures or until permanent vegetation is established. Also used on channel side slopes.

Earth Dikes and Drainage Swales (EC-9)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Will be used primarily along the perimeter to divert off-site run-on to low water crossings, slope drains, and sediment/detention basins.

Velocity Dissipation Devices (EC-10)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Used at outlet of any pipes, culverts, cross drains and low water crossing. See drawings for specific locations, dimensions and stone sizes.

Slope Drains (EC-11)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. To be used to divert water down high or steep slopes to prevent erosion and divert runoff to drainage swales. See drawings for specific locations and dimensions.

Soil Preparation-Roughening (EC-15)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. On this project Soil Preparation-Roughening is primarily intended to be used on disturbed/fill areas and as a part of the hydroseeding preparations.

Wind Erosion Control (WE-1)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H and Dust Control Plan C-RPT-000-0003.

3.2.2 Sediment Controls

Sediment controls are temporary or permanent structural measures that are intended to complement 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 following sediment control BMP selection table indicates the BMPs that will be implemented to control/prevent spills and leaks on the construction site. Fact Sheets for temporary sediment control BMPs are provided in Appendix H.

Table 3.3 Temporary Sediment Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement(1)	BMP used		If not used, state reason
			YES	NO	
SE-1	Silt Fence	✓(2) (3)	x		
SE-2	Sediment Basin			x	Perimeter controls to be used
SE-3	Sediment Trap			x	Perimeter controls to be used
SE-4	Check Dams		x		
SE-5	Fiber Rolls	✓(2)(3)	x		
SE-6	Gravel Bag Berm	✓(3)		x	Use SE-1 instead
SE-7	Street Sweeping	✓	x		
SE-8	Sandbag Barrier			x	Use SE-4 instead
SE-9	Straw Bale Barrier			x	Use SE-1 instead
SE-10	Storm Drain Inlet Protection	✓ RL2&3		x	Use SE-1 instead
SE-11	ATS			x	Project is Risk Level 1
SE-12	Temporary Silt Dike			x	Use SE-1 instead
SE-13	Compost Sock and Berm	✓(3)		x	Use SE-1 instead
SE-14	Biofilter Bags	✓(3)		x	No dewatering needed
TC-1	Stabilized Construction Entrance and Exit	✓	x		
TC-2	Stabilized Construction Roadway		x		
TC-3	Entrance Outlet Tire Wash			x	TC-1 and TC-2 will control tracking
Alternate BMPs Used:					**If used, state reason:**

(1) Applicability to a specific project will be determined by the QSD

(2) The QSD will ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the Risk Level requirements

These temporary sediment control BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Silt Fence (SE-1)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Refer to the Erosion and Sediment Control Plans and Details for locations and additional details.

Check Dams (SE-4)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Check Dams will be used downstream of construction site at Las Aquilas Creek.

Fiber Rolls (SE-5)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Refer to the Erosion and Sediment Control Plans and Details for locations and additional details.

Street Sweeping (SE-7)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Street Sweeping will be used on Little Panoche Road as necessary.

Stabilized Construction Entrance and Exit (TC-1)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Stabilized Construction Entrance and Exits are to be constructed at each access point to the site. See the Grading, Drainage and Sediment/Erosion Control Plans for locations.

Stabilized Construction Roadway (TC-2)

Refer to Erosion and Sediment Control BMP Fact Sheets in Appendix H. Location of the proposed construction road is shown on the Erosion and Sediment Control Plans, and is also referred to as the Perimeter Access Road. Road construction section is also shown on details sheets

3.3 NON-STORMWATER CONTROLS AND WASTE AND MATERIALS MANAGEMENT

3.3.1 Non-Stormwater Controls

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the General Permit, are prohibited. Non-stormwater discharges for which a separate NPDES permit is required by the local Regional Water Board are prohibited unless coverage under the separate NPDES permit has been obtained for the discharge. The selection of non-stormwater BMPs is based on the list of construction activities with a potential for non-stormwater discharges identified in Section 2.7 of this SWPPP.

The following non-stormwater control BMP selection table indicates the BMPs that will be implemented to control sediment on the construction site. Fact Sheets for temporary non-stormwater control BMPs are provided in Appendix H.

Table 3.4 Temporary Non-Stormwater BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement(1)	BMP used		If not used, state reason
			YES	NO	
NS-1	Water Conservation Practices	✓	x		
NS-2	Dewatering Operation			x	Groundwater below any excavation depths
NS-3	Paving and Grinding Operation		x		
NS-4	Temporary Stream Crossing			x	Only permanent clear spans
NS-5	Clear Water Diversion			x	No need for diversion
NS-6	Illicit Connection- Illegal Discharge Connection	✓	x		
NS-7	Potable Water Irrigation Discharge Detection			x	No irrigation system planned
NS-8	Vehicle and Equipment Cleaning	✓	x		
NS-9	Vehicle and Equipment Fueling	✓	x		
NS-10	Vehicle and Equipment Maintenance	✓	x		
NS-11	Pile Driving Operation		x		
NS-12	Concrete Curing		x		
NS-13	Concrete Finishing		x		
NS-14	Material and Equipment Use Over Water			x	No work over water
NS-15	Demolition Removal Adjacent to Water			x	On disturbance adjacent to waters
NS-16	Temporary Batch Plants			x	All material will be delivered to site ready for use
Alternate BMPs Used:			**If used, state reason:**		
(1) Applicability to a specific project will be determined by the QSD					

Non-stormwater BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Water Conservation Practices (NS-1)
Refer to Non-Stormwater BMP Fact Sheets in Appendix H

Paving and Grinding Operation (NS-3)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H

Illicit Connection- Illegal Discharge Connection (NS-6)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H

Vehicle and Equipment Cleaning (NS-8)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H

Vehicle and Equipment Fueling (NS-9)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H

Vehicle and Equipment Maintenance (NS-10)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H

Pile Driving Operation (NS-11)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H**.** Pile driving for posts will be limited to very small areas at any given time, and local measures will be employed to prevent spills and contamination.

Concrete Curing (NS-12)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H

Concrete Finishing (NS-13)

Refer to Non-Stormwater BMP Fact Sheets in Appendix H

3.3.2 Materials Management and Waste Management

Materials management control practices consist of implementing procedural and structural BMPs for handling, storing and using construction materials to prevent the release of those materials into stormwater discharges. The amount and type of construction materials to be utilized at the Site will depend upon the type of construction and the length of the construction period. The materials may be used continuously, such as fuel for vehicles and equipment, or the materials may be used for a discrete period, such as soil binders for temporary stabilization.

Waste management consist of implementing procedural and structural BMPs for handling, storing and ensuring proper disposal of wastes to prevent the release of those wastes into stormwater discharges. Waste management should be conducted in accordance with the Project's Construction Waste Management Plan

Materials and waste management pollution control BMPs will be implemented to minimize stormwater contact with construction materials, wastes and service areas; and to prevent materials and wastes from being discharged off-site. The primary mechanisms for stormwater contact that will be addressed include:

- Direct contact with precipitation
- Contact with stormwater run-on and runoff
- Wind dispersion of loose materials
- Direct discharge to the storm drain system through spills or dumping

- Extended contact with some materials and wastes, such as asphalt cold mix and treated wood products, which can leach pollutants into stormwater.

A list of construction activities is provided in Section 2.6. The following Materials and Waste Management BMP selection table indicates the BMPs that will be implemented to handle materials and control construction site wastes associated with these construction activities. Fact Sheets for Materials and Waste Management BMPs are provided in Appendix H.

All waste containers will be covered at the end of each work day and when raining.

Table 3.5 Temporary Materials Management BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement[1]	BMP used		If not used, state reason
			YES	NO	
WM-01	Material Delivery and Storage	✓	x		
WM-02	Material Use	✓	x		
WM-03	Stockpile Management	✓	x		
WM-04	Spill Prevention and Control	✓	x		
WM-05	Solid Waste Management	✓	x		
WM-06	Hazardous Waste Management	✓	x		
WM-07	Contaminated Soil Management			x	No pre-construction soil contamination on site
WM-08	Concrete Waste Management	✓	x		
WM-09	Sanitary-Septic Waste Management	✓	x		
WM-10	Liquid Waste Management			x	No creation of non-hazardous liquid waste on site.
Alternate BMPs Used:				**If used, state reason:**	
[1] Applicability to a specific project will be determined by the QSD.					

Material management BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Material Delivery and Storage (WM-01)

Refer to Material and Waste Management BMP Fact Sheets in Appendix H

Material Use (WM-02)

Refer to Material and Waste Management BMP Fact Sheets in Appendix H

Stockpile Management (WM-03)

Refer to Material and Waste Management BMP Fact Sheets in Appendix H

Spill Prevention and Control (WM-04)

Refer to Material and Waste Management BMP Fact Sheets in Appendix H

Solid Waste Management (WM-05)

Refer to Material and Waste Management BMP Fact Sheets and Trash Management Plan (Spec No. R-PLN-000-002) in Appendix H. **All waste containers will be covered at the end of each work day and when raining.**

Hazardous Waste Management (WM-06)

Refer to Material and Waste Management BMP Fact Sheets in Appendix H

Concrete Waste Management (WM-08)

Refer to Material and Waste Management BMP Fact Sheets in Appendix H**. Location of any concrete washouts to be approved by the QSP.**

Sanitary-Septic Waste Management (WM-09)

Refer to Material and Waste Management BMP Fact Sheets in Appendix H

3.4 POST CONSTRUCTION STORMWATER MANAGEMENT MEASURES

Post construction BMPs are permanent measures installed during construction, designed to reduce or eliminate pollutant discharges from the site after construction is completed.

This site is located in an area subject to a Phase I or Phase II Municipal Separate Storm Sewer System (MS4) permit approved Stormwater Management Plan. ☐ Yes ☒ No

Post construction runoff reduction will be achieved by permanent measures. These measured are detailed in the Grading and Drainage Plans in Appendix B.

The following source control post construction BMPs to comply with General Permit Section XIII.B and local requirements have been identified for the site:

- Retention Basins (PG&E)
- Stream Buffer
- Pervious Pavements
- Soil Quality
- Detention Pond

A plan for the post construction funding and maintenance of these BMPs has been developed to address at minimum five years following construction. The post construction BMPs that are described above will be funded and maintained by the LRP. If required, post construction funding and maintenance will be submitted with the NOT.

Section 4 BMP Inspection, and Maintenance

4.1 BMP INSPECTION AND MAINTENANCE

The General Permit requires routine weekly inspections of BMPs, along with inspections before, during, and after qualifying rain events. A BMP inspection checklist will be filled out for inspections and maintained on-site with the SWPPP. The inspection checklist includes the necessary information covered in Section 7.6. A blank inspection checklist can be found in Appendix I. Completed checklists will be kept in CSMP Attachment 2 “Monitoring Records.

BMPs will be maintained regularly to ensure proper and effective functionality. If necessary, corrective actions will be implemented within 72 hours of identified deficiencies and associated amendments to the SWPPP will be prepared by the QSD.

Specific details for maintenance, inspection, and repair of Construction Site BMPs can be found in the BMP Factsheets in Appendix H.

4.2 RAIN EVENT ACTION PLANS

Rain Event Action Plans (REAPs) are not required for Risk Level 1 projects.

Section 5 Training

Appendix L identifies the QSPs for the project. To promote stormwater management awareness specific for this project, periodic training of job-site personnel will be included as part of routine project meetings (e.g. daily/weekly tailgate safety meetings), or task specific trainings as needed.

The QSP will be responsible for providing this information at the meetings, and subsequently completing the training logs shown in Appendix K, which identifies the site-specific stormwater topics covered as well as the names of site personnel who attended the meeting. Tasks may be delegated to trained employees by the QSP provided adequate supervision and oversight is provided. Training will correspond to the specific task delegated including: SWPPP implementation; BMP inspection and maintenance; and record keeping.

Documentation of training activities (formal and informal) is retained in SWPPP Appendix K.

Section 6 Responsible Parties and Operators

6.1 RESPONSIBLE PARTIES

Approved Signatories who are responsible for SWPPP implementation and have authority to sign permit-related documents are listed below. Written authorizations from the LRP for these individuals are provided in Appendix L. The Approved Signatories assigned to this project is:

Name	Title	Phone Number
Mark Noyes	President	(914) 419-6701

QSPs identified for the project are identified in Appendix L. The QSP will have primary responsibility and significant authority for the implementation, maintenance and inspection/monitoring of SWPPP requirements. The QSP will be available at all times throughout the duration of the project. Duties of the QSP include but are not limited to:

- Implementing all elements of the General Permit and SWPPP, including but not limited to:
  - Ensuring all BMPs are implemented, inspected, and properly maintained;
  - Performing non-stormwater and stormwater visual observations and inspections;
  - Performing non-stormwater and storm sampling and analysis, as required;
  - Performing routine inspections and observations;
  - Implementing non-stormwater management, and materials and waste management activities such as: monitoring discharges; 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.;
- The QSP may delegate these inspections and activities to an appropriately trained employee, but will ensure adequacy and adequate deployment.
- Ensuring elimination of unauthorized discharges.
- The QSPs will be assigned authority by the LRP to mobilize crews in order to make immediate repairs to the control measures.
- Coordinate with the Contractor(s) 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.
- Notifying the LRP or Authorized Signatory immediately of off-site discharges or other non-compliance events.

6.2 CONTRACTOR LIST

For list of all contractors and subcontractors who will be directed by the QSP, see Appendix M.

Section 7 Construction Site Monitoring Program

7.1 PURPOSE

This Construction Site Monitoring Program was developed to address the following objectives:

1. To demonstrate that the site is in compliance with the Discharge Prohibitions of the Construction General Permit;
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 Best Management Practices (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 are effective in preventing or reducing pollutants in stormwater discharges and authorized non-stormwater discharges.

7.2 APPLICABILITY OF PERMIT REQUIREMENTS

This project has been determined to be a Risk Level 1 project. The General Permit identifies the following types of monitoring as being applicable for a Risk Level 1 project.

Risk Level 1

- Visual inspections of Best Management Practices (BMPs);
- Visual monitoring of the site related to qualifying storm events;
- Visual monitoring of the site for non-stormwater discharges;
- Sampling and analysis of construction site runoff for non-visible pollutants when applicable; and
- Sampling and analysis of construction site runoff as required by the Regional Water Board when applicable.

7.3. WEATHER AND RAIN EVENT TRACKING

Visual monitoring and inspections requirements of the General Permit are triggered by a qualifying rain event. The General Permit defines a qualifying rain event as any event that produces ½ inch of precipitation. A minimum of 48 hours of dry weather will be used to distinguish between separate qualifying storm events.

7.3.1 Weather Tracking

The QSP should daily consult the National Oceanographic and Atmospheric Administration (NOAA) for the weather forecasts. These forecasts can be obtained at http://www.srh.noaa.gov/. Weather reports should be printed and maintained with the SWPPP in CSMP Attachment 1 "Weather Reports".

7.3.2 Rain Gauges

The QSP will install one (1) rain gauge in the vicinity of the temporary construction trailers on the project site. Locate the gauge in an open area away from obstructions such as trees or overhangs. Mount the gauge on a post at a height of 3 to 5 feet with the gauge extending several inches beyond the post. Make sure that the top of the gauge is level. Make sure the post is not in an area where rainwater can indirectly splash from sheds, equipment, trailers, etc.

The rain gauge(s) will be read daily during normal site scheduled hours. The rain gauge should be read at approximately the same time every day and the date and time of each reading recorded. Log rain gauge readings in CSMP Attachment 1 “Weather Records”. Follow the rain gauge instructions to obtain accurate measurements.

Once the rain gauge reading has been recorded, accumulated rain will be emptied and the gauge reset.

For comparison with the site rain gauge, the nearest appropriate governmental rain gauge is Pinnacles RAWS, located at Lat. 36.4708, Long. -121.1472, approximately 19 miles SW of the project site. Data from this rain gauge can found on the NWS website at http://www.cnrfc.noaa.gov/county_precipMaps.php?group=sanbenito&hour=24.

7.4 MONITORING LOCATIONS

Monitoring locations are shown on the Site Maps in Appendix B. Monitoring locations are described in the Sections 7.6 and 7.7.

Whenever changes in the construction site might affect the appropriateness of sampling locations, the sampling locations will be revised accordingly. All such revisions will be implemented as soon as feasible and the SWPPP amended. Temporary changes that result in a one-time additional sampling location do not require a SWPPP amendment.

7.5 SAFETY AND MONITORING EXEMPTIONS

Safety practices for sample collection will be in accordance with the AMEC Health and Safety Plan.

A summary of the safety requirements that apply to sampling personnel is provided below.

- Appropriate personal protection equipment

This project is not required to collect samples or conduct visual observations (inspections) under the following conditions:

- During dangerous weather conditions such as flooding and electrical storms.
- Outside of scheduled site business hours.

Scheduled site business hours are: Monday – Friday 7:00 AM to 6:00 PM

If monitoring (visual monitoring or sample collection) of the site is unsafe because of the dangerous conditions noted above then the QSP will document the conditions for why an exception to performing the monitoring was necessary. The exemption documentation will be filed in CSMP Attachment 2 “Monitoring Records”.

7.6 VISUAL MONITORING

Visual monitoring includes observations and inspections. Inspections of BMPs are required to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Visual observations of the site are required to observe storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources.

Table 7.1 identifies the required frequency of visual observations and inspections. Inspections and observations will be conducted at the locations identified in Section 7.6.3.

Table 7.1 Summary of Visual Monitoring and Inspections

Type of Inspection	Frequency
Routine Inspections	
BMP Inspections	Weekly[1]
BMP Inspections – Tracking Control	Daily
Non-Stormwater Discharge Observations	Quarterly during daylight hours
Rain Event Triggered Inspections	
Site Inspections Prior to a Qualifying Event	Within 48 hours of a qualifying event [2]
BMP Inspections During an Extended Storm Event	Every 24-hour period of a rain event[2]
Site Inspections Following a Qualifying Event	Within 48 hours of a qualifying event[2]

[1] Most BMPs must be inspected weekly; those identified below must be inspected more frequently.

[2] Inspections are only required during scheduled site operating hours. Note however, these inspections are required daily regardless of the amount of precipitation.

7.6.1 *Routine Observations and Inspections*

Routine site inspections and visual monitoring are necessary to ensure that the project is in compliance with the requirements of the Construction General Permit.

7.6.1.1 Routine BMP Inspections

Inspections of BMPs are conducted to identify and record:

- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; or
- BMPs that could fail to operate as intended.
- Need for any additional BMPs.

7.6.1.2 Non-Stormwater Discharge Observations

Each drainage area will be inspected for the presence of or indications of prior unauthorized and authorized non-stormwater discharges. Inspections will record:

- Presence or evidence of any non-stormwater discharge (authorized or unauthorized);
- Pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.); and
- Source of discharge.

7.6.2 *Rain-Event Triggered Observations and Inspections*

Visual observations of the site and inspections of BMPs are required prior to a qualifying rain event; following a qualifying rain event, and every 24-hour period during a qualifying rain event. Pre-rain inspections will be conducted after consulting NOAA and determining that a precipitation event with a 50% or greater probability of precipitation has been predicted.

7.6.2.1 Visual Observations Prior to a Forecasted Qualifying Rain Event

Within 48-hours prior to a qualifying event a stormwater visual monitoring site inspection will include observations of the following locations:

- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;
- BMPs to identify if they have been properly implemented;
- Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- BMP inspections and visual monitoring will be triggered by a NOAA quantitative predicted forecast (QPF) that indicates ½-inch or more of rain will occur in the project area.

7.6.2.2 BMP Inspections During an Extended Storm Event

During an extended rain event, BMP inspections will be conducted to identify and record:

- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; or
- BMPs that could fail to operate as intended.

If the construction site is not accessible during the rain event, the visual inspections will be performed at all relevant outfalls, discharge points, downstream locations. The inspections should record any projected maintenance activities.

7.6.2.2 Visual Observations Following a Qualifying Rain Event

Within 48 hours following a qualifying rain event (0.5 inches of rain) a stormwater visual monitoring site inspection is required to observe:

- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;
- BMPs to identify if they have been properly designed, implemented, and effective;
- Need for additional BMPs;
- Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard; and
- Discharge of stored or contained rain water.

7.6.3 Visual Monitoring Procedures

Visual monitoring will be conducted by the QSP or staff trained by and under the supervision of the QSP.

The name(s) and contact number(s) of the site visual monitoring personnel are listed below and their training qualifications are provided in Appendix K.

Assigned inspector: (TBD) ______________________ Contact phone: _____________________

Alternate inspector: (TBD)______________________ Contact phone: _____________________

Stormwater observations will be documented on the *Visual Inspection Field Log Sheet* (see CSMP Attachment 3 “Example Forms”). BMP inspections will be documented on the site specific BMP inspection checklist. Any photographs used to document observations will be referenced on stormwater site inspection report and maintained with the Monitoring Records in Attachment 2.

The QSP will within 14 days of the inspection submit copies of the completed inspection report to Amec Foster Wheeler/Kamtech.

The completed reports will be kept in CSMP Attachment 2 “Monitoring Records”.

7.6.4 Visual Monitoring Follow-Up and Reporting

Correction of deficiencies identified by the observations or inspections, including required repairs or maintenance of BMPs, will be initiated and completed as soon as possible.

If identified deficiencies require design changes, including additional BMPs, the implementation of changes will be initiated within 72 hours of identification and be completed as soon as possible. When design changes to BMPs are required, the SWPPP will be amended to reflect the changes.

Deficiencies identified in site inspection reports and correction of deficiencies will be tracked on the *Inspection Field Log Sheet* or *BMP Inspection Report* and will be submitted to the QSP and will be kept in CSMP Attachment 2 “Monitoring Records”.

The QSP will within 14 days of the inspection submit copies of the completed *Inspection Field Log Sheet* or *BMP Inspection Report* with the corrective actions to Amec Foster Wheeler/Kamtech.

Results of visual monitoring will be summarized and reported in the Annual Report.

7.6.5 Visual Monitoring Locations

The inspections and observations identified in Sections 7.6.1 and 7.6.2 will be conducted at the locations identified in this section.

BMP locations are shown on the Site Maps in SWPPP Appendix B.

There are 3 drainage area(s) on the project site, the contractor’s yard, staging areas, and storage areas. Drainage area(s) are shown on the Post-Developed Hyrdology Plan, drawing D-000-C-0202 in Appendix B and Table 7.2 identifies each drainage area by location.

Table 7.2 Site Drainage Areas

Location	Description
SW of Site	Drainage Basin for Panoche Creek
W of Site	Drainage Basin for Los Aquilas Creek
N of Site	Drainage Basin for unnamed tributary for Panoche Creek located north of Yturiarte Road

There are two (2) stormwater storage or containment area(s) on the project site. Stormwater storage or containment area(s) are shown on drawings D-000-C-0205 and drawing 4107348 in Appendix B and Table 7.3 identifies each stormwater storage or containment area by location.

Table 7.3 Stormwater Storage and Containment Areas

Location No.	Location
POND #3	36.6281 N, 120.8770 W – SW portion of site
SWITCHYARD POND	36.6314 N, 120.8778 W – SW portion of site

There are two (2) discharge location(s) on the project site. Two (2) of these stormwater discharge location(s) are defined as those from the stormwater detention ponds, and are shown on the Site Maps in Appendix B and Table 7.4 identifies each stormwater discharge location. These are the locations of concentrated discharge, as the remainder of the site is primarily sheet flow.

Table 7.4 Site Stormwater Discharge Locations

Location No.	Location
A	LAT. 36.6557 N, LONG. 120.8776 W – AT POND #3
B	LAT. 36.6312 N, LONG. 120.8778 W – AT SWITCHYARD POND

7.7 WATER QUALITY SAMPLING AND ANALYSIS

7.7.1 Sampling and Analysis Plan for Non-Visible Pollutants in Stormwater Runoff Discharges

This Sampling and Analysis Plan for Non-Visible Pollutants describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in stormwater runoff discharges from the project site.

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.

The following construction materials, wastes, or activities, as identified in Section 2.6, are potential sources of non-visible pollutants to stormwater discharges from the project. Storage, use, and operational locations are shown on the Site Maps in Appendix B.

- Vehicle and Equipment Use
- Grading / Earthwork
- Asphalt Work
- Concrete / Masonry Work
- Landscaping

There are no known existing site features, as identified in Section 2.6, that are potential sources of non-visible pollutants to stormwater discharges from the project.

The following soil amendments have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil and will be used on the project site.

- Fertilizer

7.7.1.1 Sampling Schedule

Samples for the potential non-visible pollutant(s) and a sufficiently large unaffected background sample will be collected during the first two hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples will be collected during the site's scheduled hours and will be collected regardless of the time of year and phase of the construction.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during site inspections conducted prior to or during a rain event.

- 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) 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 drain system.
- A construction activity, including but not limited to those in Section 2.6, with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) BMPs were observed to be breached, malfunctioning, or improperly implemented, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- 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 or a storm drain system.
- 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 drain system.

7.7.1.2 Sampling Locations

Sampling locations are based on proximity to planned non-visible pollutant storage, occurrence or use; accessibility for sampling, and personnel safety. Planned non-visible pollutant sampling locations are shown on the Site Maps in Appendix B and include the locations identified in Table 7.5 through 7.10.

No sampling locations on the project site and the contractor's yard have been identified for the collection of samples of runoff from planned material and waste storage areas and areas where non-visible pollutant producing construction activities are planned. The QSP will determine where sampling for non-visible pollutants will take place depending on where such material may be temporarily stored on the site.

Table 7.6 Non-Visible Pollutant Sample Locations – Contractors' Yard

Sample Location Number (TBD)	**Sample Location Description (TBD)**	**Sample Location Latitude and Longitude** (Decimal Degrees)

Four (4) sampling locations have been identified for the collection of samples of runoff from drainage areas where soil amendments will be applied that have the potential to affect water quality.

Table 7.7 Non-Visible Pollutant Sample Locations – Soil Amendment Areas

Sample Location Number	**Sample Location**	**Sample Location Latitude and Longitude** (Decimal Degrees)
#1	South of NW perimeter road entrance and Little Panoche Road intersection.	36.6438 N 120.8767 W
#2	Los Aquilas Creek at Little Panoche Rd.	36.6360 N 120.8767 W
#3	Panoche Creek at Little Panoche Rd.	36.6220 N 120.8768 W
#4	Panoche Creek at Yturiarte Road	36.6172 N 120.8449 W

Three (3) sampling locations have 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(s) was selected such that the sample will not have come in contact with the operations, activities, or areas identified in Section 7.7.1 or with disturbed soils areas.

Table 7.9 Non-Visible Pollutant Sample Locations – Background (Unaffected Sample)

Sample Location Number	Sample Location	Sample Location Latitude and Longitude (Decimal Degrees)
BG-1	In NW area above site	36.6553 N 120.8845 W
BG-2	Upstream of perimeter road bridge over Los Aquilas Creek	36.6376 N 120.9014 W
BG-3	Upstream of perimeter road bridge over Panoche Creek	36.6172 N 120.8925 W

7.7.1.3 Monitoring Preparation

Non-visible pollutant samples will be collected by:

Contractor	☒ Yes	☐ No
Consultant	☐ Yes	☐ No
Laboratory	☐ Yes	☐ No

Samples on the project site will be collected by the following contractor sampling personnel:

Name/Telephone Number: TBD

Alternate(s)/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 come into contact with 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, but are not limited to, clean powder-free nitrile gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, and *Effluent Sampling Field Log Sheets* and Chain of Custody (CoC) forms, which are provided in CSMP Attachment 3 “Example Forms”.

7.7.1.4 Analytical Constituents

Table 7.11 lists the specific sources and types of potential non-visible pollutants on the project site and the water quality indicator constituent(s) for that pollutant.

Table 7.11 Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Vehicle and Equipment Use	Batteries	Sulfuric Acid; Pb, pH
Asphalt Work	Asphalt Concrete	VOCs
Concrete / Masonry Work	Sealant	SCOC
Concrete / Masonry Work	Curing Compounds	VOCs, SVOCs, pH
Landscaping	Fertilizers	TKN, NO3, BOD, COD, DOC, Sulfate, NH3, Phosphate, Potassium
Drywall		Cu, Al. General Minerals
Framing/Carpentry	Treated Wood	Cu, Cr, As, Zn
Framing/Carpentry	Particle Board	Formaldehyde
Framing/Carpentry	Untreated Wood	BOD
Heating, Ventilation, Air Cond.		Freon
Insulation		Al, Zn
Painting	Metallic Paint	COD, VOCs, SVOCs
Roofing		Cu, Pb, VOCs
Utility Line Testing & Flushing		Residual Chlorine, chloramines

7.7.1.5 Sample Collection

Samples of discharge will be collected at the designated non-visible pollutant sampling locations shown on the Site Maps in Appendix B or in the locations determined by observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and historical site usage areas that triggered the sampling event.

Grab samples will be collected and preserved in accordance with the generally accepted sampling procedures. Only the QSP, or personnel trained in water quality sampling under the direction of the QSP will collect samples.

Sample collection and handling requirements are described in Section 7.7.7.

7.7.1.6 Sample Analysis

Samples will be analyzed using the analytical methods identified in the Table 7.12.

Samples will be analyzed by:

Laboratory Name: (TBD by QSP)	______
Street Address:	______
City, State Zip:	______
Telephone Number:	______
Point of Contact:	______
ELAP Certification Number:	______

Samples will be delivered to the laboratory by:

Driven by Contractor	☐ Yes	☐ No
Picked up by Laboratory Courier	☐ Yes	☐ No
Shipped	☒ Yes	☐ No

7.7.1.7 Data Evaluation and Reporting

The QSP will complete an evaluation of the water quality sample analytical results.

Runoff/down gradient results will be compared with the associated upgradient/unaffected results and any associated run-on results. Should the runoff/down gradient sample show an increased level of the tested analyte relative to the unaffected background sample, which cannot be explained by run-on results, 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-visible pollutant concentrations. Any revisions to the BMPs will be recorded as an amendment to the SWPPP.

The General Permit prohibits the storm water discharges that contain hazardous substances equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4. The results of any non-stormwater discharge results that indicate the presence of a hazardous substance in excess of established reportable quantities will be immediately reported to the Regional Water Board and other agencies as required by 40 C.F.R. §§ 117.3 and 302.4.

Results of non-visible pollutant monitoring will be reported in the Annual Report.

7.7.2 Sampling and Analysis Plan for pH and Turbidity in Stormwater Runoff Discharges

Sampling and analysis of runoff for pH and turbidity is not required for Risk Level 1 projects.

7.7.3 Additional Monitoring Following an NEL Exceedance

This project is not subject to NELs.

7.7.4 Sampling and Analysis Plan for Non-Stormwater Discharges

This project is not subject to the non-stormwater sampling and analysis requirements of the General Permit because it is a Risk Level 1 project.

7.7.5 Sampling and Analysis Plan for Other Pollutants Required by the Regional Water Board

The Regional Water Board has not specified monitoring for additional pollutants.

7.7.6 Training of Sampling Personnel

Sampling personnel will be trained to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring program (SWAMP) 2008 Quality Assurance Program Plan (QAPrP). Training records of designated contractor sampling personnel are provided in Appendix K.

The stormwater sampler(s) and alternate(s) have received the following stormwater sampling training:

Name (TBD)	Training

The stormwater sampler(s) and alternates have the following stormwater sampling experience:

Name (TBD)	Experience

7.7.7 Sample Collection and Handling

7.7.7.1 Sample Collection

Samples will be collected at the designated sampling locations shown on the Site Maps and listed in the preceding sections. Samples will be collected, maintained and shipped in accordance with the SWAMP 2008 Quality Assurance Program Plan (QAPrP).

Grab samples will be collected and preserved in accordance with the methods identified in preceding sections.

To maintain sample integrity and prevent cross-contamination, sample collection personnel will follow the protocols below.

- Collect samples (for laboratory analysis) only in analytical laboratory-provided sample containers;
- Wear clean, powder-free nitrile gloves when collecting samples;
- Change gloves whenever something not known to be clean has been touched;
- Change gloves between sites;
- Decontaminate all equipment (e.g. bucket, tubing) prior to sample collection using a trisodium phosphate water wash, distilled water rinse, and final rinse with distilled water. (Dispose of wash and rinse water appropriately, i.e., do not discharge to storm drain or receiving water). Do not decontaminate laboratory provided sample containers;
- Do not smoke during sampling events;
- Never sample near a running vehicle;

- Do not park vehicles in the immediate sample collection area (even non-running vehicles);
- Do not eat or drink during sample collection; and
- Do not breathe, sneeze, or cough in the direction of an open sample container.

The most important aspect of grab sampling is to collect a sample that represents the entire runoff stream. Typically, samples are collected by dipping the collection container in the runoff flow paths and streams as noted below.

i. For small streams and flow paths, simply dip the bottle facing upstream until full.
ii. For larger stream that can be safely accessed, collect a sample in the middle of the flow stream by directly dipping the mouth of the bottle. Once again making sure that the opening of the bottle is facing upstream as to avoid any contamination by the sampler.
iii. For larger streams that cannot be safely waded, pole-samplers may be needed to safely access the representative flow.
iv. Avoid collecting samples from ponded, sluggish or stagnant water.
v. Avoid collecting samples directly downstream from a bridge as the samples can be affected by the bridge structure or runoff from the road surface.

Note, that depending upon the specific analytical test, some containers may contain preservatives. These containers should **never** be dipped into the stream, but filled indirectly from the collection container.

7.7.7.2 Sample Handling

Turbidity and pH measurements will be conducted immediately. Do not store turbidity or pH samples for later measurement.

Samples for laboratory analysis will be handled as follows. Immediately following sample collection:

- Cap sample containers;
- Complete sample container labels;
- Sealed containers in a re-sealable storage bag;
- Place sample containers into an ice-chilled cooler;
- Document sample information on the *Effluent Sampling Field Log Sheet*; and
- Complete the CoC.

All samples for laboratory analysis will be maintained between 0-6 degrees Celsius during delivery to the laboratory. Samples will be kept on ice, or refrigerated, from sample collection through delivery to the laboratory. Place samples to be shipped inside coolers with ice. Make sure the sample bottles are well packaged to prevent breakage and secure cooler lids with packaging tape.

Ship samples that will be laboratory analyzed to the analytical laboratory right away. Hold times are measured from the time the sample is collected to the time the sample is analyzed. The General Permit requires that samples be received by the analytical laboratory within 48 hours of the physical sampling (unless required sooner by the analytical laboratory).

Laboratory Name: (TBD)	____________________
Address:	____________________
City, State Zip:	____________________
Telephone Number:	____________________
Point of Contact:	____________________

7.7.7.3 Sample Documentation Procedures

All original data documented on sample bottle identification labels, *Effluent Sampling Field Log Sheet*, and CoCs 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. All corrections will be initialed and dated.

Duplicate samples will be identified consistent with the numbering system for other samples to prevent the laboratory from identifying duplicate samples. Duplicate samples will be identified in the Effluent Sampling Field Log Sheet.

Sample documentation procedures include the following:

<u>Sample Bottle Identification Labels:</u> Sampling personnel will attach an identification label to each sample bottle. Sample identification will uniquely identify each sample location.

<u>Field Log Sheets:</u> Sampling personnel will complete the *Effluent Sampling Field Log Sheet* and *Receiving Water Sampling Field Log Sheet* for each sampling event, as appropriate.

<u>Chain of Custody:</u> Sampling personnel will complete the CoC for each sampling event for which samples are collected for laboratory analysis. The sampler will sign the CoC when the sample(s) is turned over to the testing laboratory or courier.

7.8 ACTIVE TREATMENT SYSTEM MONITORING

An Active Treatment System (ATS) will be deployed on the site?

☐ Yes ☒ No

This project does not require a project specific Sampling and Analysis Plan for an ATS because deployment of an ATS is not planned.

7.9 BIOASSESSMENT MONITORING

This project is not subject to bioassessment monitoring because it is not a Risk Level 3 project.

7.10 WATERSHED MONITORING OPTION

This project is not participating in a watershed monitoring option.

7.11 QUALITY ASSURANCE AND QUALITY CONTROL

An effective Quality Assurance and Quality Control (QA/QC) plan will be implemented as part of the CSMP to ensure that analytical data can be used with confidence. QA/QC procedures to be initiated include the following:

- Field logs;
- Clean sampling techniques;
- CoCs;
- QA/QC Samples; and
- Data verification.

Each of these procedures is discussed in more detail in the following sections.

7.11.1 Field Logs

The purpose of field logs is to record sampling information and field observations during monitoring that may explain any uncharacteristic analytical results. Sampling information to be included in the field log include the date and time of water quality sample collection, sampling personnel, sample container identification numbers, and types of samples that were collected. Field observations should be noted in the field log for any abnormalities at the sampling location (color, odor, BMPs, etc.). A Visual Inspection Field Log, an Effluent Sampling Field Log Sheet, are included in CSMP Attachment 3 “Example Forms”.

7.11.2 Clean Sampling Techniques

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. As discussed in Section 7.7.7, adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

7.11.3 Chain of Custody

The sample CoC is an important documentation step that tracks samples from collection through analysis to ensure the validity of the sample. Sample CoC procedures include the following:

- Proper labeling of samples;
- Use of CoC forms for all samples; and
- Prompt sample delivery to the analytical laboratory.

Analytical laboratories usually provide CoC forms to be filled out for sample containers. An example CoC is included in CSMP Attachment 3 “Example Forms”.

7.11.4 QA/QC Samples

QA/QC samples provide an indication of the accuracy and precision of the sample collection; sample handling; field measurements; and analytical laboratory methods. The following types of QA/QC will be conducted for this project:

☒ Field Duplicates at a frequency of 1 duplicate minimum per sampling event
(Required for all sampling plans with field measurements or laboratory analysis)

☒ Travel Blanks at a frequency of 1 duplicate minimum per sampling event
(Required for sampling plans that include VOC laboratory analysis)

7.11.4.1 Field Duplicates

Field duplicates provide verification of laboratory or field analysis and sample collection. Duplicate samples will be collected, handled, and analyzed using the same protocols as primary samples. The sample location where field duplicates are collected will be randomly selected from the discharge locations. Duplicate samples will be collected immediately after the primary sample has been collected. Duplicate samples will be collected in the same manner and as close in time as possible to the original sample. Duplicate samples will not influence any evaluations or conclusion.

7.11.4.4 Travel Blanks

Travel blanks assess the potential for cross-contamination of volatile constituents between sample containers during shipment from the field to the laboratory. De-ioninzed water blanks are taken along for the trip and held unopened in the same cooler with the VOC samples.

7.11.5 Data Verification

After results are received from the analytical laboratory, the QSP will verify the data to ensure that it is complete, accurate, and the appropriate QA/QC requirements were met. Data will be verified as soon as the data reports are received. Data verification will include:

- Check the CoC and laboratory reports.
  Make sure all requested analyses were performed and all samples are accounted for in the reports.
- Check laboratory reports to make sure hold times were met and that the reporting levels meet or are lower than the reporting levels agreed to in the contract.
- Check data for outlier values and follow up with the laboratory.
  Occasionally typographical errors, unit reporting errors, or incomplete results are reported and should be easily detected. These errors need to be identified, clarified, and corrected quickly by the laboratory. The QSP should especially note data that is an order of magnitude or more different than similar locations, or is inconsistent with previous data from the same location.
- Check laboratory QA/QC results.
  EPA establishes QA/QC checks and acceptable criteria for laboratory analyses. These data are typically reported along with the sample results. The QSP will evaluate the reported QA/QC data to check for contamination (method, field, and equipment blanks), precision (laboratory matrix spike duplicates), and accuracy (matrix spikes and laboratory control samples). When QA/QC checks are outside acceptable ranges, the laboratory must flag the data, and usually provides an explanation of the potential impact to the sample results.
- Check the data set for outlier values and, accordingly, confirm results and re-analyze samples where appropriate.
  Sample re-analysis should only be undertaken when it appears that some part of the QA/QC resulted in a value out of the accepted range. Sample results may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met and confirms this in writing.

Field data including inspections and observations must be verified as soon as the field logs are received, typically at the end of the sampling event. Field data verification will include:

- Check field logs to make sure all required measurements were completed and appropriately documented;
- Check reported values that appear out of the typical range or inconsistent;
  Follow-up immediately to identify potential reporting or equipment problems, if appropriate, recalibrate equipment after sampling;
- Verify equipment calibrations;
- Review observations noted on the field logs; and
- Review notations of any errors and actions taken to correct the equipment or recording errors.

7.12 RECORDS RETENTION

All records of stormwater monitoring information and copies of reports (including Annual Reports) must be retained for a period of at least three years from date of submittal or longer if required by the Regional Water Board.

Results of visual monitoring, field measurements, and laboratory analyses must be kept in the SWPPP along with CoCs, and other documentation related to the monitoring.

Records are to be kept onsite while construction is ongoing. Records to be retained include:

- The date, place, and time of inspections, sampling, visual observations, and/or measurements, including precipitation;
- The individual(s) who performed the inspections, sampling, visual observation, and/or field measurements;
- The date and approximate time of field measurements and laboratory analyses;
- The individual(s) who performed the laboratory analyses;
- A summary of all analytical results, the method detection limits and reporting limits, and the analytical techniques or methods used;
- Rain gauge readings from site inspections;
- QA/QC records and results;
- Calibration records;
- Visual observation and sample collection exemption records;
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observations, or inspections

CSMP Attachment 1: Weather Reports

CSMP Attachment 2: Monitoring Records

CSMP Attachment 3: Example Forms

Rain Gauge Log Sheet				
Construction Site Name:				
WDID #:				
Date (mm/dd/yy)	Time (24-hr)	Initials	Rainfall Depth (Inches)	Notes:

Risk Level 1, 2, 3 ***Visual Inspection Field Log Sheet***						
Date and Time of Inspection:				Report Date:		
Inspection Type:	☐ Weekly	☐ Before predicted rain	☐ During rain event	☐ Following qualifying rain event	☐ Contained stormwater release	☐ Quarterly non-stormwater
Site Information						
Construction Site Name:						
Construction stage and completed activities:					Approximate area of exposed site:	
Weather and Observations						
Date Rain Predicted to Occur:				Predicted % chance of rain:		
Estimate storm beginning: ________ (date and time)		Estimate storm duration:________ (hours)		Estimate time since last storm: ________ (days or hours)	Rain gauge reading:________ (inches)	
Observations: If yes identify location						
Odors	Yes ☐ No ☐					
Floating material	Yes ☐ No ☐					
Suspended Material	Yes ☐ No ☐					
Sheen	Yes ☐ No ☐					
Discolorations	Yes ☐ No ☐					
Turbidity	Yes ☐ No ☐					
Site Inspections						
Outfalls or BMPs Evaluated			**Deficiencies Noted**			
(add additional sheets or attached detailed BMP Inspection Checklists)						
Photos Taken:	Yes ☐	No ☐	Photo Reference IDs:			
Corrective Actions Identified (note if SWPPP/REAP change is needed)						
Inspector Information						
Inspector Name:				Inspector Title:		
Signature:					Date:	

CHAIN-OF-CUSTODY **DATE:** **Lab ID:**

DESTINATION LAB:		REQUESTED ANALYSIS / Notes:
ATTN:		
ADDRESS:		
Office Phone:		
Cell Phone:		
SAMPLED BY:		
Contact:		
Project Name		

Client Sample ID	**Sample Date**	**Sample Time**	**Sample Matrix**	**Container #**	**Container Type**	**Container Pres.**					

SENDER COMMENTS:	**RELINQUISHED BY** Signature: Print: Company: Date: TIME:
LABORATORY COMMENTS:	**RECEIVED BY** Signature: Print: Company: Date: TIME:

CSMP Attachment 4: Field Meter Instructions

N/A – Not required

Section 8 References

Project Plans and Specifications - Construction drawings for Panoche Valley Solar, prepared by AMEC E & C Services, 1979 Lakeside Parkway, Suite 400, Tucker, GA 30084

State Water Resources Control Board (2009). Order 2009-0009-DWQ, NPDES General Permit No. CAS000002: National Pollutant Discharges Elimination System (NPDES) California General Permit for Storm Water Discharge Associated with Construction and Land Disturbing Activities. Available on-line at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml.

State Water Resources Control Board (2010). Order 2010-0014-DWQ, NPDES General Permit No. CAS000002: National Pollutant Discharges Elimination System (NPDES) California General Permit for Storm Water Discharge Associated with Construction and Land Disturbing Activities. Available on-line at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml.

CASQA 2009, *Stormwater BMP Handbook Portal: Construction*, November 2009, www.casqa.org

Appendix A: Calculations

APPENDIX D- CN CALCULATIONS

The SCS Curve Number Loss method was used in the hydrologic model. Determination of curve numbers are based on observation of aerial imagery, Figure 2-1: Vegetative Cover Map from California Dept of Forestry and Fire Protection, 2002 and hydrologic soil groups per APPENDIX B - NRCS Web Soils Survey Report. Composite curve numbers are then calculated for each sub-basin.

In summary, the applicable curve numbers used in this report are:

Cover Description	HSG	CN	Notes
Roads, Posts, Concrete Pads & Footings	N/A	98	Per NRCS TR-55
Pasture, grassland or range - Poor	A	68	Refer to Table 9.1 in this report
Pasture, grassland or range - Poor	B	79	
Pasture, grassland or range - Poor	C	86	
Pasture, grassland or range - Poor	D	89	
Mountain brush mixture – Fair	B	48	Refer to Table 9.2 in this report
Mountain brush mixture – Fair	C	57	
Mountain brush mixture - Fair	D	63	
Disturbed Pervious	A	74	Refer to Section D.1 in this report
Disturbed Pervious	B	83	
Disturbed Pervious	C	89	
Disturbed Pervious	D	92	
Pond	N/A	100	Per Caltrans Table 819.7E

D.1 Disturbed Pervious Areas

Disturbed Pervious areas are areas that will be disturbed by grading and construction activities but will remain pervious after construction. These areas are confined to the valley floor where the existing cover is characterized by pasture/grassland/range. Adjustments are made to the curve numbers to reflect compaction to the soils due to construction activities.
Using NRCS TR-55 equation, S = 1000/CN – 10, where S = potential maximum retention after runoff begins in inches and assuming S(disturbed) = 75% x S(undisturbed)

CN (undisturbed)	S (undisturbed)	S (disturbed)	**CN (disturbed)**
68	4.71	3.53	**74**
79	2.66	1.99	**83**
86	1.63	1.22	**89**
89	1.24	0.93	**92**

Table 9-1: NRCS TR-55 Runoff Curve Numbers For Other Agricultural Lands

Cover description: Cover type	Hydrologic condition	Curve numbers for hydrologic soil group: A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. 2/	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. 3/	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 4/	48	65	73
Woods—grass combination (orchard or tree farm). 5/	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. 6/	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 4/	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

Table 9-2: NRCS TR-55 Runoff Curve Numbers for Arid and Semiarid Rangelands

Cover description: Cover type	Hydrologic condition 2/	Curve numbers for hydrologic soil group: A 3/	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

D.2. Area Calculation for Posts and Fence Footings

The proposed impervious area (CN = 98) of the Panoche Valley Solar project site area is broken into five groups and an important note related to the panels;

- The posts that support the ground mount racking structures.
- The electrical equipment concrete spread foundation.
- The fence post footings.
- The impervious area required within the substation area.
- The internal gravel roads.

Posts:
The solar panels on the site are assembled on ground mount racking structures. Each ground mount structure, as designed by Arraytech, is supported by a minimum of 15-W6x8.5 and 1-W6x15 structural posts. Array Technologies is a company based out of Albuquerque, NM that specializes in design and construction of solar panel ground mount racking structures (for further information about ArrayTech see, http://arraytechinc.com/). Each post will be driven into the ground with a pile driver. Therefore, the amount of impervious contributed to the site from each individual post is equivalent to the posts cross sectional area (see attached photocopied page from AISC with highlighted geometric properties for both the W6x8.5 and W6x15).

The impervious area from each individual post is small so, to create an easy way to determine the area from the total number of posts in each basin AMEC Civil has created a ratio. The area of posts per the area of ground mounts racking structures. Basically we take the area of one ground mount racking structures and then determine the area of posts per one racking structure. Once we have that ratio we look at the total area of ground mount racking structures in each basin then multiple by the ratio to determine the total impervious area from the posts in each basin.

Preliminary Ratio of Posts Area(PA) to Racking Structure Area (RSA):
Post = 72 cm^2
Post = 72 cm^2 x 0.155 in^2 / 1 cm^2 x 1 ft^2 / 144 in^2
Post = 0.0775 ft^2
Post = 0.0775 ft^2 x 1 acre / 43560 ft^2
Post = 1.779×10^{-6} acre/post
Racking Structure = 815 ft^2 x 1 acre / 43560 ft^2
Racking Structure = 1.872×10^{-2} acre

PA/RSA = (1.779×10^{-6} acre/post x 5 posts) / 1.872×10^{-2} acre
PA/RSA = 4.751×10^{-8} acre/acre

Each onsite post developed area for the proprietary posts are detailed on the CN tables within this appendix.

Preliminary Electrical Equipment Concrete Spread Foundation:

The project site has approximately 113 electrical equipment concrete spread foundations placed at various locations throughout the site. Each electrical equipment concrete spread foundation is a rectangle with dimensions of 13 ft (width) by 30 ft (long).

> Area of Electrical Equipment Concrete Spread Foundation = 13 ft * 30 ft = 390 ft^2
> Area of Electrical Equipment Concrete Spread Foundation = 390 ft^2 x 1 acre / 43560 ft^2
> Area of Electrical Equipment Concrete Spread Foundation = 8.953×10^{-3} acre

By taking the total number of skids in each basin we determine the amount of impervious contributed to the basin by computing the collective area of the skids. See each basin's respective CN table for the contribution of the electrical equipment concrete spread foundation area to the total impervious area.

<u>Fence Post Footings:</u>
A proposed perimeter security fence is to be in accordance with pre developed project boundary lines as determined by client, CDFW, and San Benito planning. The perimeter security fence shall be built to specifications set forth by AMEC Civil. The portion of the perimeter security fence that impacts the sites hydrology is the footing dimensions for each fence post.

Footing Dimensions/Area: Diameter of Footing = 2 ft
Area of Footing = π*Diameter^2/4 = π*2 ft * 2 ft/4 = π $ft^2 \approx 3.14$ ft^2

<u>Substation Area:</u>
Approximately the entire area of the substation and switchyard areas will be considered impervious since the ground will either be covered by GAB, stone, or concrete foundations.

<u>Internal Gravel Roads:</u>
Internal gravel roads will be considered impervious since it will be surfaced by aggregate and compacted to 95% the maximum dry density as determined by the modified Proctor compaction test (SPMDD), ASTM D1557.

Table 9-3: Sub-Basin Composite CN

Sub-Basin:	**1.0**		
	CN	PRE Area (Acres)	POST Area (Acres)
Roads (Impervious)	98	3	46
Posts (Impervious)	98	0	0.075
Concrete Pads & Footings (Imp)	98	0	0.410
Pasture, grassland or range - HSG A	68	2,082	1,971
Pasture, grassland or range - HSG B	79	225	225
Pasture, grassland or range - HSG D	89	268	268
Disturbed (Pervious) – HSG A	74	0	60
Pond	100	0	2
Total area =		**2,578**	**2,578**
Composite CN =		**71.2**	**71.9**
		0.10% imp.	1.82% imp.

Sub-Basin:	**1.1**		
	CN	PRE Area (Acres)	POST Area (Acres)
Roads (Impervious)	98	1	1
Pasture, grassland or range - HSG A	68	187	187
Pasture, grassland or range - HSG B	79	0	0
Pasture, grassland or range - HSG D	89	62	62
Total area =		**249**	**249**
Composite CN =		**73.3**	**73.3**
		0.20% imp.	

Sub-Basin:	**1.2**		
	CN	PRE Area (Acres)	POST Area (Acres)
Pasture, grassland or range - HSG A	68	294	294
Pasture, grassland or range - HSG B	79	231	231
Pasture, grassland or range - HSG C	86	1,074	1,074
Pasture, grassland or range - HSG D	89	1,071	1,071
Mountain brush mixture (Fair) - HSG D	63	252	252
Total area =		**2,922**	**2,922**
Composite CN =		**82.7**	**82.7**

Sub-Basin:	**1.2a**		
	CN	PRE Area (Acres)	POST Area (Acres)
Pasture, grassland or range - HSG A	68	600	600
Pasture, grassland or range - HSG B	79	133	133
Pasture, grassland or range - HSG C	86	783	783
Pasture, grassland or range - HSG D	89	552	552
Total area =		**2,069**	**2,069**
Composite CN =		**81.1**	**81.1**

Sub-Basin:	1.2b		
	CN	PRE Area (Acres)	POST Area (Acres)
Mountain brush mixture (Fair) - HSG B	48	472	472
Mountain brush mixture (Fair) - HSG C	57	3,690	3,690
Mountain brush mixture (Fair) - HSG D	63	10,032	10,032
Total area =		**14,195**	**14,195**
Composite CN =		**60.9**	**60.9**

Sub-Basin:	1.2d		
	CN	PRE Area (Acres)	POST Area (Acres)
Pasture, grassland or range - HSG A	68	53	53
Pasture, grassland or range - HSG B	79	105	105
Pasture, grassland or range - HSG D	89	585	585
Mountain brush mixture (Fair) - HSG D	63	146	146
Total area =		**889**	**889**
Composite CN =		**82.3**	**82.3**

Sub-Basin:	1.2e		
	CN	PRE Area (Acres)	POST Area (Acres)
Pasture, grassland or range - HSG A	68	182	182
Pasture, grassland or range - HSG B	79	230	230
Pasture, grassland or range - HSG C	86	55	55
Mountain brush mixture (Fair) - HSG B	48	137	137
Mountain brush mixture (Fair) - HSG D	63	2,382	2,382
Total area =		**2,987**	**2,987**
Composite CN =		**64.3**	**64.3**

Sub-Basin:	1.2g		
	CN	PRE Area (Acres)	POST Area (Acres)
Pasture, grassland or range - HSG A	68	482	482
Pasture, grassland or range - HSG D	89	159	159
Mountain brush mixture (Fair) - HSG D	63	1,943	1,943
Total area =		**2,584**	**2,584**
Composite CN =		**65.5**	**65.5**

Sub-Basin:	1.2h		
	CN	PRE Area (Acres)	POST Area (Acres)
Pasture, grassland or range - HSG A	68	7	7
Pasture, grassland or range - HSG B	79	264	264
Pasture, grassland or range - HSG C	86	167	167
Pasture, grassland or range - HSG D	89	209	209
Mountain brush mixture (Fair) - HSG C	57	290	290
Mountain brush mixture (Fair) - HSG D	63	657	657
Total area =		**1,593**	**1,593**
Composite CN =		**70.4**	**70.4**

Appendix B: Site Maps

PANOCHE VALLEY SOLAR, LLC
PANOCHE VALLEY SOLAR PROJECT

CIVIL DRAWING INDEX

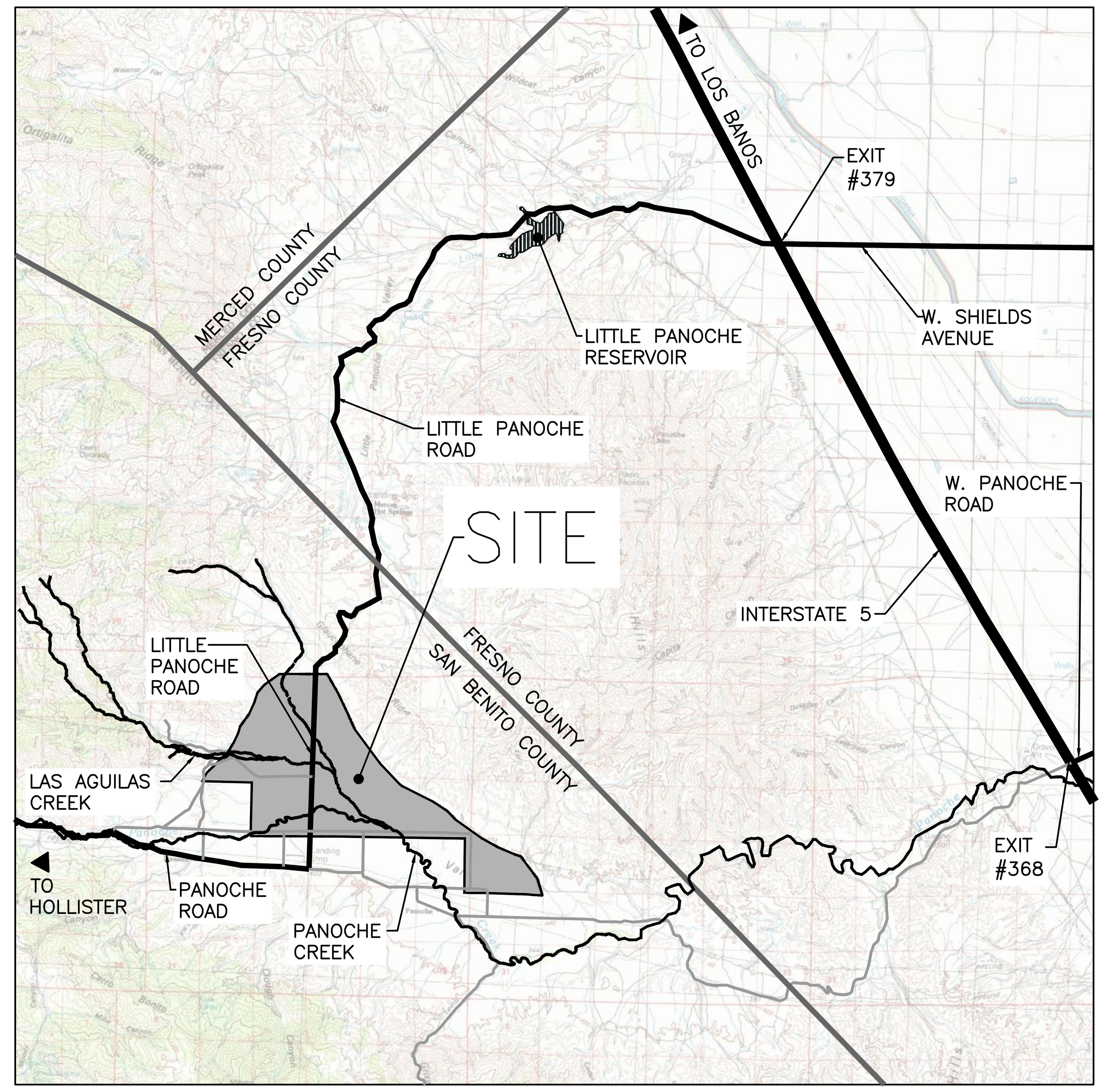
DWG #	DRAWING TITLE
D-000-C-0001	COVER SHEET AND LOCATION PLAN
D-000-C-0002	INDEX SHEET, GENERAL NOTES, AND LEGEND
D-000-C-0003	KEY PLAN
D-000-C-0011	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0012	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0013	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0014	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0015	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0016	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0017	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0018	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0019	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0020	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0021	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0022	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0023	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0024	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0025	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0026	GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN
D-000-C-0071	EROSION CONTROL NOTES & DETAILS
D-000-C-0072	EROSION CONTROL NOTES & DETAILS
D-000-C-0073	EROSION CONTROL NOTES & DETAILS
D-000-C-0074	EROSION CONTROL NOTES & DETAILS
D-000-C-0081	GENERAL DETAILS - PERIMETER FENCE
D-000-C-0082	GENERAL DETAILS - PERIMETER FENCE
D-000-C-0083	GENERAL DETAILS - PERIMETER FENCE POST LOCATIONS AT AC TRENCHES
D-000-C-0084	GENERAL DETAILS - SITE DETAILS
D-000-C-0085	GENERAL DETAILS - SITE DETAILS
D-000-C-0086	GENERAL DETAILS - MISC
D-000-C-0087	GENERAL DETAILS - MISC
D-000-C-0088	GENERAL DETAILS - MISC
D-000-C-0089	GENERAL DETAILS - MISC
D-000-C-0091	SUBSTATION AREA AND OPERATIONS BUILDING DETAIL
D-000-C-0096	CONSTRUCTION TRAILER AREA DETAIL
D-000-C-0097	CONSTRUCTION TRAILER AREA SEPTIC DETAILS
D-000-C-0098	CONSTRUCTION WATER POND DETAILS AND WELL LOCATIONS
D-000-C-0101	CIVIL - OVERALL SITE LAYOUT
D-000-C-0111	CIVIL -DEMOLITION PLAN
D-000-C-0121	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE GEOMETRY TABLE
D-000-C-0122	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0123	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0124	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0125	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0126	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0127	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0128	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0129	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0130	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0131	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0132	PERIMETER ROAD PLAN AND PROFILES - EAST SIDE
D-000-C-0133	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE GEOMETRY TABLE
D-000-C-0134	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0135	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0136	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0137	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0138	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0139	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0140	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0141	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0142	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0143	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0144	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE
D-000-C-0145	PERIMETER ROAD PLAN AND PROFILES - WEST SIDE (DELETED)
D-000-C-0146	NEW VASQUEZ CREEK ROAD PLAN

CIVIL DRAWING INDEX

DWG #	DRAWING TITLE
D-000-C-0151	PERIMETER ROAD DETAILS - OVERALL HYDRAULICS PLAN
D-000-C-0152	PERIMETER ROAD DETAILS - OPEN CHANNEL DETAILS
D-000-C-0154	PERIMETER ROAD DETAILS - CROSSING 12
D-000-C-0155	PERIMETER ROAD DETAILS - CROSSING 14
D-000-C-0156	PERIMETER ROAD DETAILS - CROSSING 16
D-000-C-0157	PERIMETER ROAD DETAILS - CROSSING 17
D-000-C-0158	PERIMETER ROAD DETAILS - CROSSING 19
D-000-C-0159	PERIMETER ROAD DETAILS - CROSSING 21
D-000-C-0160	PERIMETER ROAD DETAILS - CROSSING 22 AND 23
D-000-C-0171	PERIMETER ROAD DETAILS - LOW WATER CROSSING DETAILS
D-000-C-0172	PERIMETER ROAD DETAILS - CROSSING 7
D-000-C-0173	PERIMETER ROAD DETAILS - CROSSING 10.1
D-000-C-0174	PERIMETER ROAD DETAILS - CROSSING 13
D-000-C-0175	PERIMETER ROAD DETAILS - CROSSING 14.1
D-000-C-0176	PERIMETER ROAD DETAILS - CROSSING 16.1
D-000-C-0177	PERIMETER ROAD DETAILS - CROSSING 19.1
D-000-C-0178	PERIMETER ROAD DETAILS - CROSSING 20
D-000-C-0179	PERIMETER ROAD DETAILS - CROSSING 20.1
D-000-C-0180	PERIMETER ROAD DETAILS - CROSSING 23.1
D-000-C-0182	PERIMETER ROAD DETAILS - CROSSING 25
D-000-C-0183	PERIMETER ROAD DETAILS - CROSSING 25.1
D-000-C-0184	PERIMETER ROAD DETAILS - CROSSING 25.2 & 25.3
D-000-C-0185	PERIMETER ROAD DETAILS - CROSSING 3 & 30
D-000-C-0186	PERIMETER ROAD DETAILS - CROSSING 5.1
D-000-C-0187	PERIMETER ROAD DETAILS - CROSSING 4
D-000-C-0188	PERIMETER ROAD DETAILS - CROSSING 38 & 38A
D-000-C-0189	PERIMETER ROAD DETAILS - CROSSING 39
D-000-C-0190	PERIMETER ROAD DETAILS - CROSSING 40 & 41
D-000-C-0201	PRE-DEVELOPMENT HYDROLOGY PLAN
D-000-C-0202	POST-DEVELOPMENT HYDROLOGY PLAN
D-000-C-0205	DETENTION BASIN PLANS & DETAILS - POND #3

LAS AGUILAS AND PANOCHE BRIDGE, CIVIL DRAWING INDEX

DWG #	DRAWING TITLE
D-000-C-0301	GENERAL PLAN AND ELEVATION
D-000-C-0302	GENERAL NOTES AND QUANTITIES
D-000-C-0303	PILE LAYOUT AND ROCK SLOPE PROTECTION DETAILS
D-000-C-0304	GENERAL NOTES FOR BOX BEAMS
D-000-C-0305	LAS AGUILAS CREEK BOX BEAM
D-000-C-0306	PANOCHE CREEK BOX BEAM
D-000-C-0307	BOX BEAM DETAILS
D-000-C-0308	BOX BEAM DIAPHRAGM
D-000-C-0309	ABUTMENT DETAILS 1
D-000-C-0310	ABUTMENT DETAILS 2
D-000-C-0311	GUARDRAIL SYSTEM GENERAL NOTES
D-000-C-0312	GUARDRAIL SYSTEM DETAILS 1
D-000-C-0313	GUARDRAIL SYSTEM DETAILS 2
D-000-C-0314	GUARDRAIL SYSTEM DETAILS 3



VICINITY MAP

SCALE: 1" = 1500'

PROJECT ADDRESS: 721 LITTLE PANOCHE ROAD
PAICINES, CA 95043

PROJECT OWNER: PANOCHE VALLEY SOLAR, LLC
845 OAK GROVE AVE., SUITE 202
MENLO PARK, CA 94025

RECORD OWNER: PANOCHE VALLEY SOLAR, LLC
845 OAK GROVE AVE., SUITE 202
MENLO PARK, CA 94025

OWNER CONTACT: ERIC CHERNISS
PHONE (408) 460–8200
EMAIL eric@pv2energy.com

CONSTRUCTION MANAGER: AMEC FOSTER WHEELER
WAYNE HAFF
1979 LAKESIDE PARKWAY, SUITE 400
TUCKER, GA 30084
PHONE (518) 260–5740
FAX (770) 688–2501
EMAIL wayne.half@amecfw.com

SITE MANAGER: AMEC FOSTER WHEELER
NATHAN FEATHERSTONE
1979 LAKESIDE PARKWAY, SUITE 400
TUCKER, GA 30084
PHONE (648) 688–9071
EMAIL nathan.featherstone@amecfw.com

ENGINEERING MANAGER: AMEC FOSTER WHEELER
HEATHER MUNOZ
COLORADO CENTER
TOWER 2, 2000 S COLORADO BLVD, 10TH FLOOR
DENVER, CO 80222
PHONE (303) 630–0773
EMAIL heather.munoz@amecfw.com

CIVIL ENGINEER: AMEC FOSTER WHEELER
MATTHEW GILL, PE 84621
1979 LAKESIDE PARKWAY, SUITE 400
TUCKER, GA 30084
PHONE (770) 688–2500
FAX (770) 688–2501
EMAIL matthew.gill@amecfw.com

BIOLOGY MANAGER: AMEC FOSTER WHEELER
ANGIE HARBIN–IRELAND
9210 SKY PARK COURT, SUITE 200
SAN DIEGO, CA 92123
PHONE (858) 300–4338
EMAIL angie.harbin–ireland@amecfw.com

SOILS ENGINEER: KLIENFELDER
ADAM D. TSCHIDA, PE
1801 CALIFORNIA STREET, SUITE 1100
DENVER, CO 80202
PHONE (303) 237–6601
FAX (303) 237–6601

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	MTG	LEC	HRM	JCG	
B	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	19JUNE14	ISSUED FOR CONCEPTUAL DESIGN REVIEW	JTW	MTG	LEC	HRM		

REFERENCES

REF	NUMBER	TITLE

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	JTW/MTG	19JUN14
SCALE	PACKAGE CODE	DRN	JTW	19JUN14
NTS		CHK	MTG	19JUN14
		APP	LEC	19JUN14

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL
COVER SHEET
AND LOCATION PLAN

AREA

CLIENT DWG. NO.

DRAWING NO. D–000–C–0001 REV. D

SAVED: 15–Sep–15 4:51 PM PLOTTED: 15–Sep–15 5:54 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIV\D–000–C–0001.DWG

ARCH D–24x36

GENERAL LEGEND

NEW | EXISTING

- ELECTRICAL/TELEPHONE POLE
- TANK STRUCTURE
- WELL
- TREE
- ELECTRICAL TRANSMISSION TOWER
- OVERHEAD WIRE
- FLOW ARROW
- PV TRACKER ROW
- ROPE FENCE
- PERIMETER FENCE
- EXCLUSION FENCE
- COMPOSITE FENCE
- TEMPORARY FENCE
- GUARDRAIL
- PERIMETER CONTROLS WATTLES OR SILT FENCE
- DIVERSION DITCH OPEN CHANNEL
- EROSION CONTROL BLANKET
- LOW WATER CROSSING
- CONCRETE BLOCK PAVERS
- RIPRAP PROTECTION
- ROCK CHECK DAM
- CRUSHED AGGREGATE SURFACE
- ASPHALT PAVEMENT SURFACE
- CONCRETE PAVEMENT SURFACE
- ROADWAY DEDICATION LINE
- ROADWAY CENTERLINE
- SPOT ELEVATION (1407 / 1408)
- MAJOR CONTOURS (1410 / 1410)
- MINOR CONTOURS (1408 / 1408)
- STREAM BUFFER
- TOP OF STREAM BANK
- CDFW STREAMS
- USACE STREAMS
- DIKE
- FLOODPLAIN
- PACIFIC GAS AND ELECTRIC POWER EASEMENT
- FOUND SURVEY MONUMENT
- BENCHMARK
- CULVERT/PIPE
- POLLUTANT MONITORING POINT

ABBREVIATIONS

APN	ASSESSORS PARCEL NUMBER
BG1	BACKGROUND MONITORING POINT
BLDG	BUILDING
BMP	BEST MANAGEMENT PRACTICES
BVCE	BEGIN VERTICAL CURVE ELEVATION
BVCS	BEGIN VERTICAL CURVE STATION
CASQA	CALIFORNIA STORMWATER QUALITY ASSOCIATION
CDFW	CALIFORNIA DEPARTMENT OF FISH & WILDLIFE
CJ	CONSTRUCTION JOINT
COSB	COUNTY OF SAN BENITO
DA	DRAINAGE AREA
DIA	DIAMETER
DWG	DRAWING
EL	ELEVATION
EOP	EDGE OF PAVEMENT
ERP	ENVIRONMENTAL REVIEW PARTNERS
EX	EXISTING
FES	FLARED END SECTION
GAL	GALLON
HP	HIGH POINT
JD	JURISDICTION
K	VERTICAL CURVE K VALUE
L	LENGTH
LF	LINEAR FEET
LP	LOW POINT
LWC	LOW WATER CROSSING
MAX	MAXIMUM
MIN	MINIMUM
MMRP	MITIGATION MONITORING & REPORTING PLAN
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
PCS	POWER CONVERSION SKID
PI	POINT OF INTERSECTION
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE FOR PIPE
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENT
RL	RURAL LIVING
RP	RADIUS POINT
R/W	RIGHT OF WAY
SFR	SINGLE FAMILY RESIDENCE
STA	STATION
SWPPP	STORM WATER POLLUTION PREVENTION PLAN
TAN	TANGENT
TYP	TYPICAL
USACE	US ARMY CORP OF ENGINEERS
VC	VERTICAL CURVE

GENERAL NOTES

1. GENERAL NOTES APPLICABLE TO ALL CIVIL DRAWINGS.
2. BOUNDARY AND TOPOGRAPHIC (2-FOOT CONTOURS) SURVEY PROVIDED BY PENFIELD & SMITH, 111 EAST VICTORIA STREET, SANTA BARBARA, CA. 93101, SURVEY DATED JULY, 2014.
3. BEARINGS SHOWN ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM, NAD 83, ZONE 4 GRID (EPOCH 2011.1), DEFINED LOCALLY BY CONTINOUSLY OPERATING REFERENCE STATIONS OPERATED BY THE CALIFORNIA SPATIAL REFERENCE CENTER. THE SURVEY WAS TIED TO STATIONS P249, P286, AND P302.
4. DIMENSIONS AND COORDINATES ARE IN FEET UNLESS NOTED OTHERWISE.
5. ALL WORK TO BE PERFORMED SHALL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES OF GOVERNMENTAL AGENCIES HAVING JURISDICTION OVER THE PROJECT.
6. ALL CONTRACTORS SHALL ADHERE TO AND FOLLOW RULES AND GUIDELINES SET FORTH WITHIN THE STREAM BED ALTERATION AGREEMENT, ISSUED BY THE CALIFORNIA NATIONAL RESOURCES AGENCY, DEPARTMENT OF FISH AND GAME.
7. ALL CONTRACTORS SHALL ADHERE TO AND FOLLOW THE CONDITIONS OF APPROVAL FROM SAN BENITO COUNTY AS PUT FORTH IN THE DEVELOPMENT AGREEMENT, THE FINAL ENVIRONMENTAL IMPACT REPORT, AND THE MITIGATION MONTORING AND REPORTING PLAN (MMRP).
8. SEE SPECIFICATION C-SPC-000-001, "CS02200" FOR EARTHWORK SPECIFICATIONS.
9. SEE SPECIFICATION C-SPC-000-002, "CS02710" EXTERIOR FENCE SPECIFICATIONS.
10. SEE SPECIFICATION C-SPC-000-003, "CS02550" FOR INSTALLATION OF UNDERGROUND UTILITIES.
11. SEE SPECIFICATION C-SPC-100-004, "CS02710" FOR SUBSTATION & SWITCHYARD EXTERIOR FENCE SPECIFICATIONS.
12. FOR GEOTECHNICAL RECOMMENDATIONS AND CONCLUSIONS SEE REVISED GEOTECHNICAL EVALUATION, PANOCHE VALLEY SOLAR PHOTOVOLTAIC (PV) GENERATION FACILITY, BY KLEINFELDER, DATED DECEMBER 9, 2014.

CONSTRUCTION PRACTICES

1. CONSTRUCTION ACTIVITY AND EQUIPMENT MAINTENANCE IS LIMITED TO THE HOURS BETWEEN 7:00 A.M. AND DUSK ON WEEKDAYS. CONSTRUCTION MAY NOT OCCUR ON WEEKENDS OR STATE HOLIDAYS, WITHOUT PRIOR CONSENT OF THE BUILDING OFFICIAL. NON-NOISE GENERATING ACTIVITIES (E.G. INTERIOR PAINTING) ARE NOT SUBJECT TO THESE RESTRICTIONS.
2. STATIONARY CONSTRUCTION EQUIPMENT THAT GENERATES NOISE IN EXCESS OF 65 DBA AT THE PROJECT BOUNDARIES MUST BE SHIELDED AND LOCATED AT LEAST 100 FEET FROM OCCUPIED RESIDENCES. THE EQUIPMENT AREA WITH APPROPRIATE ACOUSTIC SHIELDING SHALL BE DESIGNATED ON BUILDING AND GRADING PLANS. EQUIPMENT AND SHIELDING SHALL REMAIN IN THE DESIGNATED LOCATION THROUGHOUT CONSTRUCTION ACTIVITIES.
3. CONSTRUCTION ROUTES ARE LIMITED TO SAN BENITO COUNTY APPROVED TRUCK ROUTES.
4. WATER TRUCKS OR SPRINKLER SYSTEMS SHALL BE USED DURING CLEARING, GRADING, EARTH MOVING, EXCAVATION, OR TRANSPORTATION OF CUT OR FILL MATERIALS TO PREVENT DUST FROM LEAVING THE SITE AND TO CREATE A CRUST AFTER EACH DAY'S ACTIVITIES CEASE. AT A MINIMUM, THIS WOULD INCLUDE WETTING DOWNS SUCH AREAS IN THE LATER MORNING AND AFTER WORK IS COMPLETED FOR THE DAY AND WHENEVER WIND EXCEEDS 15 MILES PER HOUR.
5. A PERSON OR PERSONS SHALL BE DESIGNATED TO MONITOR THE DUST CONTROL PROGRAM AND TO ORDER INCREASING WATERING AS NECESSARY TO PREVENT TRANSPORT OF DUST OFF-SITE. THE NAME AND TELEPHONE NUMBER OF SUCH PERSON(S) SHALL BE PROVIDED TO THE COUNTY.
6. ALL GRADING EQUIPMENT SHALL BE KEPT IN GOOD WORKING ORDER PER FACTORY SPECIFICATIONS.

CONSTRUCTION ACTIVITY

1. THE CONTRACTOR SHALL PROVIDE VERIFICATION THAT ALL CONSTRUCTION EQUIPMENT IS IN PROPER TUNE PER THE MANUFACTURER'S RECOMMENDATION.
2. ROLL OFF TRASH BINS AND CHEMICAL TOILETS FOR CONSTRUCTION WORKERS SHALL BE REQUIRED ON ALL CONSTRUCTION SITES AND TEMPORARY FENCING PROVIDED AROUND THE CONSTRUCTION SITES AND/OR A ROW OF TEMPORARY FENCING PROVIDED AT SUCH LOCATION AS TO PREVENT ANY BUILDING MATERIALS FROM BLOWING OFF THE CONSTRUCTION SITE.
3. DURING THOSE PERIODS WHEN GRADING IS BEING CONDUCTED, THE CONTRACTOR SHALL INSPECT THE ADJACENT PAVED ROADWAYS AT LEAST TWO TIMES PER WEEK, AND SHALL SWEEP THE STREET IF VISIBLE DIRT OR DUST, ATTRIBUTABLE TO THE PROJECT, CAN BE SEEN ON THE ROADWAY.
4. ALL TRASH CONTAINERS ARE TO BE COVERED AT THE END OF EACH DAY AND BEFORE RAIN.
5. PRIOR TO GROUND DISTURBANCE OF ANY KIND, THE PROJECT WORK AREAS SHALL BE CLEARLY DELINEATED BY STAKES, FLAGS, OR OTHER CLEARLY IDENTIFIABLE SYSTEM.
6. ALL GENERAL TRASH AND OTHER HUMAN-GENERATED DEBRIS WILL BE STORED IN ANIMAL PROOF CONTAINERS AND/OR REMOVED FROM THE SITE EACH DAY. NO DELIBERATE FEEDING OF WILDLIFE.
7. ALL PIPES, CONDUITS, CULVERTS, OR SIMILAR ITEMS WITH A DIAMETER OF GREATER THAN ONE INCH SHALL BE DELIVERED TO THE SITE CAPPED OR TAPED CLOSED. IN THE EVENT A PIPE IS INADVERTENTLY LEFT OPEN, THE PIPE SHALL BE INSPECTED BY A BIOLOGICAL MONITOR PRIOR TO MOVING, CAPPING, OR TAPING. CAPS AND TAPE SHALL BE REMOVED DURING INSTALLATION.
8. THE SPEED LIMIT ON SITE SHALL NOT EXCEED 15 MILES PER HOUR.
9. NO VEHICLES OR EQUIPMENT SHALL BE REFUELED WITHIN 100 FEET OF AN EPHEMERAL DRAINAGE OR WETLAND UNLESS BERMED AND LINED REFUELING AREA IS CONSTRUCTED.

EARTHWORK & DRAINAGE NOTES

1. ALL STUMPS AND ROOTS LARGER THAN 2 INCHES IN DIAMETER SHALL BE COMPLETELY GRUBBED AND REMOVED. SURFACE VEGETATION SHALL BE REMOVED COMPLETE WITH ROOTS UP TO A DEPTH OF 24 INCHES. ALL VEGETATION SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF IN ACCORDANCE WITH LOCAL AND STATE REGULATION. ANY ONSITE DISPOSAL WORK SHALL BE APPROVED IN ADVANCE BY THE OWNER.
2. SPOT ELEVATIONS AND CONTOURS ON THESE DRAWINGS ARE TOP OF FINISHED GRADE. SUBTRACT FINISH SURFACING MATERIAL THICKNESS TO OBTAIN TOP OF SUBGRADE. GRADE SHALL SLOPE UNIFORMLY BETWEEN CONTOURS AND FINISH SPOT ELEVATIONS SHOWN ON THE PLANS.
3. IF NEEDED, FINISH GRADE TIE-IN'S INTO EXISTING GRADE OUTSIDE OF AREAS OF TRACKER ARRAYS AND PERIMETER ACCESS MAY BE AT A SLOPE OF 8 FEET HORIZONTAL TO 1 FOOT VERTICAL, UNLESS NOTED OTHERWISE ON PLANS. STEEPER SLOPE AT EXISTING GRADE TIE-IN'S WILL BE ALLOWED AT THE DISCRETION OF THE SITE SUPERVISOR. MAX SLOPE ON SITE SHALL BE 3 FEET HORIZONTAL TO 1 FOOT VERTICAL.
4. REFER TO REVISED GEOTECHNICAL EVALUATION, BY KLEINFELDER DATED DECEMBER 9, 2014, FOR GENERAL EARTHWORK AND GRADING RECOMMENDATIONS.
5. APPLICABLE WIND EROSION AND FUGITIVE DUST CONTROL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE PVS LLC – PANOCHE VALLEY SOLAR – WIND EROSION PROTECTION AND FUGITIVE DUST CONTROL PLAN, DOCUMENT NO. C-RPT-000-003.
6. ALL POND OUTLET STRUCTURES AND ASSOCIATED PIPES SHALL BE CLEANED OUT PRIOR TO DEMOBILIZATION SUCH THAT THE SEDIMENT DEPTH IS LESS THAN 10% OF THE PIPE DIAMETER.
7. PROJECT SITE IS LOCATED IN FLOODPLAIN ZONE X, WITH AREAS OF ZONE A ALONG THE WATERWAYS THROUGH THE SITE. REFER TO FEMA FIRMS FM06069C0425D, FM06069C0450D, FM06069C0550D, AND FM06069C0575D.
8. GENERAL GRADING CONCEPT IS TO MAINTAIN EXISTING TOPOGRAPHY IN ITS NATURAL DRAINAGE PATTERN.
9. PRECONSTRUCTION SURVEYS FOR THREATENED AND ENDANGERED SPECIES SHALL BE MADE BY THE SITE BIOLOGISTS PRIOR TO EARTH DISTURBING ACTIVITIES AS REQUIRED IN THE MMRP.

SEDIMENTATION & EROSION CONTROL NOTES

1. CONSTRUCTION SEQUENCE SHALL BE SCHEDULED TO MINIMIZE UNCONTROLLED RUNOFF AND OFFSITE SEDIMENTATION DURING GRADING OPERATIONS. SEDIMENTATION BARRIERS SHALL BE INSTALLED IN EACH AREA BEFORE GRADING OPERATIONS BEGIN. ALL DISTURBED AREAS SHALL BE RE-VEGETATED IN ACCORDANCE WITH RE-VEGETATION REPORT.
2. REMOVAL OF VEGETATION SHALL BE LIMITED TO AREAS CRITICAL TO CONDUCTING THE CONSTRUCTIONS WORKS. REFER TO DRAWINGS D-000-C-0011 THROUGH D-000-C-0026 FOR LIMITS OF CONSTRUCTION AND PRESERVATION OF EXISTING VEGETATION.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO AND MAINTAINED DURING THE CONSTRUCTION PHASES UNTIL FINAL STABILIZATION.
4. CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE TO ENSURE THAT WORKS ARE CONDUCTED DURING FAVORABLE WEATHER CONDITIONS. SHOULD AN UNEXPECTED RAIN EVENT ARISE, PROTECT THE SITE TO ENSURE NO DISCHARGE OF DELETERIOUS MATERIALS OFF-SITE.
5. ALL TEMPORARY STOCKPILES SHALL BE PROTECTED BY INSTALLING AND MAINTAINING SEDIMENTATION BARRIERS AROUND THE PERIMETER. CONTRACTOR SHALL REFER TO EROSION AND SEDIMENT CONTROL DETAIL 8, WM-03, ON DRAWING D-000-C-0072.
6. ALL ENTRANCES INTO PROJECT SHALL HAVE STABILIZED CONSTRUCTION ENTRANCE/EXIT, TC-1.
7. ADDITIONAL MEASURES MAY BE REQUIRED DURING CONSTRUCTION TO CONTROL EROSION AND SEDIMENTATION CAUSED BY CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL COMPLY WITH THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP), C-RPT-000-001, PREPARED FOR THE SITE.
8. CONTRACTOR MAY INTERCHANGE SEDIMENTATION BARRIER METHODS, WATTLES WITH SILT FENCE, IF DEEMED NECESSARY. A QUALIFIED DEVELOPER'S APPROVAL OF THE SWPPP IS REQUIRED FOR INTERCHANGE OF SEDIMENTATION BARRIER METHODS.
9. ALL SEDIMENT AND EROSION CONTROL MEASURES SHOWN ON PLANS ARE IDENTIFIED WITH THE NOMENCLATURE DERIVED FROM CASQA BMP HANDBOOK.
10. "NOTICE OF TERMINATION" (NOT) SHOULD BE SUBMITTED WITHIN 90 DAYS OF MEETING ALL GENERAL PERMIT REQUIREMENTS TO TERMINATION.

ROADS & SURFACING NOTES

1. PRIVATE ACCESS ROADS FOR THE PROJECT HAVE BEEN DESIGNED TO ALLOW SHEET FLOW TO PASS ACROSS THE ROAD WAY TO MAINTAIN THE NATURAL DRAINAGE PATTERN OF THE SITE AS MUCH AS FEASIBLE, UNLESS NOTED OTHERWISE.
2. SMOOTH VERTICAL TRANSITION'S SHALL BE PROVIDED AT ROAD INTERSECTIONS.
3. SEE CONSTRUCTION PLANS AND DETAILS FOR ROAD LAYOUT, GUIDELINES, AND GRADES.
4. EXISTING ROADWAY AND ROW INFORMATION INDICATED ON THESE DRAWINGS ARE BASED UPON INFORMATION AVAILABLE AT THE TIME OF DRAWING PREPARATION. NO GUARANTEE IS MADE OR INTENDED AS TO THE ACCURACY OF THIS INFORMATION.

DESERT AREA FIRE HAZARD ABATEMENT NOTES:

1. ALL COMBUSTIBLE VEGETATION SHALL BE REMOVED A MINIMUM DISTANCE OF THIRTY FEET FROM ALL STRUCTURES OR TO THE PROPERTY LINE, WHICHEVER IS LESS, PER THE REQUIREMENTS OF CALIFORNIA PUBLIC RESOURCE CODE 4291.
   - 1.1. COMBUSTIBLE VEGETATION INCLUDES, BUT IS NOT LIMITED TO:
     - 1.1.1. TUMBLEWEEDS (RUSSIAN THISTLE)
     - 1.1.2. LIMB AND DEBRIS OF SALT CEDAR (TAMARISK) WITHIN SIX FEET OF THE GROUND
     - 1.1.3. PLANTS, UNLESS PRUNED TO REMOVE DEAD MATERIAL
     - 1.1.4. GRASS OVER FOUR INCHES IN HEIGHT

PROJECT STUDIES AND REPORTS:

1. C-STY-000-001 STREAM CROSSING STUDY
2. C-RPT-000-001 SWPPP/NOI
3. C-RPT-000-002 HYDROLOGY/HYDRAULICS REPORT
4. C-RPT-000-003 DUST CONTROL PLAN AND NOTES
5. C-RPT-100-004 HYDROLOGY REPORT – LAS AGUILAS SWITCHING STATION (BY OTHERS)

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
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B	30JAN15	REVISED FOR BID	JTW	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.: 176055
ACTIVITY NO.:
SCALE: NTS
PACKAGE CODE:

	BY	DDMMMYY
DES	MTG	06NOV14
DRN	DRD	06NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

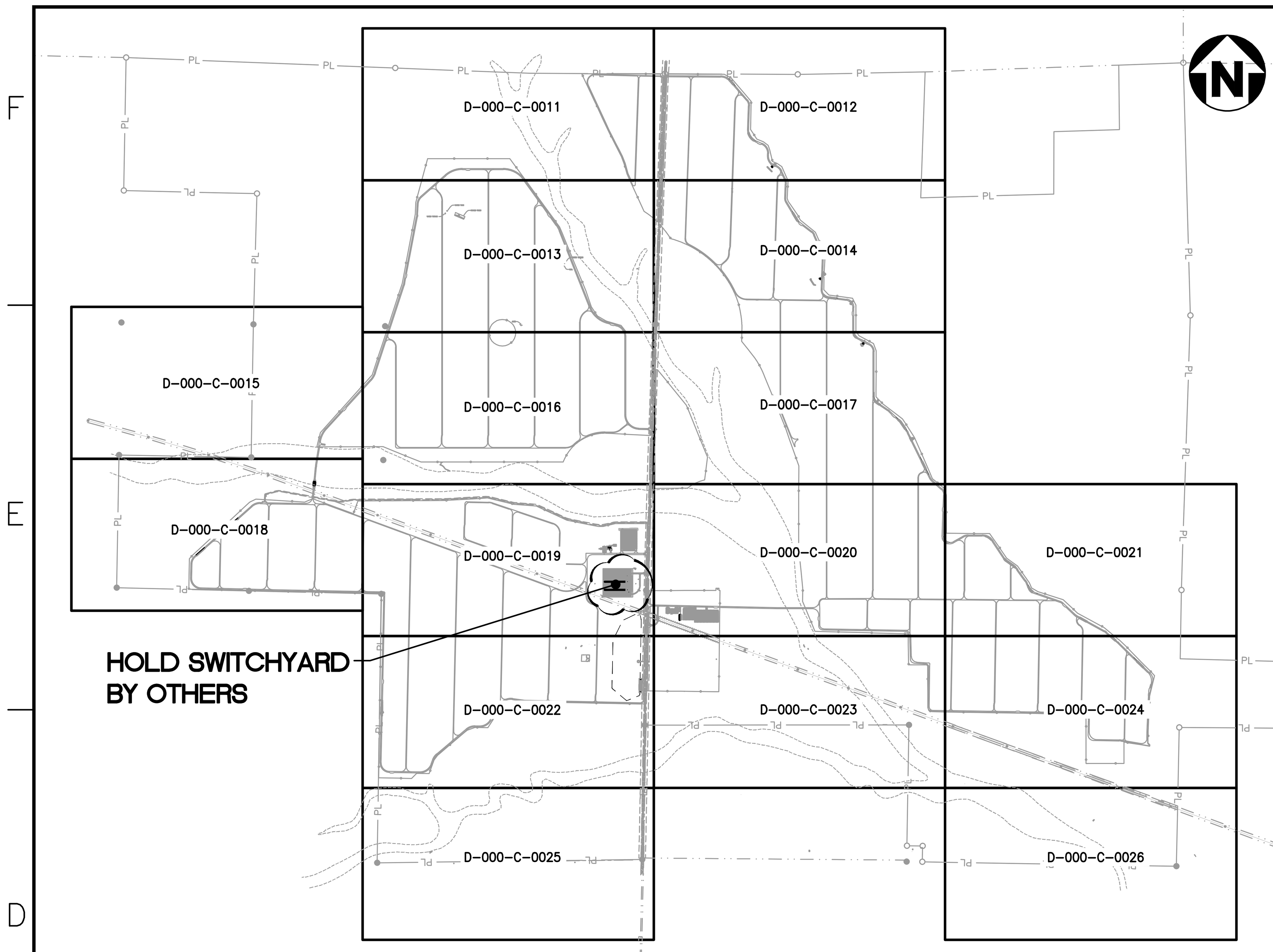
SUBJECT: CIVIL INDEX SHEET, GENERAL NOTES, AND LEGEND

AREA:
CLIENT DWG. NO.:
DRAWING NO.: D-000-C-0002
REV.: E

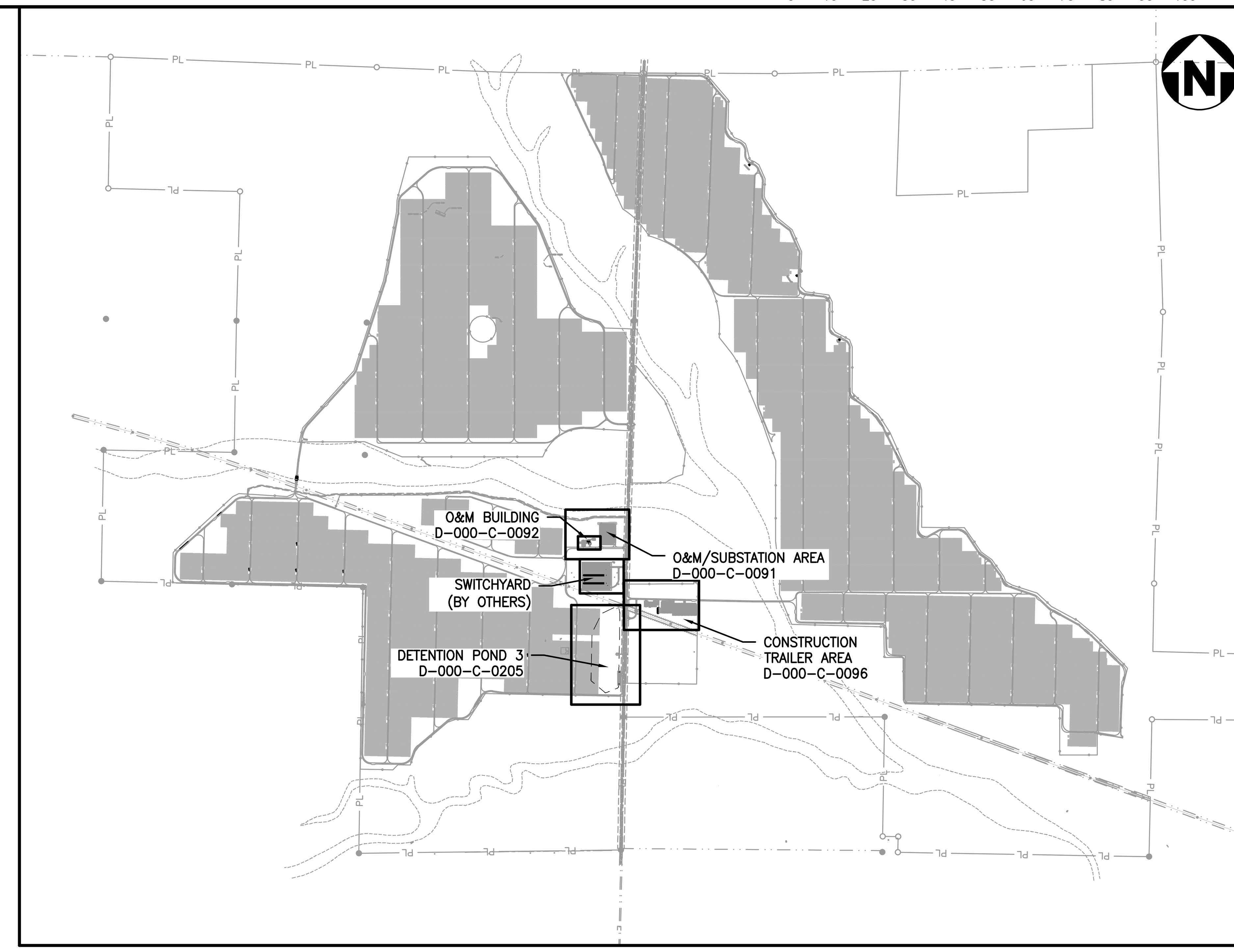
ARCH D-24x36

CAD FILE: P:\CAD\CIV\D-000-C-0002.DWG

SAVED: 15-Sep-15 3:16 PM PLOTTED: 15-Sep-15 3:45 PM USER: GILL, MATTHEW



GRADING, DRAINAGE & EROSION CONTROL DRAWINGS KEY PLAN



AREA DETAIL DRAWINGS KEY PLAN

NOTES

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3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
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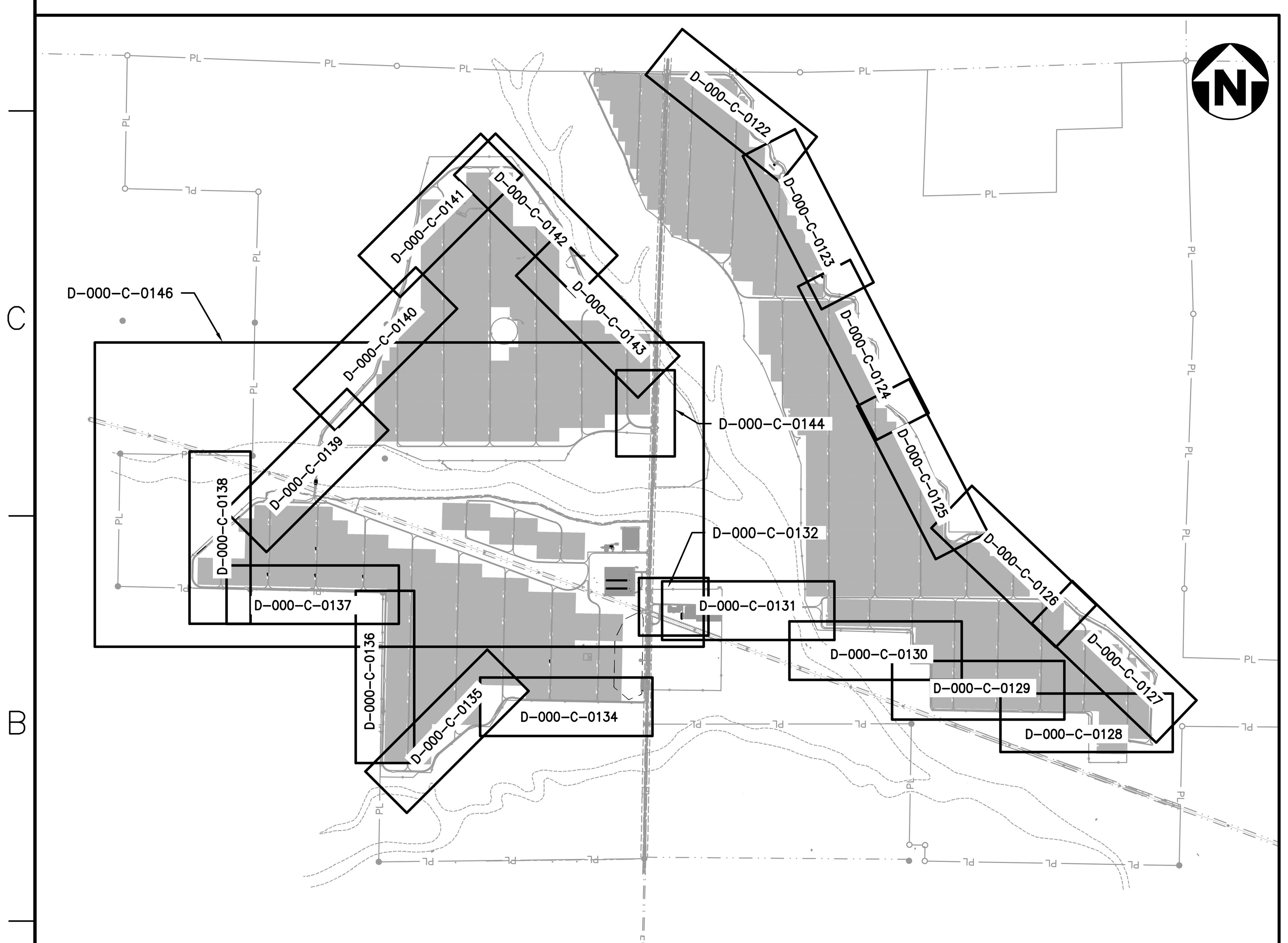
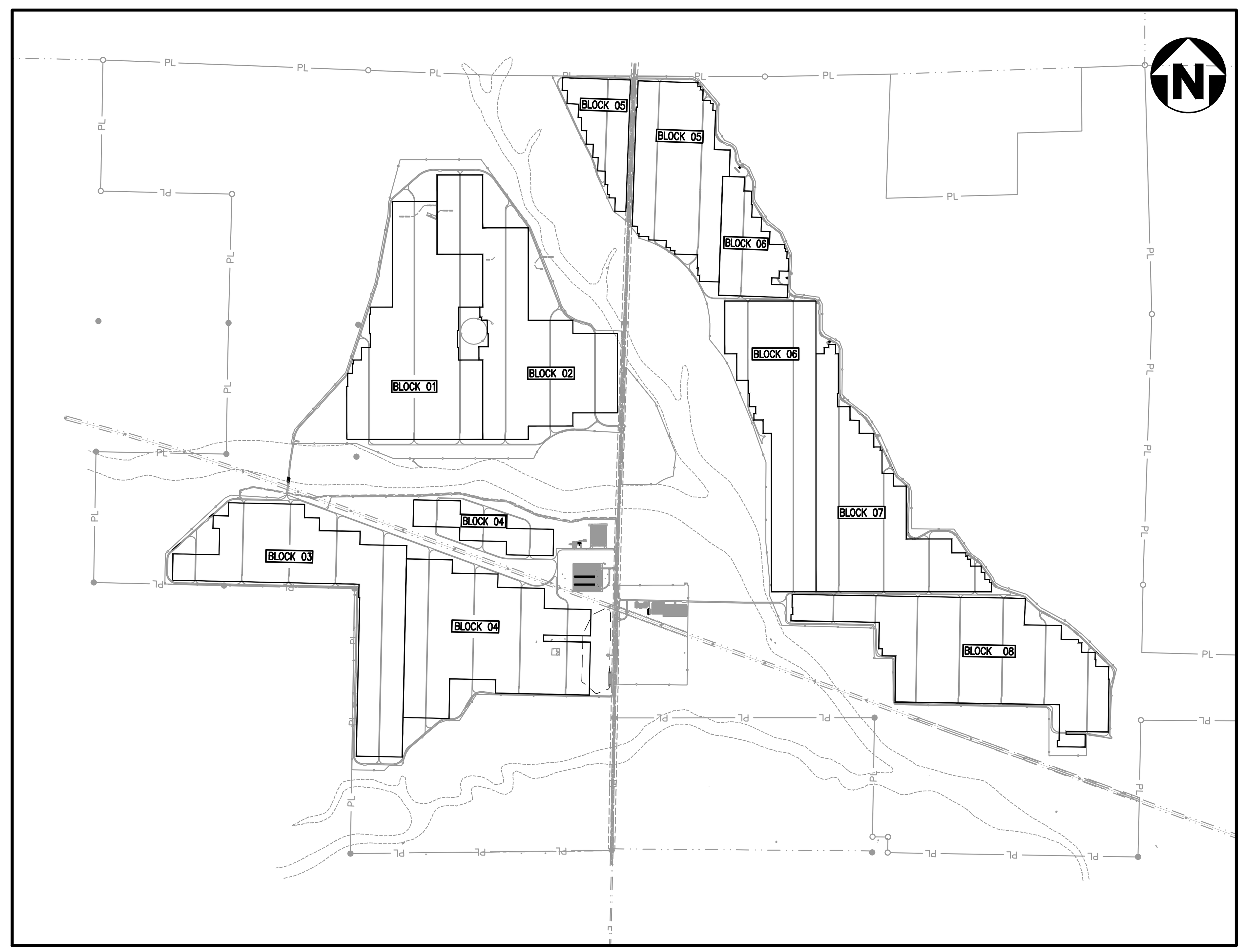
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.



ROAD PLAN AND PROFILE DRAWINGS KEY PLAN



CONSTRUCTION AREA BLOCKS KEY PLAN

BLOCKS AREA TABLE	
CIVIL SITE BOUNDARIES	AREA (ACRES)
Block 01	295.68
Block 02	265.12
Block 03	265.81
Block 04	330.13
Block 05 (West Section)	58.28
Block 05 (East Section)	149.75
Block 06	25.18
Block 07	203.88
Block 08	267.99
Laydown Area North	40.39
Laydown Area South	65.30
Switchyard Area	33.28
Substation	20.54

* CIVIL SITE BOUNDARIES ARE BLOCK AREAS SHOWN UP TO PERIMETER FENCE BEYOND ELECTRICAL LIMITS.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER (ARMAN NAZEMI C.E. 55927) DATE

0 1000' 2000' 4000'
1"=2000'

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
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REFERENCES

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NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	08JUL14
SCALE	PACKAGE CODE	DRN	JCS	08JUL14
AS SHOWN		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL KEY PLAN

AREA

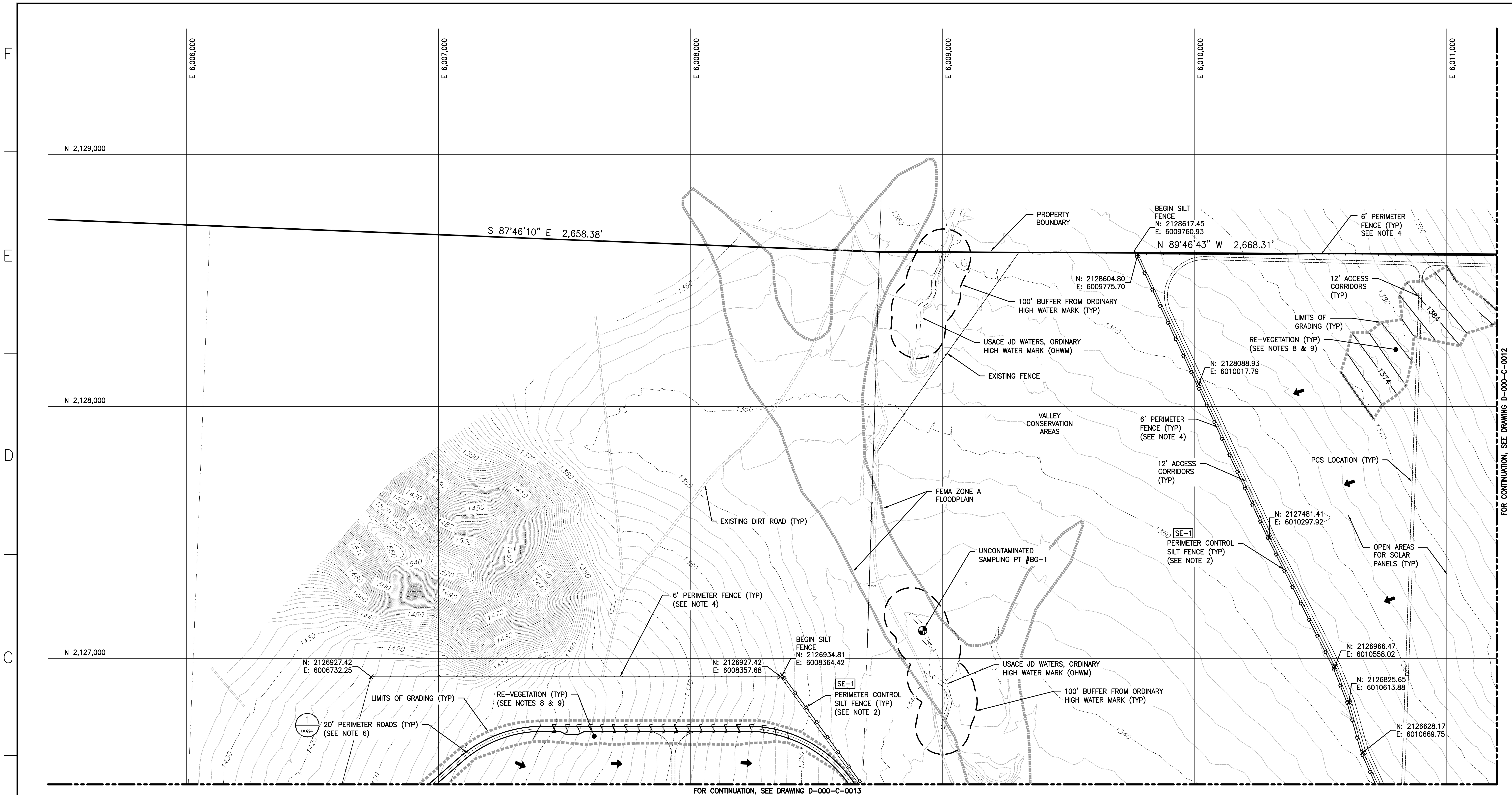
CLIENT DWG. NO.

DRAWING NO. D-000-C-0003 REV. E

CAD FILE: P:\CAD\CIV\D-000-C-0003.DWG

SAVED: 14-Sep-15 2:14 PM PLOTTED: 15-Sep-15 3:48 PM USER: GILL, MATTHEW

ARCH D-24x36



NOTES

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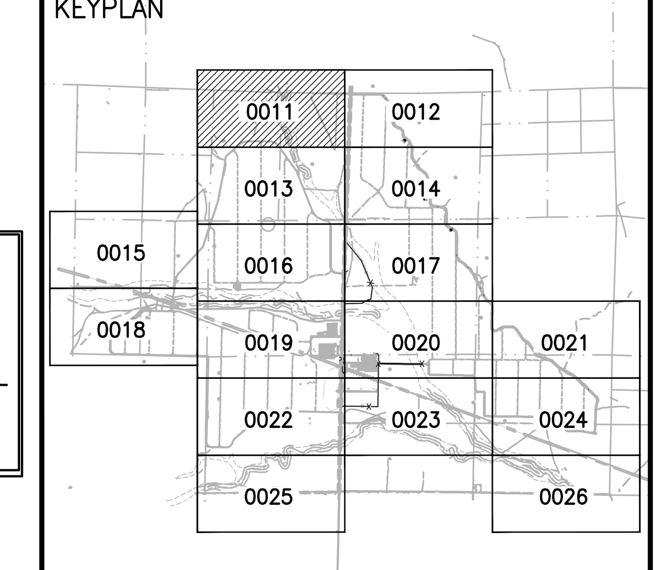
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN



KEYNOTES 1

1.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
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REF	NUMBER	TITLE

REFERENCES

UNLESS OTHERWISE AGREED IN A WRITTEN CONTRACT BETWEEN AMEC AND ITS CLIENT: (I) THIS AMEC DOCUMENT CONTAINS INFORMATION, DATA AND DESIGN THAT IS CONFIDENTIAL AND MAY NOT BE COPIED OR DISCLOSED; AND (II) THIS DOCUMENT MAY ONLY BE USED BY THE CLIENT IN THE CONTEXT AND FOR THE EXPRESS PURPOSE FOR WHICH IT HAS BEEN DELIVERED. ANY OTHER USE OR RELIANCE ON THIS DOCUMENT BY ANY THIRD PARTY IS AT THAT PARTY'S SOLE RISK AND RESPONSIBILITY.

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APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	10NOV14
SCALE	PACKAGE CODE	DRN	DRD	10NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

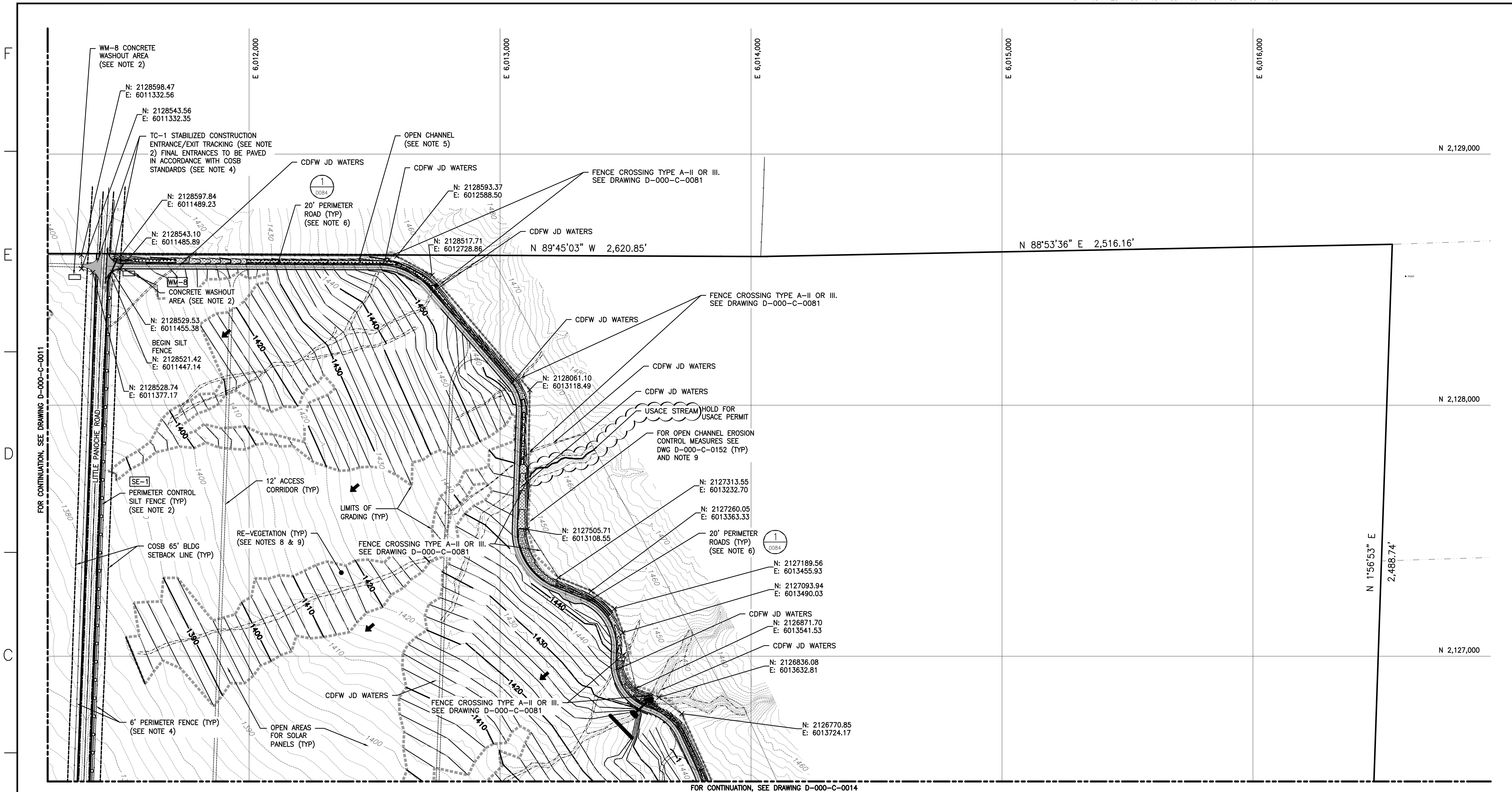
CLIENT DWG. NO.

DRAWING NO. D-000-C-0011 REV. E

SAVED: 09-Sep-15 4:15 PM PLOTTED: 15-Sep-15 3:49 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIV\D-000-C-0011.DWG

ARCH D-24x36



KEYNOTES 1

1.

NOTES

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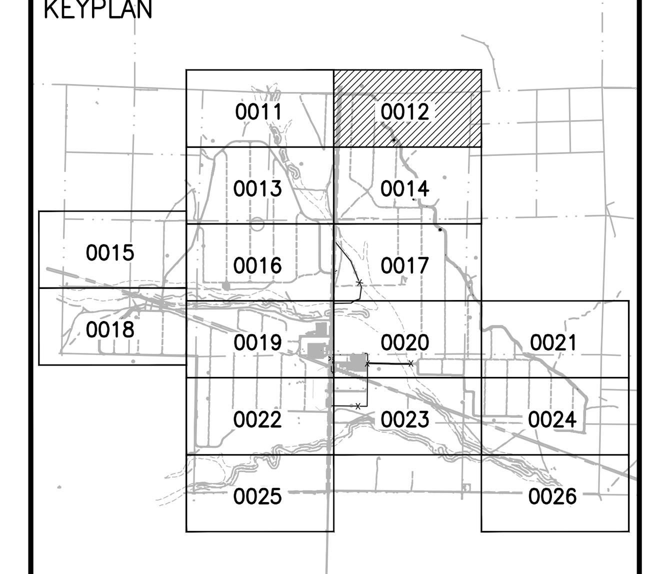
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
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REF	NUMBER	TITLE
		REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

DRE HRM
CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE 1" = 200'
PACKAGE CODE

	BY	DDMMMYY
DES	MTG	10NOV14
DRN	DRD	10NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

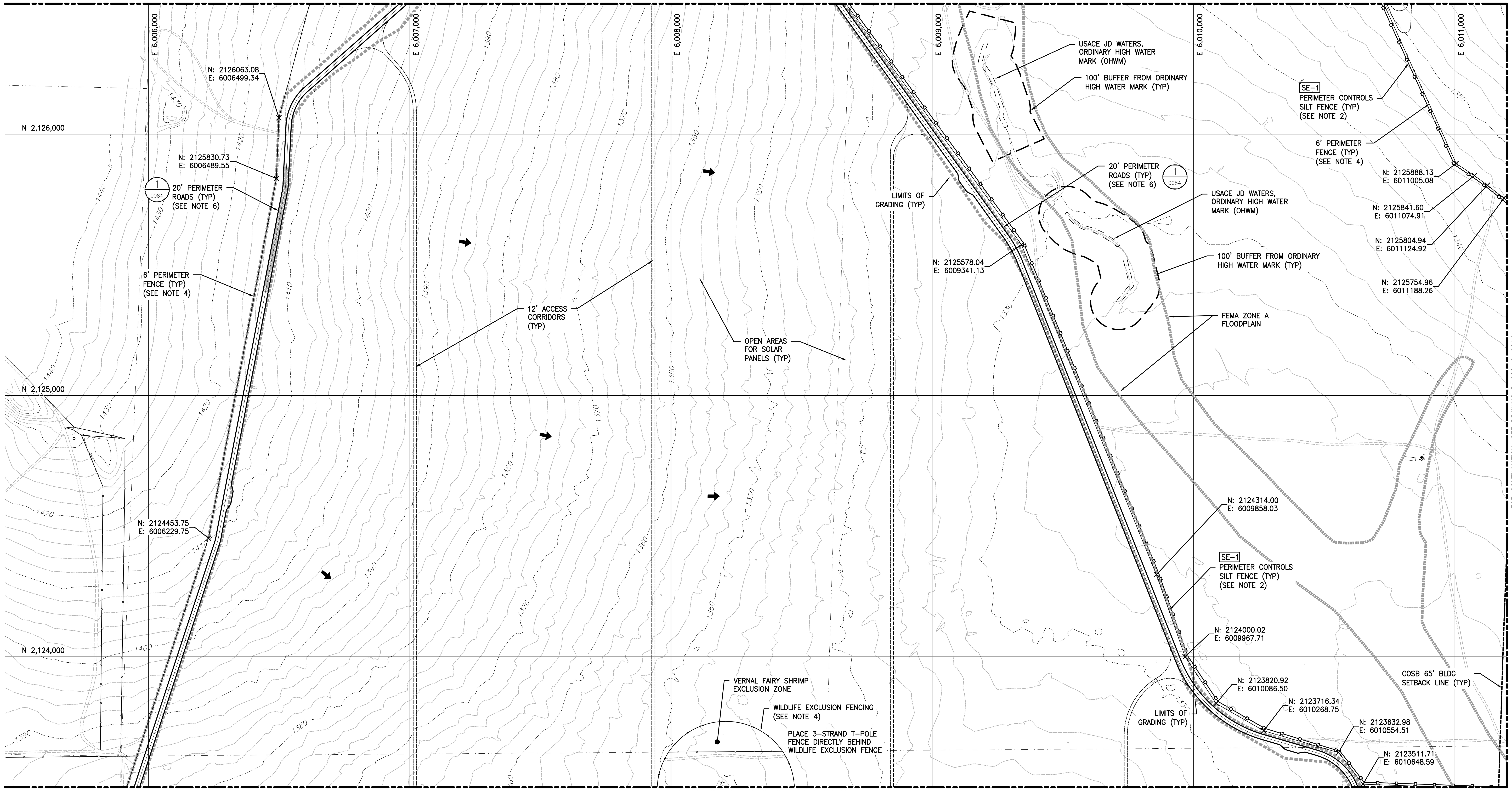
amec

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0012
REV. E

FOR CONTINUATION, SEE DRAWING D-000-C-0011



FOR CONTINUATION, SEE DRAWING D-000-C-0014

FOR CONTINUATION, SEE DRAWING D-000-C-0016

KEYNOTES 1

1.

NOTES

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12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

0 40' 100' 200' 400'

1"=200'-0"

KEYPLAN

0011 0012 0013 0014 0015 0016 0017 0018 0019 0020 0021 0022 0023 0024 0025 0026

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
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DRE HRM

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055 | ACTIVITY NO.

SCALE 1" = 200' | PACKAGE CODE

	BY	DDMMMYY
DES	MTG	12NOV14
DRN	DRD	12NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT: CIVIL GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

amec

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0013 REV. E

SAVED: 09-Sep-15 4:22 PM PLOTTED: 15-Sep-15 3:51 PM USER: GILL, MATTHEW

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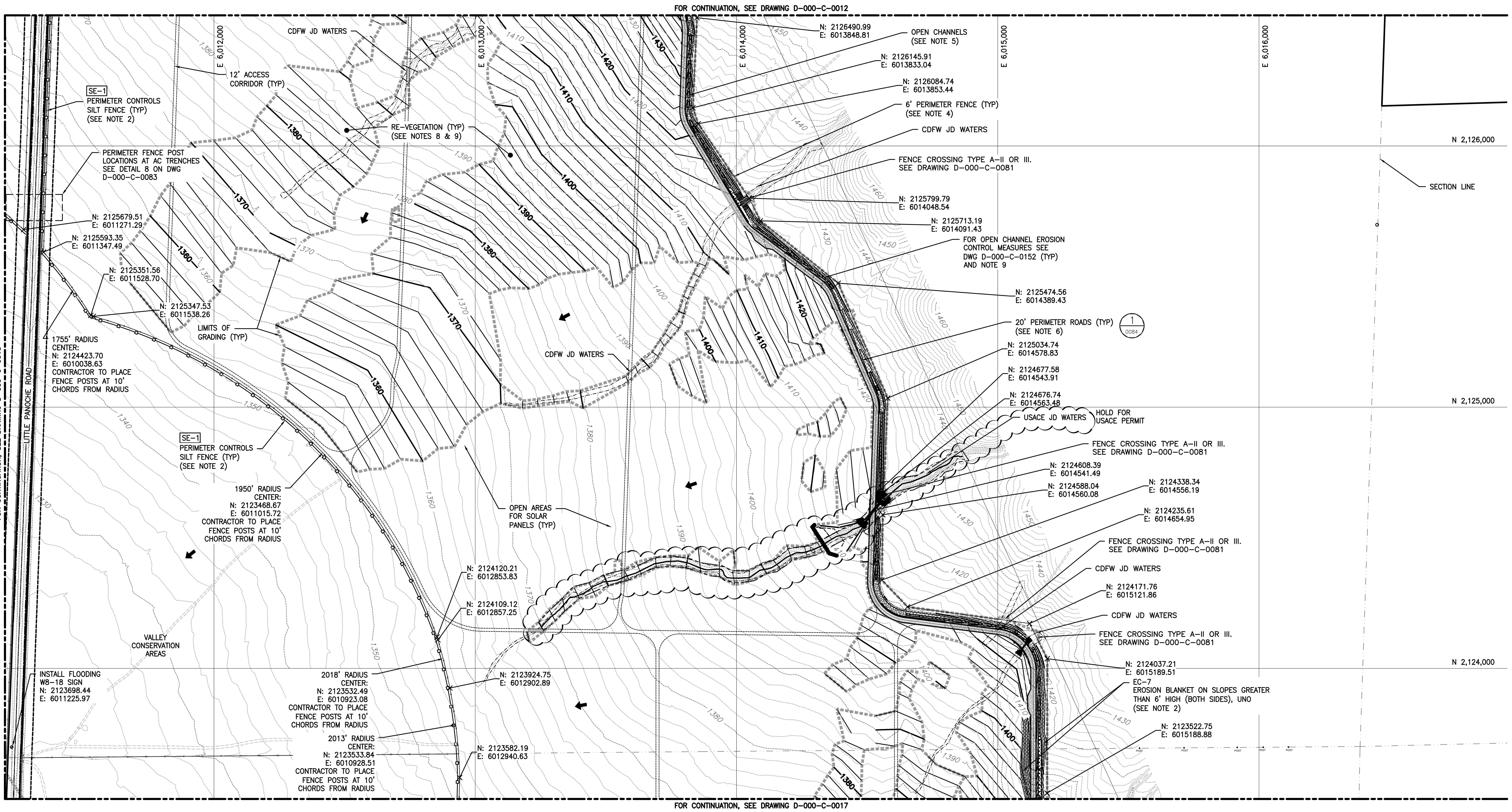
ARCH D-24x36

FOR CONTINUATION, SEE DRAWING D-000-C-0012



FOR CONTINUATION, SEE DRAWING D-000-C-0017

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
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11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

0 40' 100' 200' 400'
1"=200'-0"

KEYPLAN

0011 0012 0013 0014 0015 0016 0017 0018 0019 0020 0021 0022 0023 0024 0025 0026

KEYNOTES 1

1.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW
CLIENT PROJECT MGR.: — DEPARTMENT MGR.: DRE PROJECT MGR.: HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.: 176055 ACTIVITY NO.:
SCALE: 1" = 200' PACKAGE CODE:

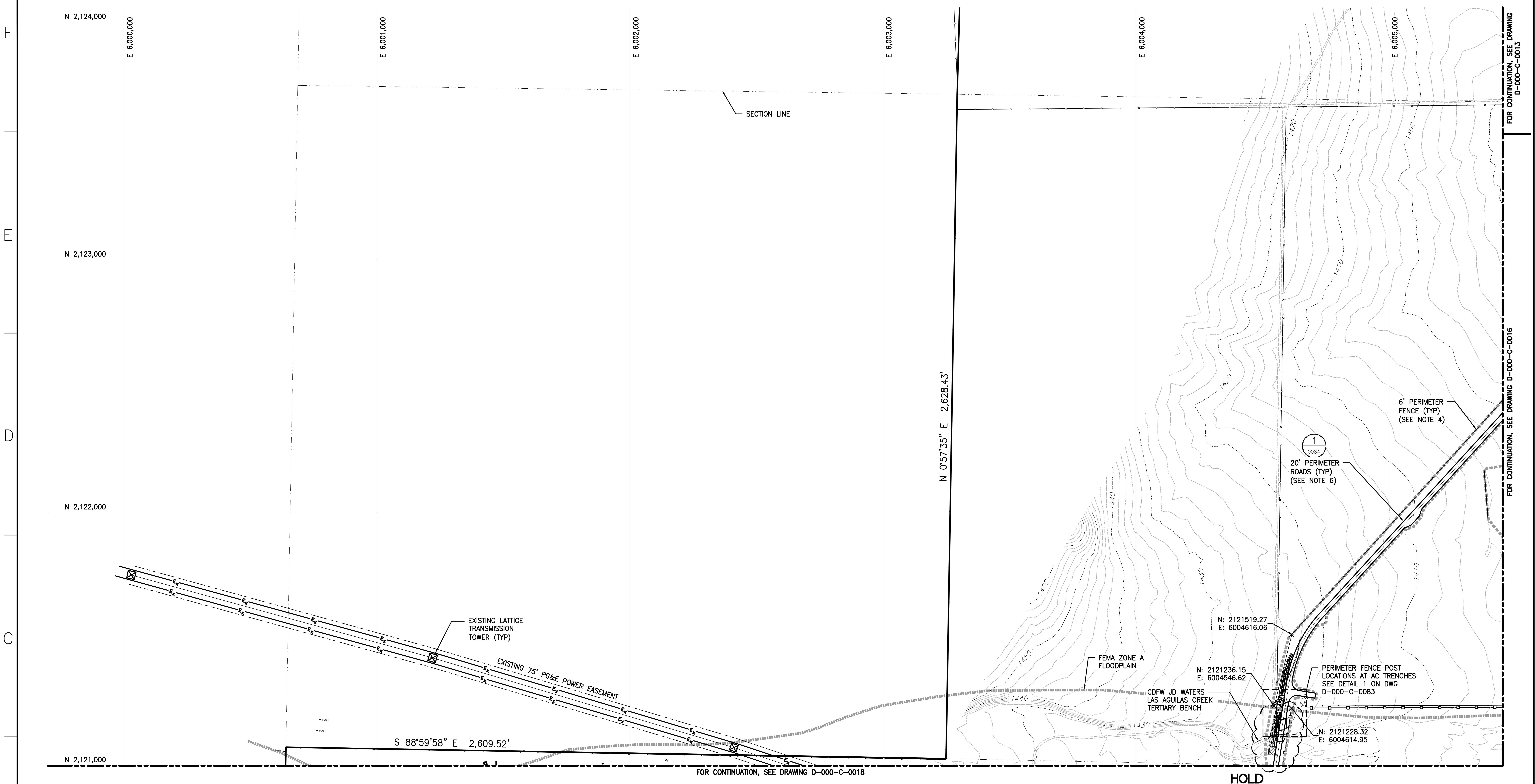
	BY	DDMMMYY
DES	MTG	12NOV14
DRN	DRD	12NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT: CIVIL GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

amec

AREA
CLIENT DWG. NO.
DRAWING NO. D-000-C-0014 REV. E



KEYNOTES 1

1.

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3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
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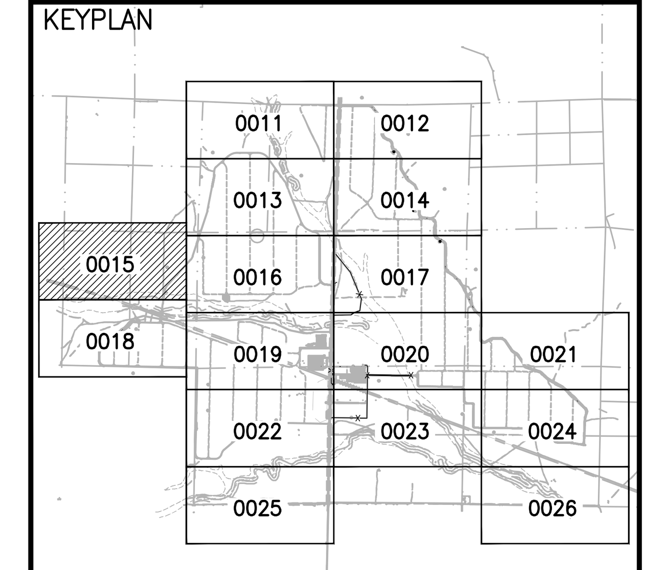
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
F	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
E	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
D	25AUG15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE
	REFERENCES	

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	12NOV14
SCALE	PACKAGE CODE	DRN	DRD	12NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT: CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

amec

AREA

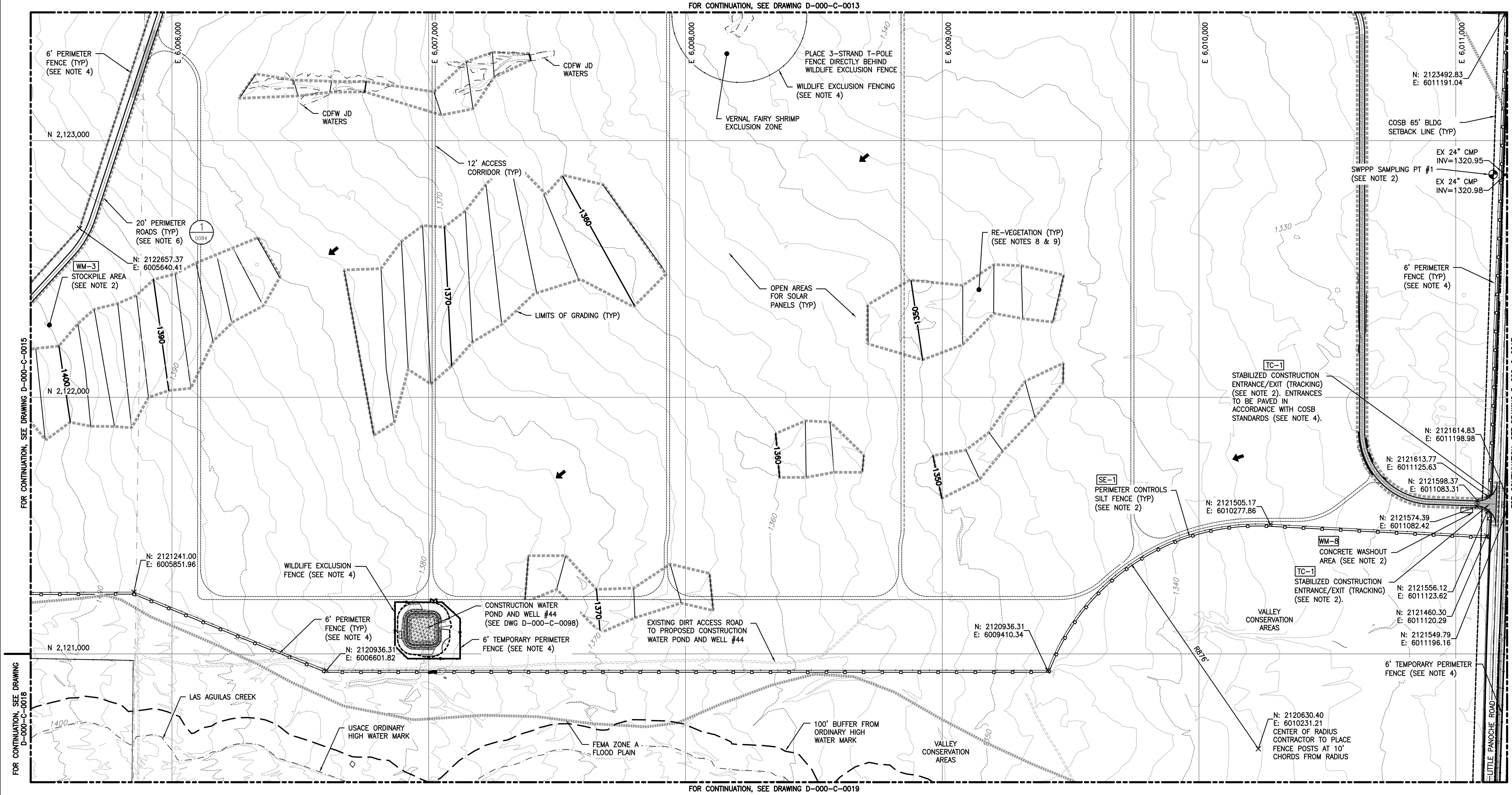
CLIENT DWG. NO.

DRAWING NO. D-000-C-0015 REV. F

CAD FILE: P:\CAD\CIV\D-000-C-0015.DWG

SAVED: 14-Sep-15 2:18 PM PLOTTED: 15-Sep-15 3:54 PM USER: GILL, MATTHEW

ARCH D-24x36



NOTES

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3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
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12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN

	0011	0012	
	0013	0014	
0015	0016	0017	
0018	0019	0020	0021
	0022	0023	0024
	0025		0026

KEYNOTES 1

1.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	12NOV14
SCALE	PACKAGE CODE	DRN	DRD	12NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

CLIENT DWG. NO.

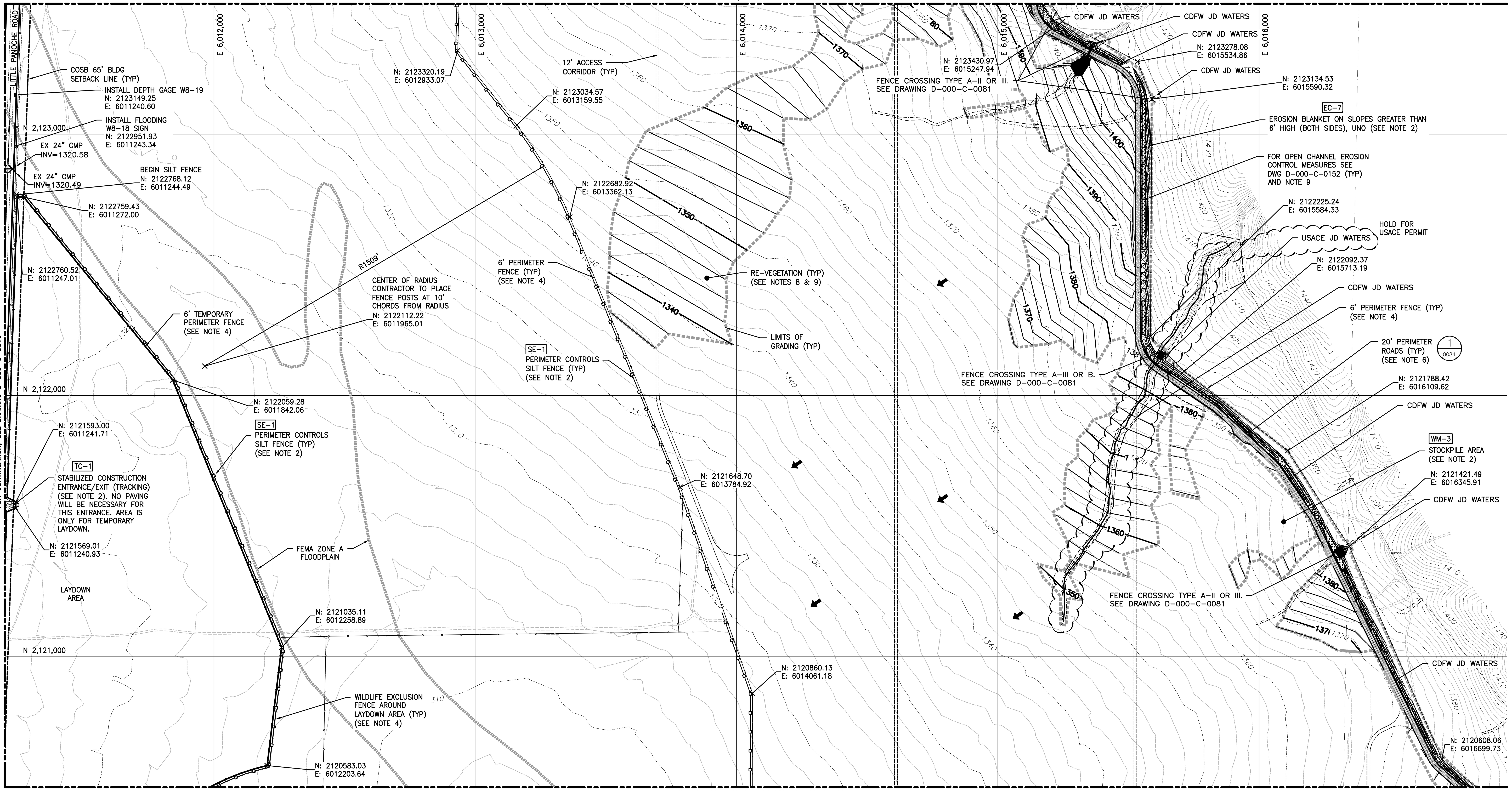
DRAWING NO. D-000-C-0016 REV. E

SAVED: 09-Sep-15 4:30 PM PLOTTED: 15-Sep-15 3:55 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIVIL\D-000-C-0016.DWG

ARCH D-24x36

FOR CONTINUATION, SEE DRAWING D-000-C-0014



FOR CONTINUATION, SEE DRAWING D-000-C-0020

N

0 40' 100' 200' 400'

1"=200'-0"

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
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11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYNOTES 1

1.

KEYPLAN

0011	0012
0013	0014

0015 0016 0017 0018 0019 0020 0021 0022 0023 0024 0025 0026

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

DRE HRM

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	12NOV14
SCALE	PACKAGE CODE	DRN	DRD	12NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

amec

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0017 REV. E

SAVED: 10-Sep-15 11:07 AM PLOTTED: 15-Sep-15 11:34 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIV\D-000-C-0017.DWG

ARCH D-24x36

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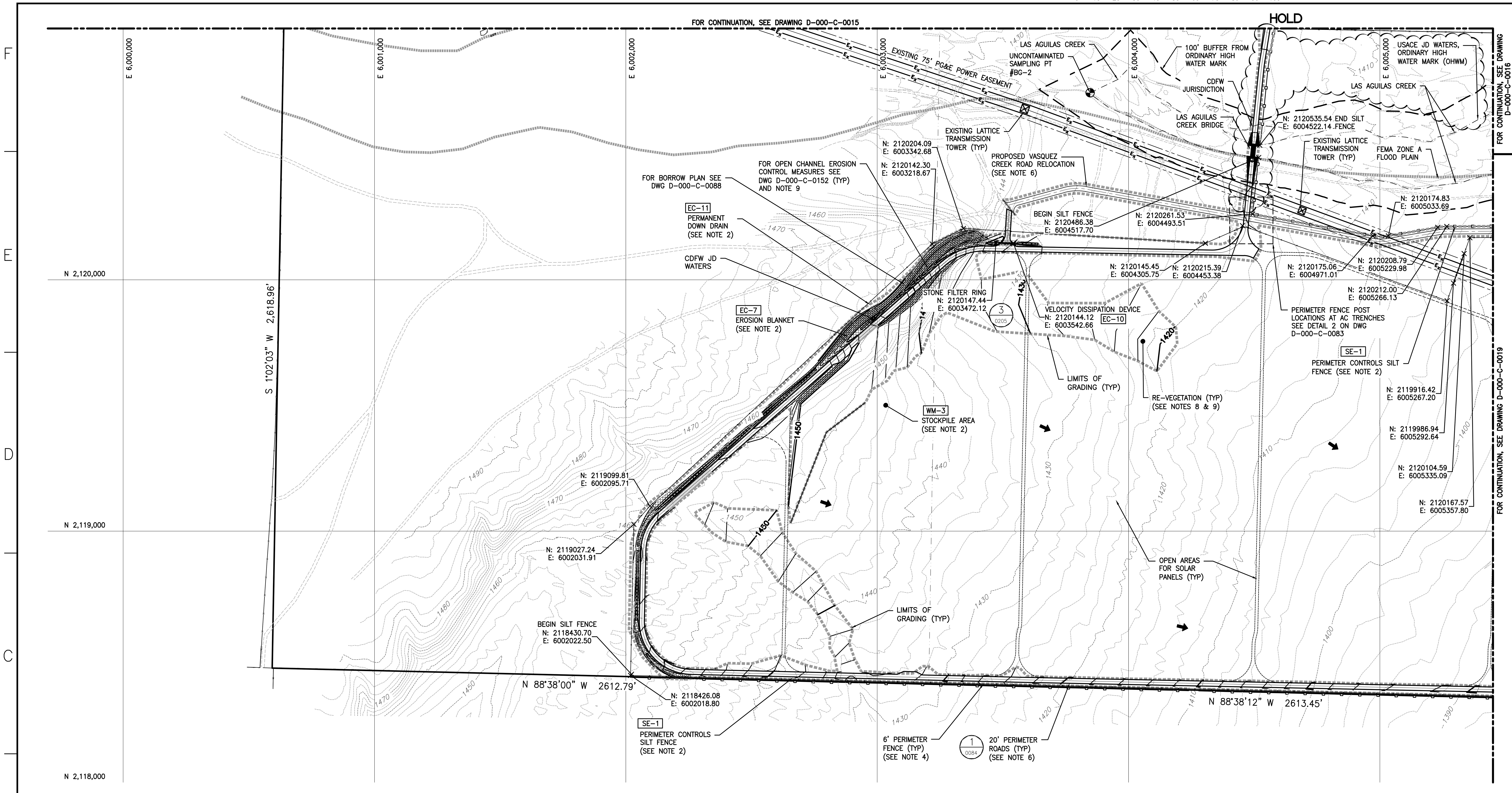

KEYNOTES 1

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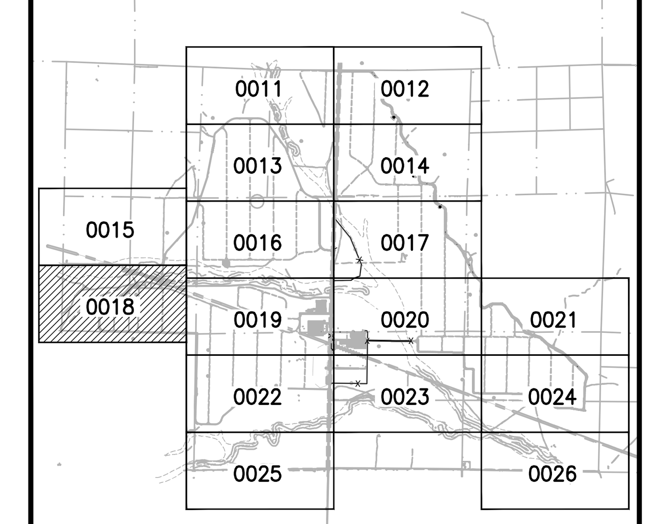
KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
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WORK SAFELY

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F	16SEP15	ISSUED FOR PERMIT REVIEW	TDC	MTG	HRM	DRE	JCG	
E	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	HRM	DRE	JCG	
D	03MAR15	ISSUED FOR PERMIT REVIEW; ADDED CDFW JURISDICTIONAL WATERS	JTW	LEC	DRE	HRM	JCG	
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REF	NUMBER	TITLE

REFERENCES

UNLESS OTHERWISE AGREED IN A WRITTEN CONTRACT BETWEEN AMEC AND ITS CLIENT: (I) THIS AMEC DOCUMENT CONTAINS INFORMATION, DATA AND DESIGN THAT IS CONFIDENTIAL AND MAY NOT BE COPIED OR DISCLOSED; AND (II) THIS DOCUMENT MAY ONLY BE USED BY THE CLIENT IN THE CONTEXT AND FOR THE EXPRESS PURPOSE FOR WHICH IT HAS BEEN DELIVERED. ANY OTHER USE OR RELIANCE ON THIS DOCUMENT BY ANY THIRD PARTY IS AT THAT PARTY'S SOLE RISK AND RESPONSIBILITY.

STAMP/SEAL

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APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	13NOV14
SCALE	PACKAGE CODE	DRN	DRD	13NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0018 REV. F

SAVED: 14-Sep-15 2:20 PM PLOTTED: 15-Sep-15 3:58 PM USER: GILL, MATTHEW
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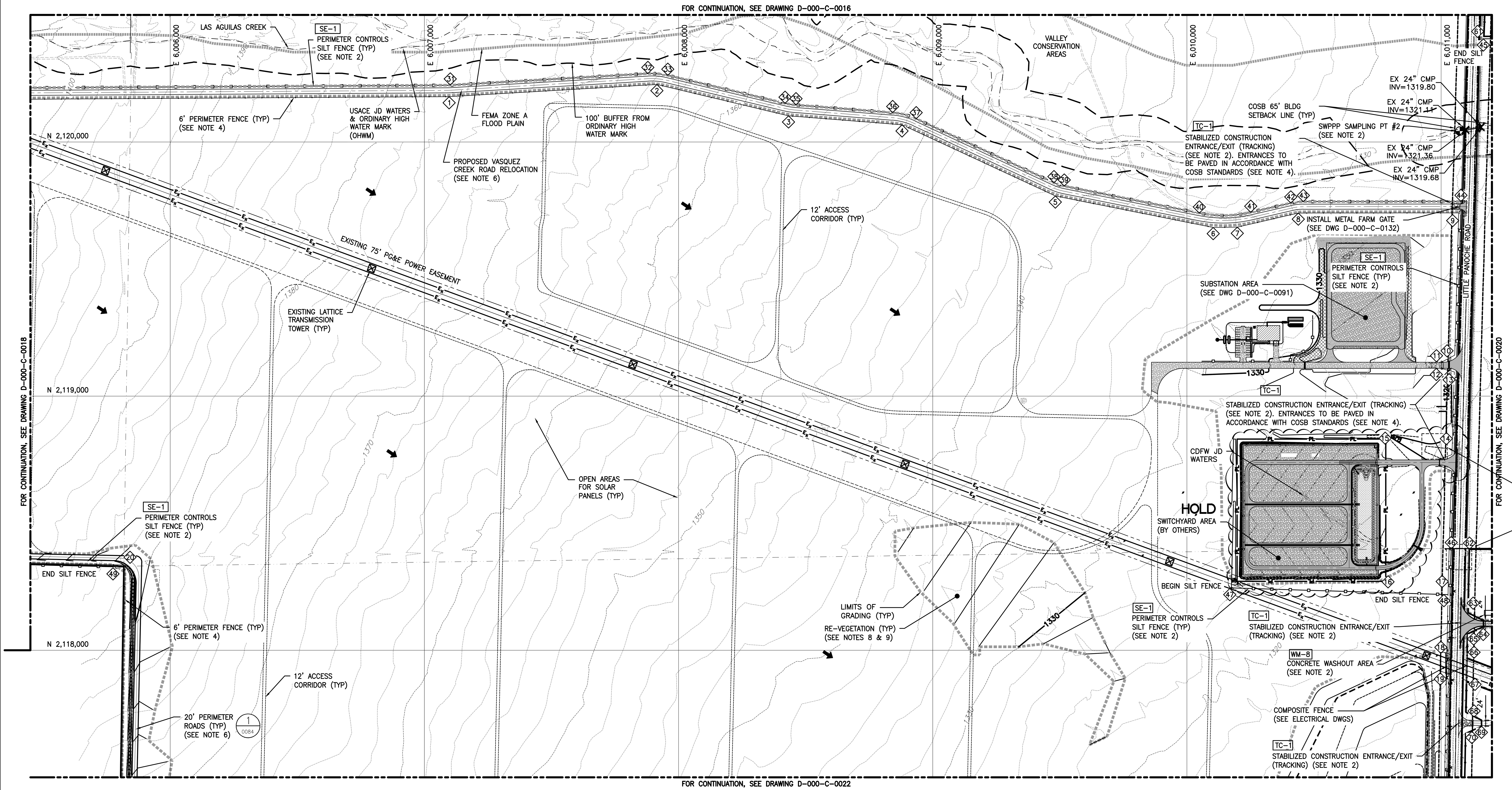
ARCH D-24x36



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10. ALL EROSION CONTROL PRODUCTS SHALL BE NON-WOVEN SUCH AS NON-WOVEN SILT FENCE, GEOTEXTILES, ETC... CONTRACTOR SHALL AVOID USE OF PLASTIC MONOFILAMENT NETTING. TIGHTLY WOVEN FIBER NETTING OR SIMILAR MATERIAL SHALL NOT BE USED FOR EROSION CONTROL OR OTHER PURPOSES AT THE PROJECT SITE TO ENSURE THAT BLUNT NOSE LEOPARD LIZARDS DO NOT BECOME ENTANGLED OR TRAPPED.
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

PERIMETER FENCE COORDINATES		
KEY NOTE	NORTHING	EASTING
1	N 2120178.30	E 6007097.46
2	N 2120226.20	E 6007915.04
3	N 2120102.78	E 6008432.59
4	N 2120067.54	E 6008879.34
5	N 2119787.60	E 6009482.35
6	N 2119663.42	E 6010103.55
7	N 2119664.84	E 6010198.37
8	N 2119720.38	E 6010438.42
9	N 2119720.99	E 6011069.27
10	N 2119161.19	E 6011053.64
11	N 2119134.31	E 6011002.42
12	N 2119108.31	E 6011002.44
13	N 2119095.22	E 6011051.84
14	N 2118806.03	E 6011043.75
15	N 2118806.03	E 6010767.15
16	N 2118296.53	E 6010767.15
17	N 2118296.53	E 6011028.45
18	N 2118011.61	E 6011023.36
19	N 2117886.65	E 6011020.98
20	N 2118335.42	E 6005822.91

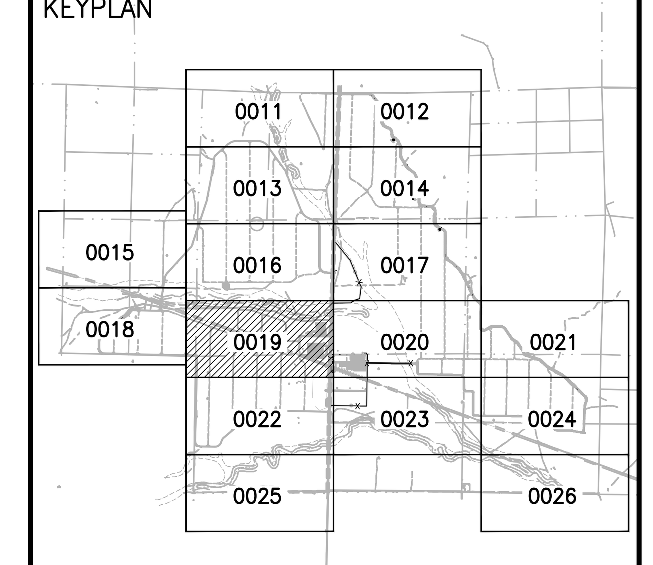
SILT FENCE COORDINATES		
KEY NOTE	NORTHING	EASTING
31	N 2120223.65	E 6007102.02
32	N 2120269.18	E 6007879.30
33	N 2120262.28	E 6007957.72
34	N 2120151.51	E 6008422.21
35	N 2120145.95	E 6008457.48
36	N 2120115.58	E 6008842.53
37	N 2120091.32	E 6008934.99
38	N 2119839.71	E 6009476.97
39	N 2119826.47	E 6009517.48
40	N 2119720.22	E 6010048.95
41	N 2119723.27	E 6010251.24
42	N 2119759.74	E 6010408.89
43	N 2119765.40	E 6010458.27
44	N 2119766.00	E 6011078.32
45	N 2120405.88	E 6011165.57
46	N 2118400.55	E 6011039.12
47	N 2118245.61	E 6010171.45
48	N 2118219.04	E 6011026.43
49	N 2118327.62	E 6005814.72

TEMP FENCE COORDINATES		
KEY NOTE	NORTHING	EASTING
61	N 2120415.39	E 6011168.55
62	N 2118397.26	E 6011111.27
63	N 2118147.45	E 6011105.88
64	N 2118092.92	E 6011166.69
65	N 2118064.40	E 6011103.92
66	N 2117992.25	E 6011102.52
67	N 2117865.27	E 6011100.14
68	N 2117755.82	E 6011097.91
69	N 2117701.09	E 6011159.10
70	N 2117672.55	E 6011096.28

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

KEYPLAN



WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	HRM	DRE	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	HRM	DRE	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE
	REFERENCES	

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	13NOV14
SCALE	PACKAGE CODE	DRN	DRD	13NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

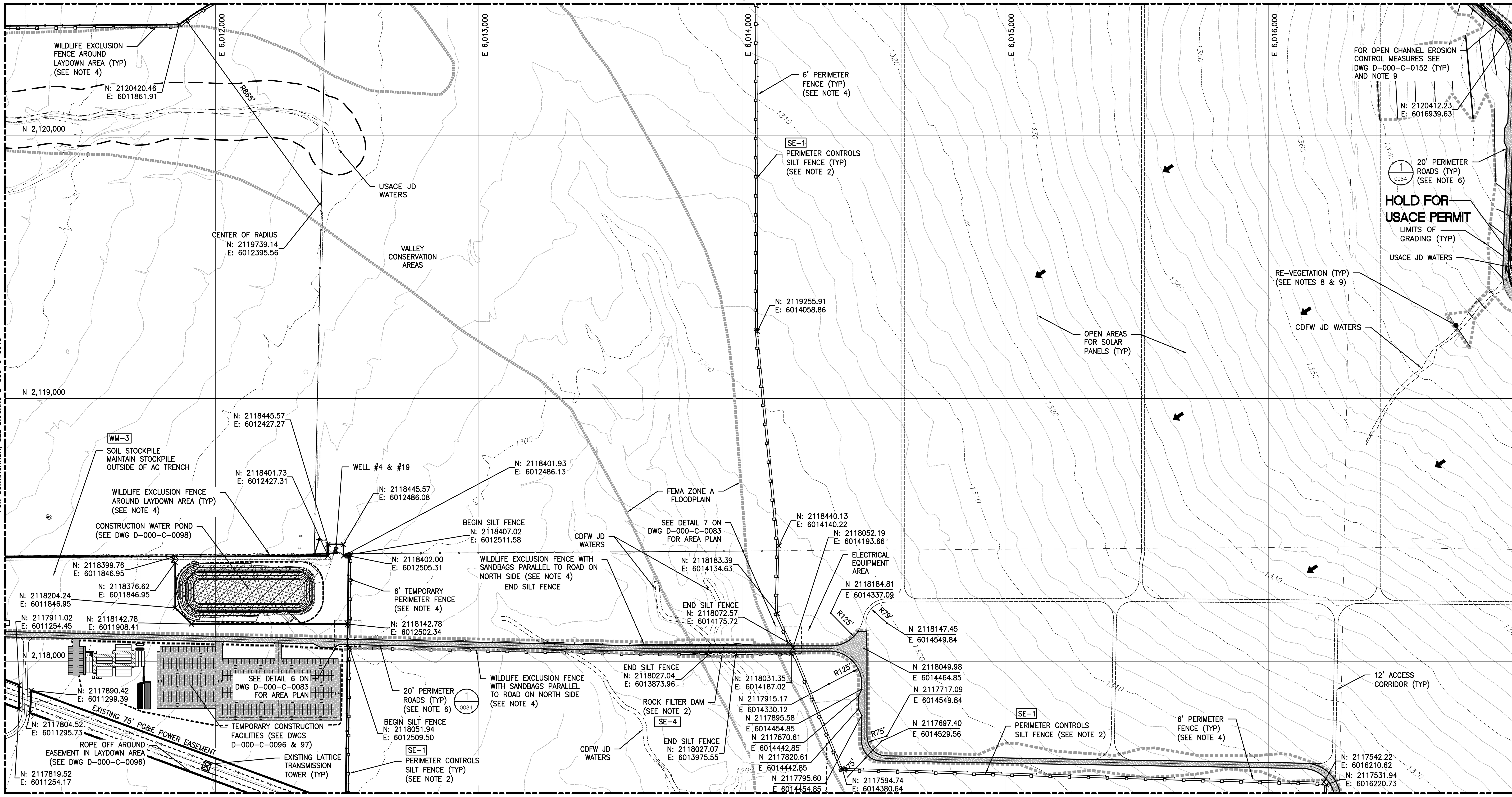
SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0019 REV. E

FOR CONTINUATION, SEE DRAWING D-000-C-0017



FOR CONTINUATION, SEE DRAWING D-000-C-0019

FOR CONTINUATION, SEE DRAWING D-000-C-0021

FOR CONTINUATION, SEE DRAWING D-000-C-0023

KEYNOTES 1

1.

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
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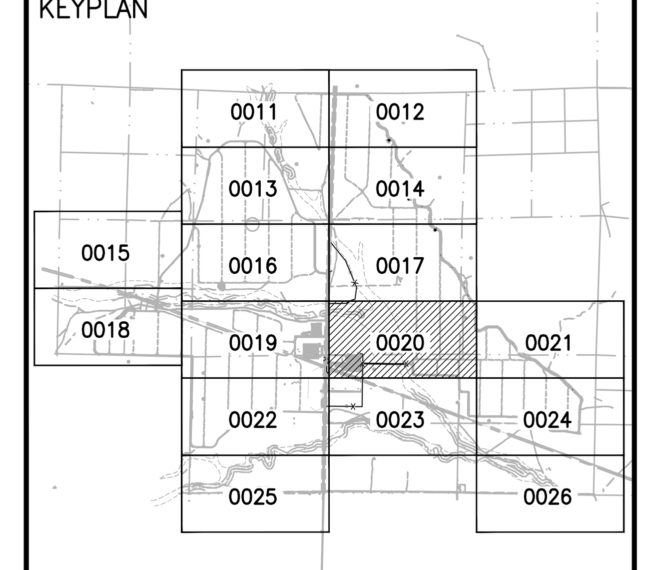
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
F	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
E	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
D	03MAR15	ISSUED FOR PERMIT REVIEW; ADDED CDFW JURISDICTIONAL WATERS	JTW	LEC	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR INFORMATION

	DRE	HRM
CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	13NOV14
SCALE	PACKAGE CODE	DRN	DRD	13NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

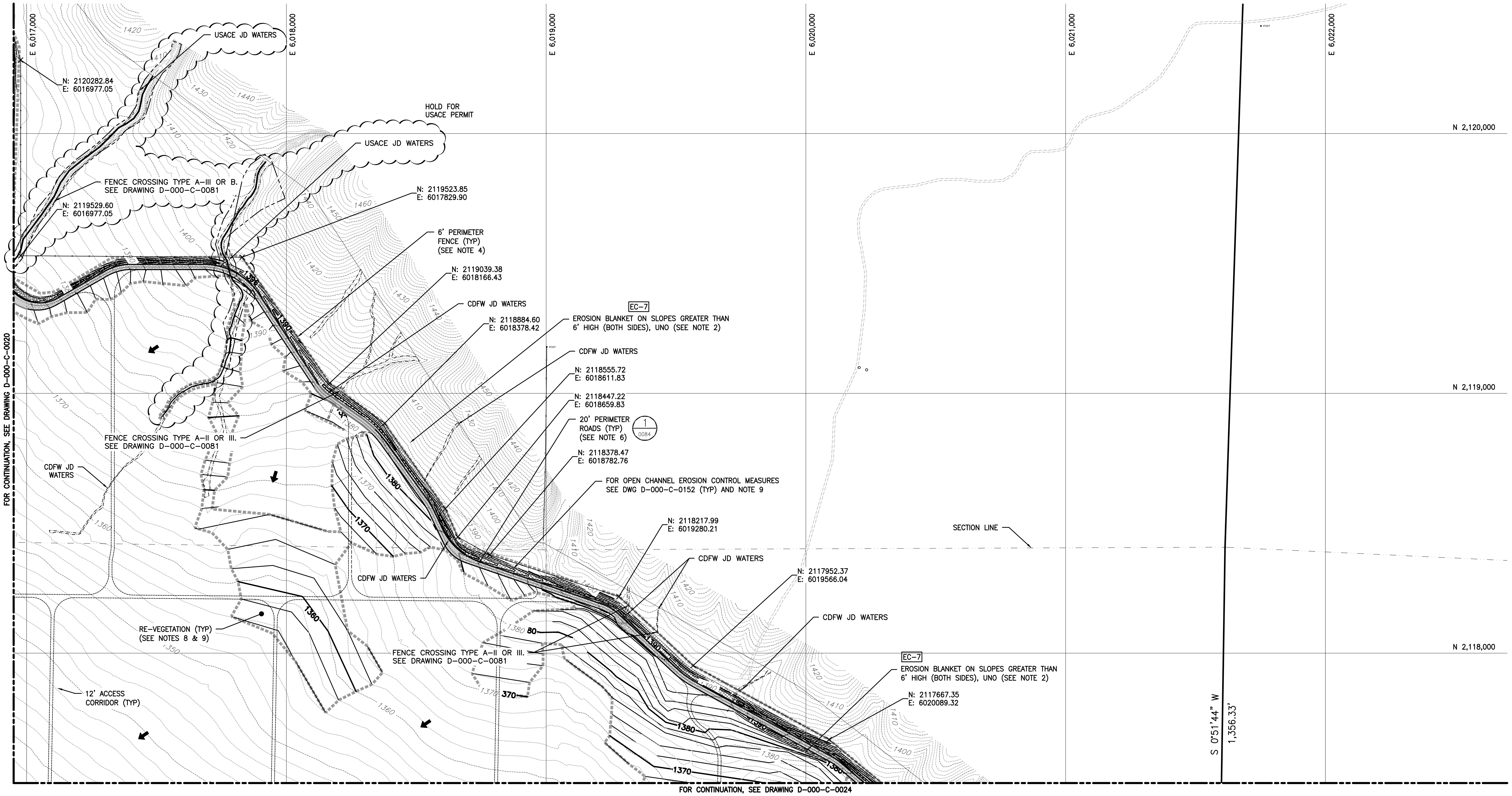
CLIENT DWG. NO.

DRAWING NO. D-000-C-0020 REV. F

ARCH D-24x36

CAD FILE: P:\CAD\CIVIL\D-000-C-0020.DWG

SAVED: 14-Sep-15 3:08 PM PLOTTED: 15-Sep-15 6:32 PM USER: GILL, MATTHEW



KEYNOTES 1

1.

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
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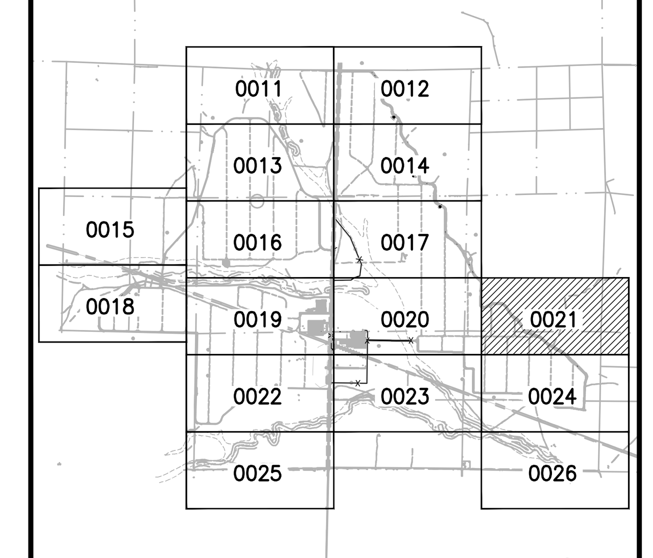
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

0 40' 100' 200' 400'

1"=200'-0"

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

DRE HRM

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.: 176055

ACTIVITY NO.

SCALE: 1" = 200'

PACKAGE CODE

	BY	DDMMMYY
DES	MTG	13NOV14
DRN	DRD	13NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

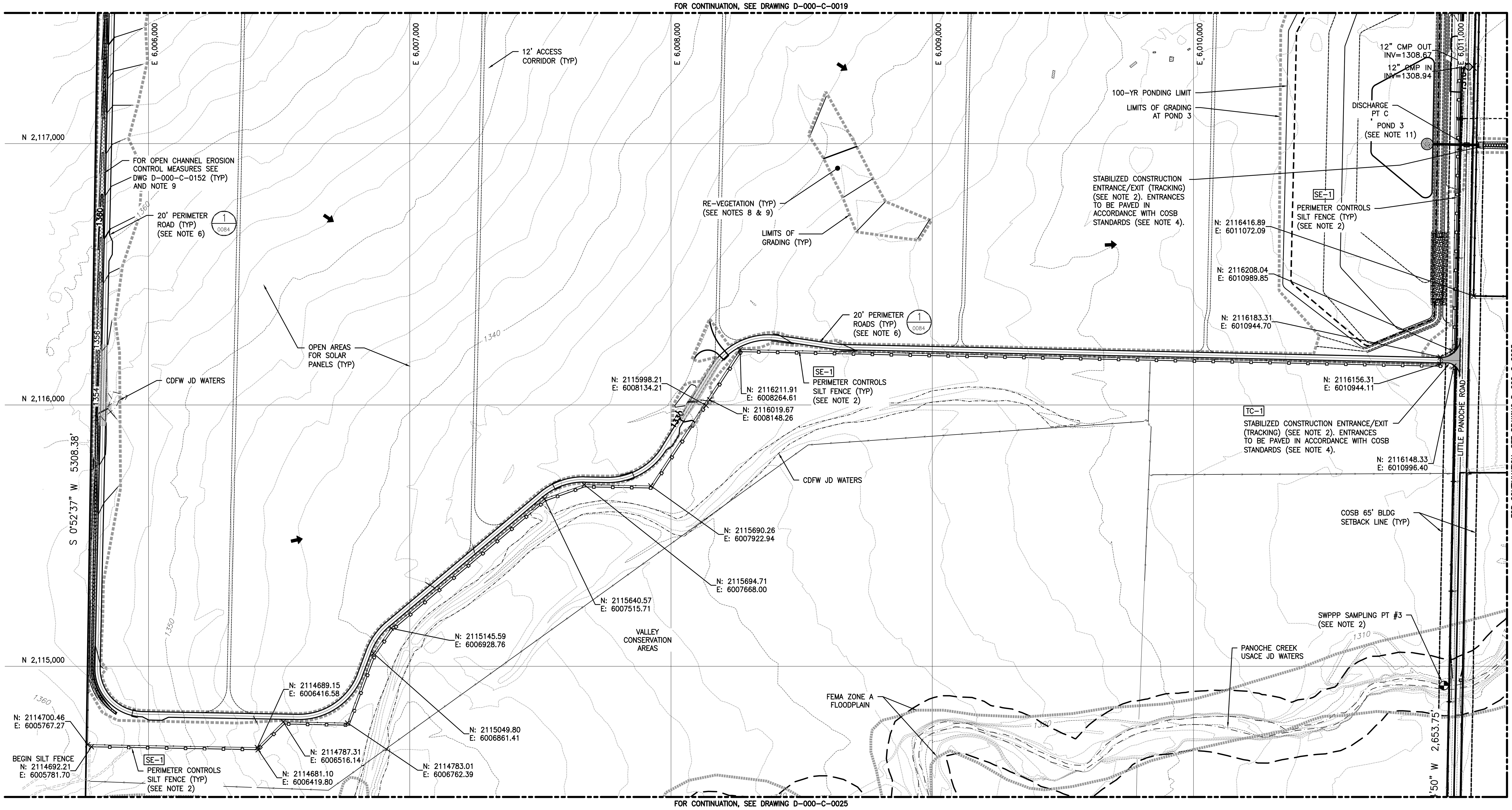
AREA

CLIENT DWG. NO.

DRAWING NO.: D-000-C-0021

REV.: E

FOR CONTINUATION, SEE DRAWING D-000-C-0019



FOR CONTINUATION, SEE DRAWING D-000-C-0025

FOR CONTINUATION, SEE DRAWING D-000-C-0023

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
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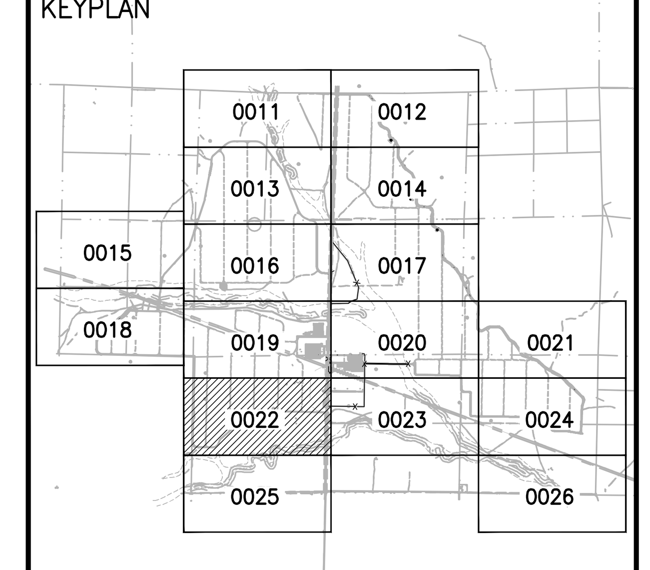
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN



KEYNOTES 1

1.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

UNLESS OTHERWISE AGREED IN A WRITTEN CONTRACT BETWEEN AMEC AND ITS CLIENT: (I) THIS AMEC DOCUMENT CONTAINS INFORMATION, DATA AND DESIGN THAT IS CONFIDENTIAL AND MAY NOT BE COPIED OR DISCLOSED; AND (II) THIS DOCUMENT MAY ONLY BE USED BY THE CLIENT IN THE CONTEXT AND FOR THE EXPRESS PURPOSE FOR WHICH IT HAS BEEN DELIVERED. ANY OTHER USE OR RELIANCE ON THIS DOCUMENT BY ANY THIRD PARTY IS AT THAT PARTY'S SOLE RISK AND RESPONSIBILITY.

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	13NOV14
SCALE	PACKAGE CODE	DRN	DRD	13NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT: CIVIL GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

amec

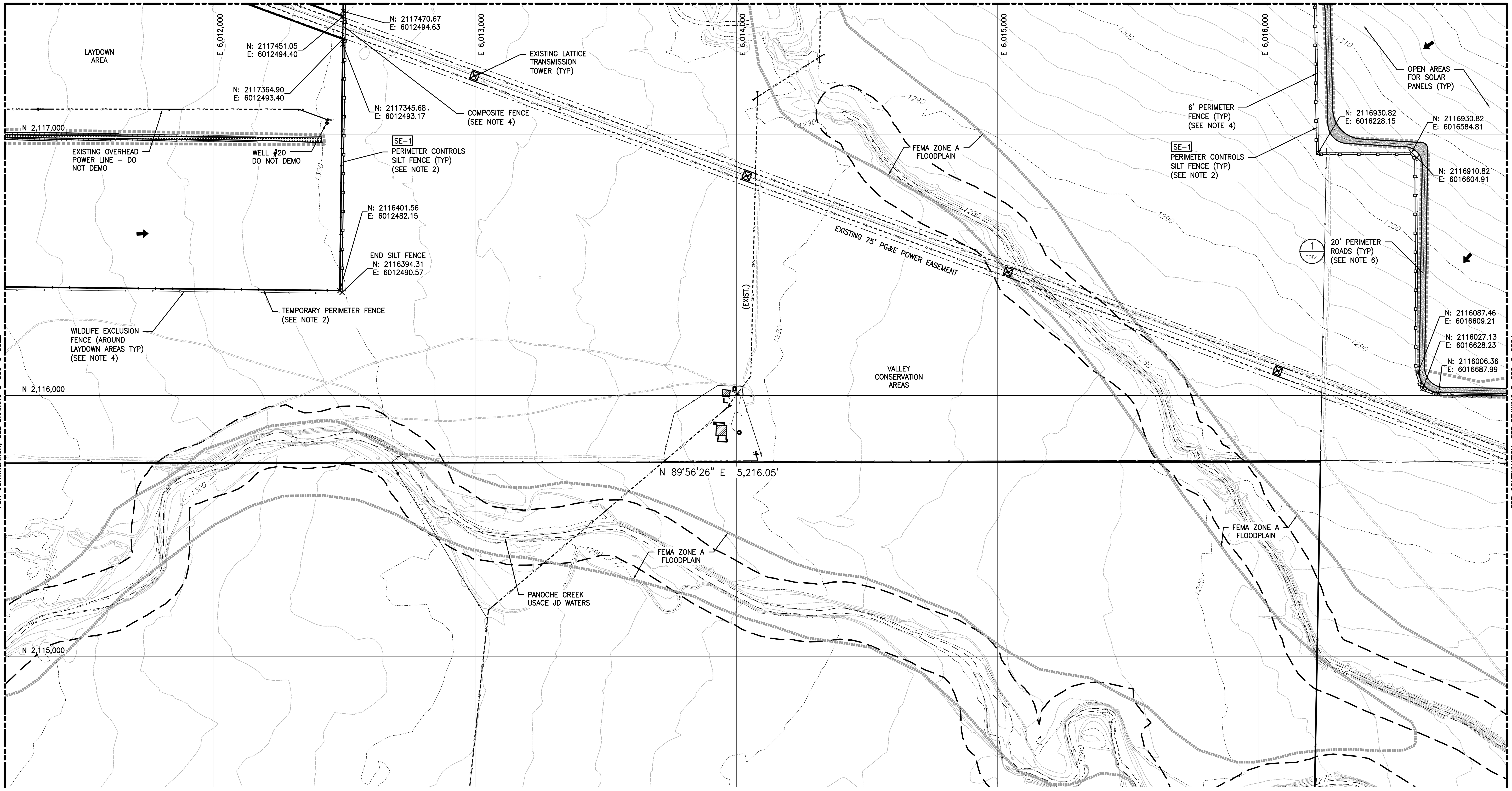
AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0022 REV. E

SAVED: 11-Sep-15 3:08 PM PLOTTED: 15-Sep-15 6:36 PM USER: GILL, MATTHEW

FOR CONTINUATION, SEE DRAWING D-000-C-0020



FOR CONTINUATION, SEE DRAWING D-000-C-0022

FOR CONTINUATION, SEE DRAWING D-000-C-0024

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
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5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
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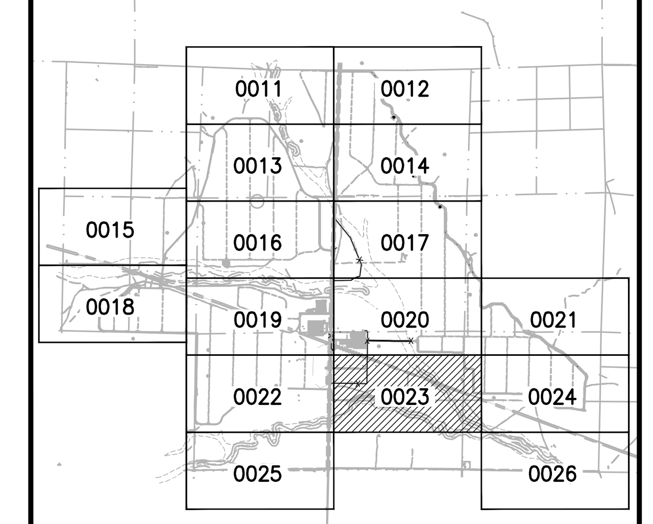
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

0 40' 100' 200' 400'
1"=200'-0"

KEYPLAN



KEYNOTES 1

1.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE 1" = 200'
PACKAGE CODE

	BY	DDMMMYY
DES	MTG	13NOV14
DRN	DRD	13NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

CLIENT DWG. NO.

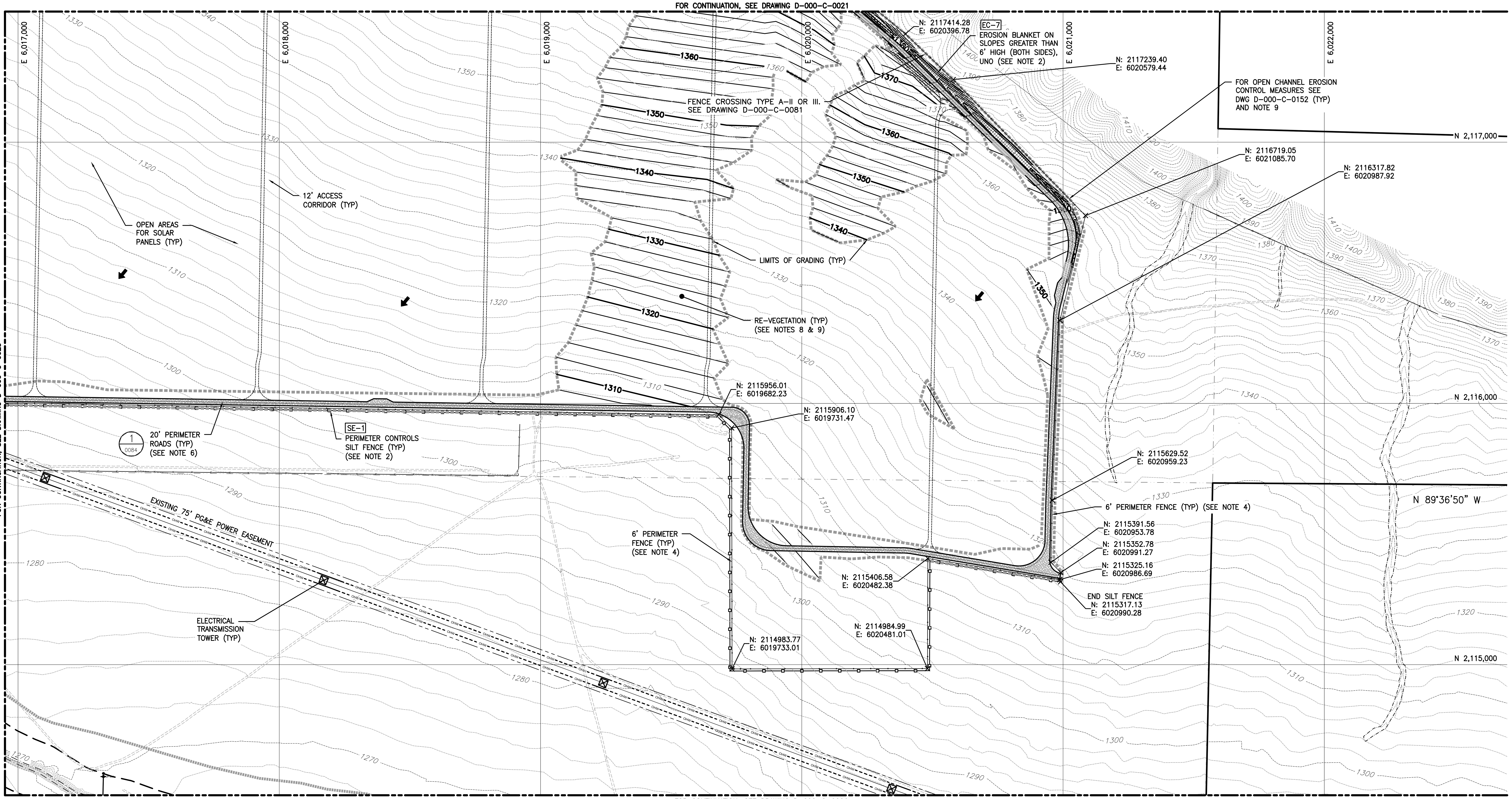
DRAWING NO. D-000-C-0023
REV. E

ARCH D-24x36

CAD FILE: P:\CAD\CIV\D-000-C-0023.DWG

SAVED: 09-Sep-15 4:50 PM PLOTTED: 15-Sep-15 6:37 PM USER: GILL, MATTHEW

FOR CONTINUATION, SEE DRAWING D-000-C-0021



FOR CONTINUATION, SEE DRAWING D-000-C-0026

HOLD

KEYNOTES 1

1.

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
9. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
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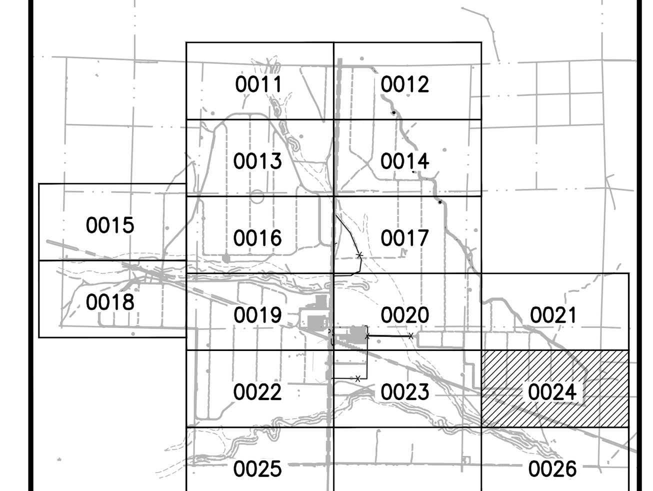
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE
		REFERENCES

UNLESS OTHERWISE AGREED IN A WRITTEN CONTRACT BETWEEN AMEC AND ITS CLIENT: (I) THIS AMEC DOCUMENT CONTAINS INFORMATION, DATA AND DESIGN THAT IS CONFIDENTIAL AND MAY NOT BE COPIED OR DISCLOSED; AND (II) THIS DOCUMENT MAY ONLY BE USED BY THE CLIENT IN THE CONTEXT AND FOR THE EXPRESS PURPOSE FOR WHICH IT HAS BEEN DELIVERED. ANY OTHER USE OR RELIANCE ON THIS DOCUMENT BY ANY THIRD PARTY IS AT THAT PARTY'S SOLE RISK AND RESPONSIBILITY.

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	14NOV14
SCALE	PACKAGE CODE	DRN	DRD	14NOV14
1" = 200'		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

CLIENT DWG. NO.

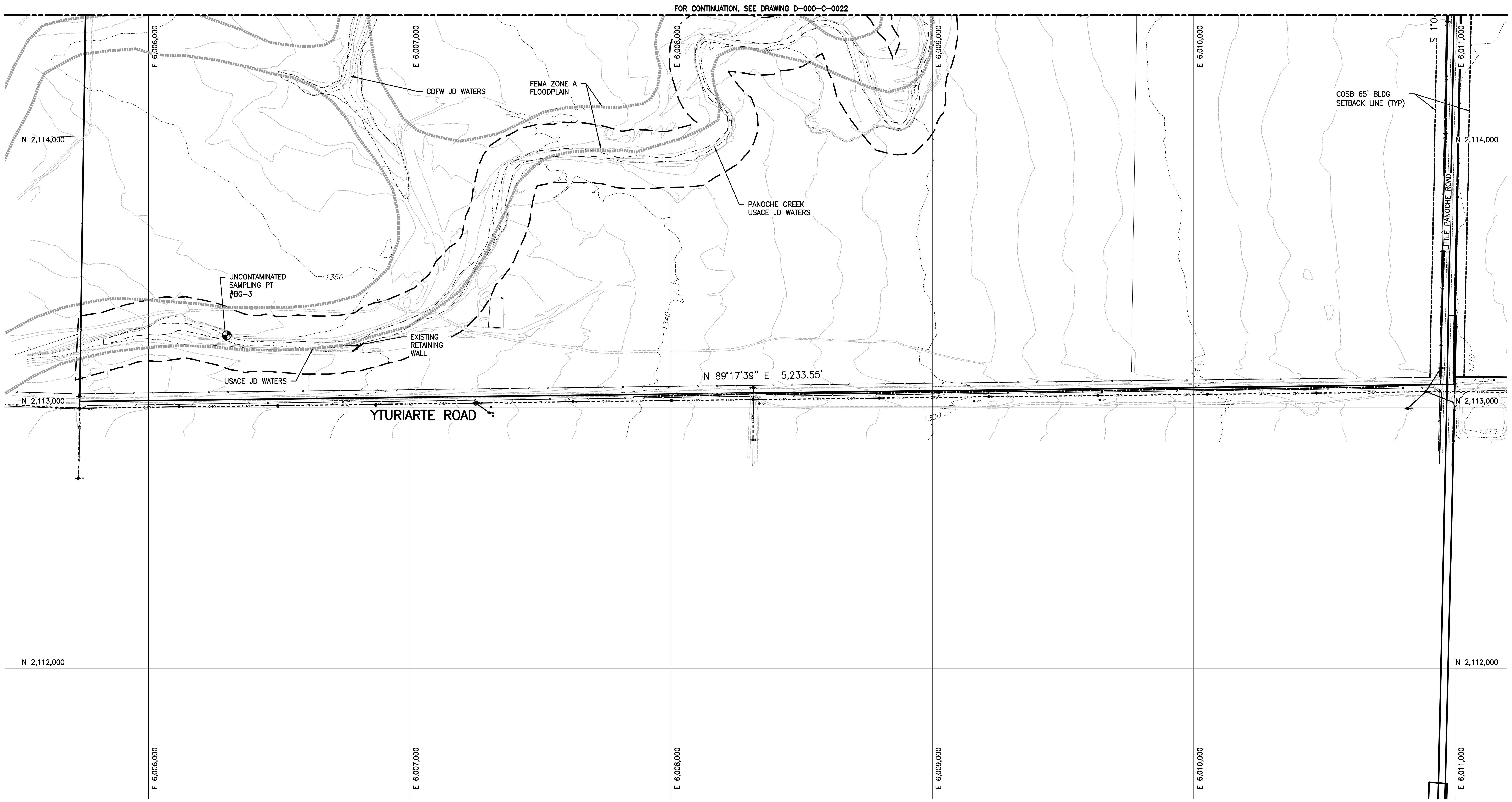
DRAWING NO. D-000-C-0024 REV. E

ARCH D-24x36

SAVED: 09-Sep-15 4:52 PM PLOTTED: 15-Sep-15 6:38 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIVIL\D-000-C-0024.DWG

FOR CONTINUATION, SEE DRAWING D-000-C-0022



KEYNOTES 1

1.

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1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
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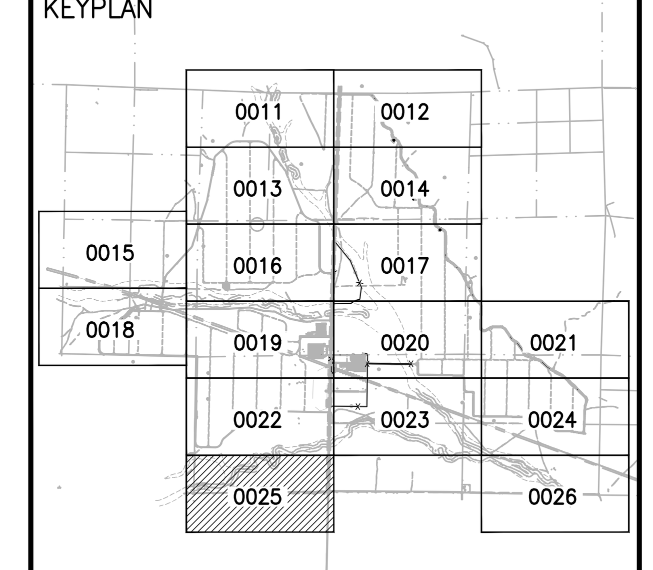
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

N

0 40' 100' 200' 400'

1"=200'-0"

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
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CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055

ACTIVITY NO.

SCALE 1" = 200'

PACKAGE CODE

	BY	DDMMMYY
DES	MTG	14NOV14
DRN	DRD	14NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

AREA

CLIENT DWG. NO.

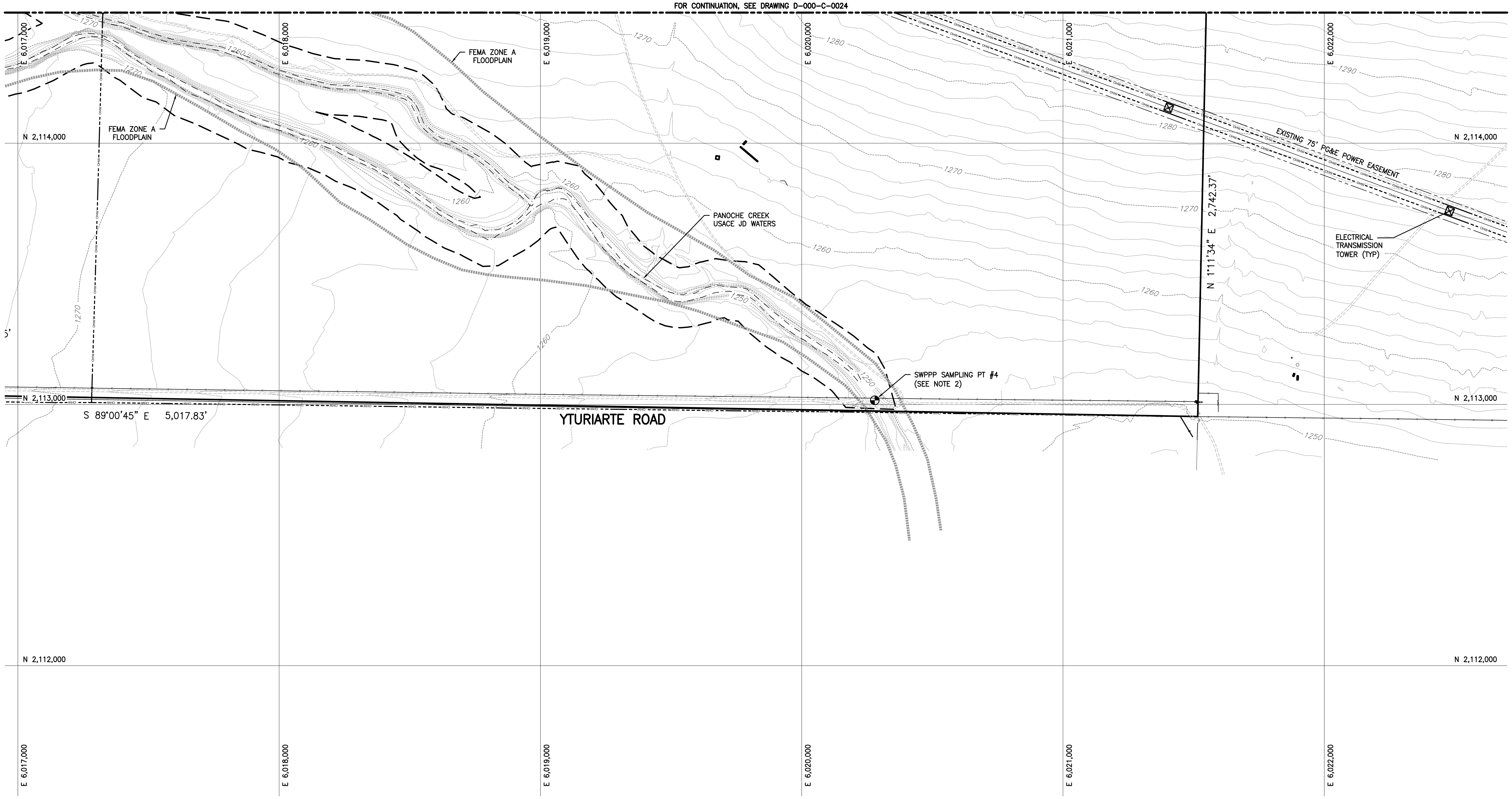
DRAWING NO. D-000-C-0025

REV. E

SAVED: 14-Sep-15 2:38 PM PLOTTED: 15-Sep-15 11:46 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIVIL\D-000-C-0025.DWG

ARCH D-24x36



KEYNOTES 1

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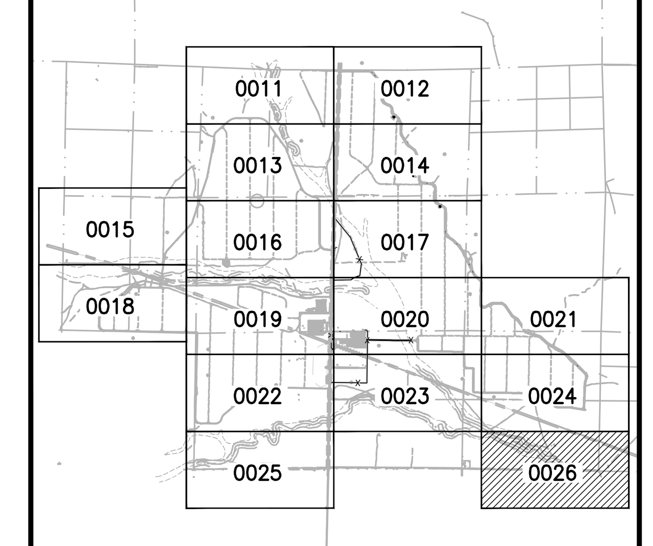
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SEE DETAIL 3 ON DWG D-000-C-0071 FOR SILT FENCE LOCATION DETAIL.

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
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REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

DRE HRM

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE 1" = 200'
PACKAGE CODE

	BY	DDMMMYY
DES	MTG	14NOV14
DRN	DRD	14NOV14
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT
CIVIL
GRADING, DRAINAGE, AND SEDIMENT / EROSION CONTROL PLAN

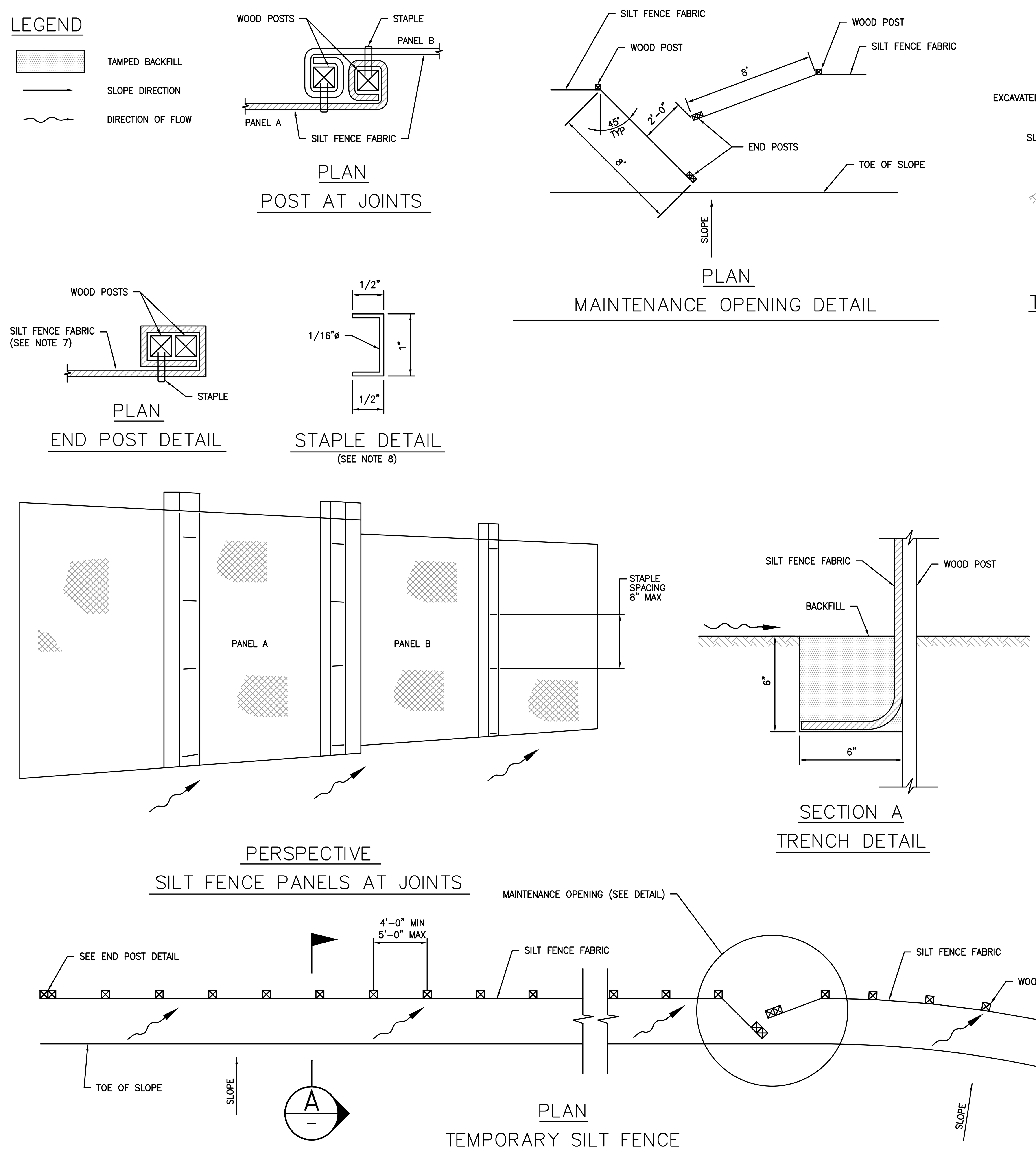
amec

AREA

CLIENT DWG. NO.

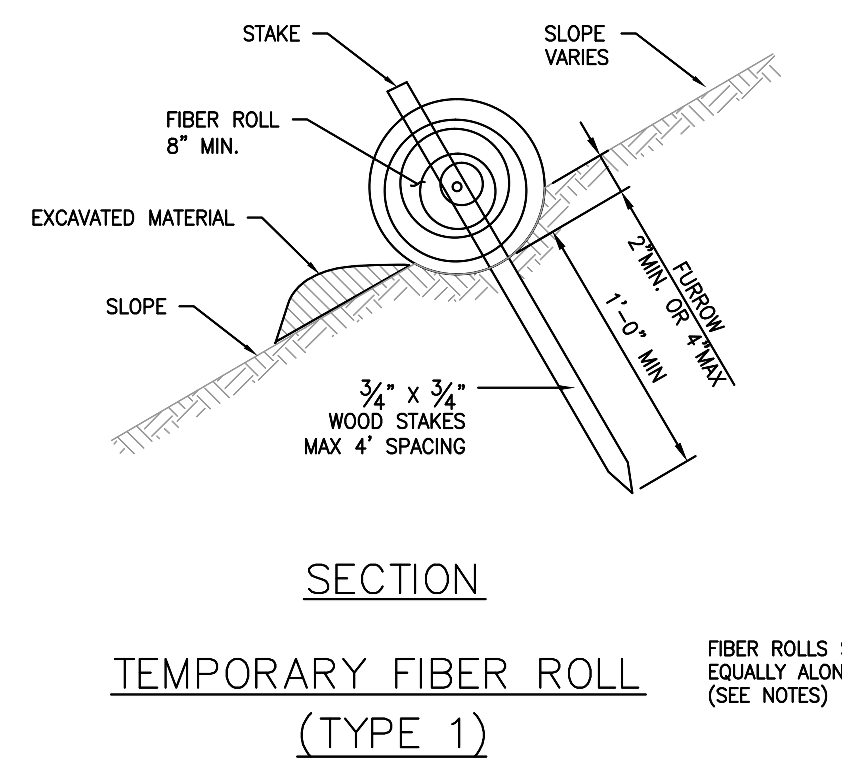
DRAWING NO. D-000-C-0026
REV. E

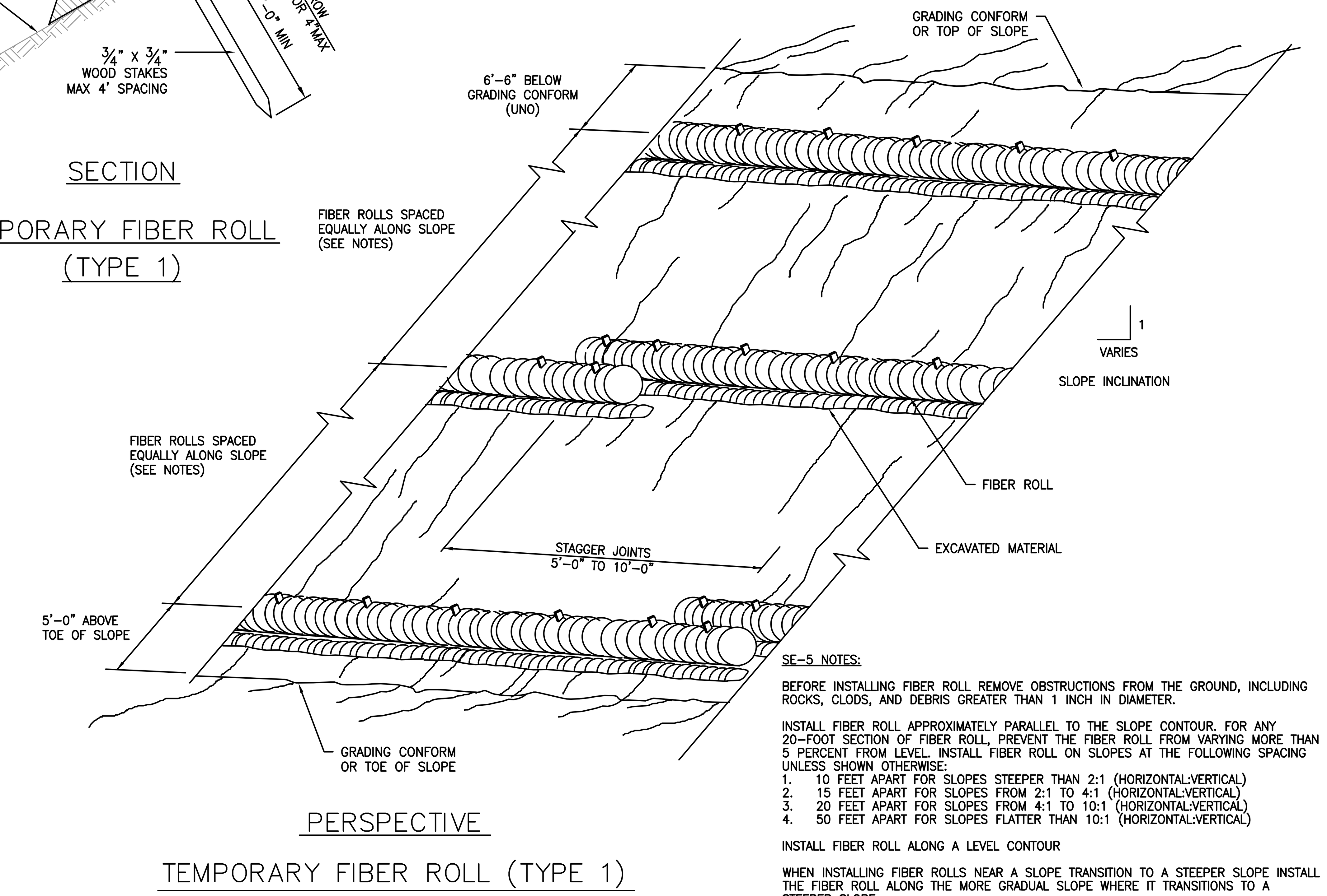
SAVED: 09-Sep-15 4:54 PM PLOTTED: 15-Sep-15 6:35 PM USER: GILL, MATTHEW



1 SILT FENCE SE-1
NTS

1. EACH DETAIL REPRESENTS A BMP.
2. ANY FIELD CHANGES OF EROSION OR SEDIMENT CONTROL MEASURES SHALL BE APPROVED BY ENGINEER (QUALIFIED SWPPP DEVELOPER).
3. TO MINIMIZE WILDLIFE ENTANGLEMENT AND PLASTIC DEBRIS POLLUTION, CHOOSE TEMPORARY EROSION AND SEDIMENT CONTROL PRODUCTS THAT EITHER DO NOT CONTAIN NETTING, OR THAT CONTAIN NETTING MANUFACTURED FROM 100% BIODEGRADABLE NON-PLASTIC MATERIALS SUCH AS JUTE, SISAL, OR COIR FIBER. DEGRADABLE, PHOTODEGRADABLE, UV-DEGRADABLE, OXO-DEGRADABLE, OR OXO-BIODEGRADABLE. PLASTIC NETTING (INCLUDING POLYPROPYLENE, NYLON, POLYETHYLENE, AND POLYESTER) ARE NOT ACCEPTABLE ALTERNATIVES. NETTING USED IN THESE PRODUCTS SHOULD HAVE A LOOSE-WEAVE WILDLIFE-SAFE DESIGN WITH MOVABLE JOINTS BETWEEN THE HORIZONTAL AND VERTICAL TWINES, ALLOWING THE TWINES TO MOVE INDEPENDENTLY AND THUS REDUCING THE POTENTIAL FOR WILDLIFE ENTANGLEMENT. AVOID THE USE OF SILT FENCES REINFORCED WITH METAL OR PLASTIC MESH. WHEN NO LONGER REQUIRED, CONTRACTOR SHOULD PROMPTLY REMOVE FROM THE PROJECT SITE TEMPORARY EROSION AND SEDIMENT CONTROL PRODUCTS.





2 FIBER ROLLS SE-5
NTS

SE-5 NOTES:

BEFORE INSTALLING FIBER ROLL REMOVE OBSTRUCTIONS FROM THE GROUND, INCLUDING ROCKS, CLODS, AND DEBRIS GREATER THAN 1 INCH IN DIAMETER.

INSTALL FIBER ROLL APPROXIMATELY PARALLEL TO THE SLOPE CONTOUR. FOR ANY 20-FOOT SECTION OF FIBER ROLL, PREVENT THE FIBER ROLL FROM VARYING MORE THAN 5 PERCENT FROM LEVEL. INSTALL FIBER ROLL ON SLOPES AT THE FOLLOWING SPACING UNLESS SHOWN OTHERWISE:
1. 10 FEET APART FOR SLOPES STEEPER THAN 2:1 (HORIZONTAL:VERTICAL)
2. 15 FEET APART FOR SLOPES FROM 2:1 TO 4:1 (HORIZONTAL:VERTICAL)
3. 20 FEET APART FOR SLOPES FROM 4:1 TO 10:1 (HORIZONTAL:VERTICAL)
4. 50 FEET APART FOR SLOPES FLATTER THAN 10:1 (HORIZONTAL:VERTICAL)

INSTALL FIBER ROLL ALONG A LEVEL CONTOUR

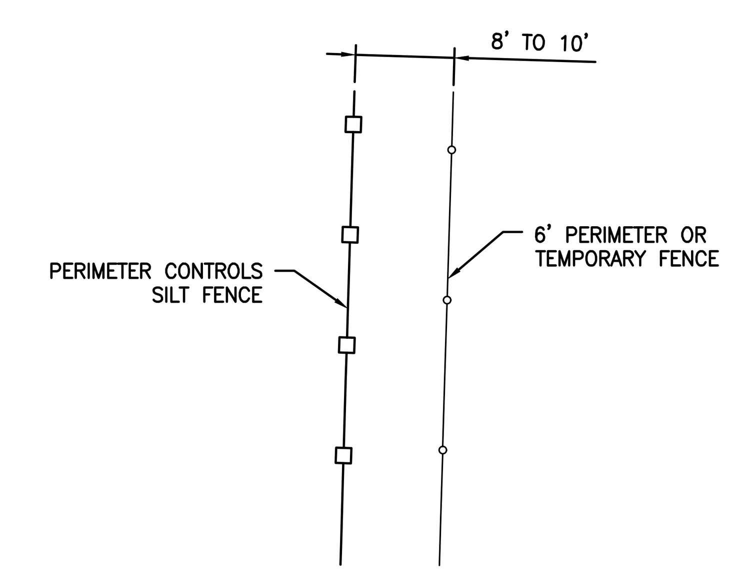
WHEN INSTALLING FIBER ROLLS NEAR A SLOPE TRANSITION TO A STEEPER SLOPE INSTALL THE FIBER ROLL ALONG THE MORE GRADUAL SLOPE WHERE IT TRANSITIONS TO A STEEPER SLOPE.

TYPE 1 FIBER ROLL INSTALLATION CONSISTS OF PLACING AND FASTENING AS FOLLOWS:
1. PLACE IN A FURROW THAT IS FROM 2 TO 4 INCHES DEEP.
2. FASTEN WITH WOOD STAKES EVERY 4 FEET ALONG THE LENGTH OF THE FIBER ROLL.
3. FASTEN THE ENDS OF THE FIBER ROLL BY PLACING A STAKE 6 INCHES FROM THE END OF THE ROLL.
4. DRIVE THE STAKES INTO THE SOIL SO THAT THE TOP OF THE STAKE IS LESS THAN 2 INCHES ABOVE THE TOP OF THE FIBER ROLL.

TYPE 2 FIBER ROLL (NOT SHOWN ON DETAIL) INSTALLATION CONSISTS OF PLACING AND FASTENING AS FOLLOWS:
1. FASTEN WITH NOTCHED WOOD STAKES AND ROPE.
2. DRIVE STAKES INTO THE SOIL UNTIL THE NOTCH IS EVEN WITH THE TOP OF THE FIBER ROLL.
3. LACE THE ROPE BETWEEN STAKES AND OVER THE FIBER ROLL. KNOT THE ROPE AT EACH STAKE.
4. TIGHTEN THE FIBER ROLL TO THE SURFACE OF THE SLOPE BY DRIVING THE STAKES FURTHER INTO THE SOIL.

MAINTAIN FIBER ROLL IN A MANNER THAT PROVIDES SEDIMENT HOLDING CAPACITY AND REDUCES RUNOFF VELOCITIES AS FOLLOWS:
1. REMOVE SEDIMENT FROM BEHIND THE FIBER ROLL WHEN SEDIMENT IS 1/3 OF FIBER ROLL HEIGHT ABOVE GROUND.
2. REPAIR OR ADJUST THE FIBER ROLL WHEN RILLS OR OTHER EVIDENCE OF CONCENTRATED RUNOFF OCCUR BENEATH THE FIBER ROLL.
3. REPAIR OR REPLACE THE FIBER ROLL WHEN THEY BECOME SPLIT, TORN, OR UNRAVELED.
4. ADD STAKES WHEN THE FIBER ROLL SLUMPS OR SAGS.
5. REPLACE BROKEN OR SPLIT WOOD STAKES.
6. REMOVE SEDIMENT DEPOSITS, TRASH, AND DEBRIS FROM FIBER ROLL AS NEEDED OR WHEN ORDERED. IF REMOVED SEDIMENT IS DEPOSITED WITHIN PROJECT LIMITS, IT MUST BE STABILIZED AND NOT EXPOSED TO EROSION BY WIND OR WATER.

CONTRACTOR SHALL EMPLOY THE USE OF THE FIBER ROLLS ON DISTURBED SOILS IF RE VEGETATION OF DISTURBED SOILS DOES NOT TAKE HOLD AND/OR DISTURBED SOILS WITH RE VEGETATION BEGIN TO RILL OR GULLY. CONTRACTOR SHALL REPAIR RILED OR GULLIED SOILS PRIOR TO INSTALLATION OF FIBER ROLLS. PLACE FIBER ROLLS ALONG DISTURBED SOILS AT SPACING INTERVALS SHOWN ABOVE.



NOTES:
1. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
2. SEE DWGS D-000-C-0011 THROUGH D-000-C-0026 FOR FENCE COORDINATES.

3 SILT FENCE LOCATION DETAIL
NTS

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

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11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. ANY FIELD CHANGES OF HYDRAULIC BMPS SHALL BE APPROVED BY ENGINEER (QUALIFIED SWPPP DEVELOPER).

SE-1 NOTES:

1. INSTALL TEMPORARY SILT FENCE BY FIRST DIGGING TRENCH, DRIVING POSTS, PLACING AND SECURING FABRIC. THEN BACKFILL AND TAMP.
2. REACH LENGTH SHOULD NOT EXCEED 500 FEET.
3. THE DOWN STREAM END OF THE TEMPORARY SILT FENCE SHALL HAVE THE LAST 8' ANGLED UP SLOPE.
4. SETBACK DIMENSIONS MAY VARY TO FIT FIELD CONDITIONS.
5. POSTS TO OVERLAP AND FENCE FABRIC TO FOLD AROUND EACH POST ONE FULL TURN. SECURE FABRIC WITH 4 STAPLES FOR EACH POST.
6. POSTS SHALL BE DRIVEN TIGHTLY TOGETHER TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT THE JOINT. THE TOPS OF THE POSTS SHALL BE SECURED TO EACH OTHER WITH WIRE.
7. FOR EACH END POST, FENCE FABRIC SHALL BE FOLDED AROUND TWO POSTS ONE FULL TURN AND SECURED WITH 4 STAPLES.
8. MINIMUM OF 4 STAPLES SHALL BE INSTALLED PER POST. DIMENSIONS SHOWN ARE TYPICAL.
9. MAINTENANCE OPENINGS SHALL BE CONSTRUCTED IN A MANNER TO ENSURE THAT SEDIMENT IS RETAINED BY THE TEMPORARY SILT FENCE.
10. MAINTENANCE OPENINGS SHALL BE INSTALLED EVERY 250 FT CENTER TO CENTER.
11. JOINT SECTIONS SHALL NOT BE PLACED AT SUMP LOCATIONS.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
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PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	07JUL14
		DRN	JTW	08JUL14
SCALE: NTS	PACKAGE CODE	CHK	LEC	07JAN15
		APP	DRE	

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL EROSION CONTROL NOTES & DETAILS

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0071 REV. E

CAD FILE: P:\CAD\CIV\D-000-C-0071.DWG

SAVED: 15-Sep-15 3:27 PM PLOTTED: 15-Sep-15 6:46 PM USER: GILL, MATTHEW

- DESCRIPTION AND PURPOSE:

CAREFULLY PLANNED PRESERVATION OF EXISTING VEGETATION MINIMIZES THE POTENTIAL OF REMOVING OR INJURING EXISTING TREES, VINES, SHRUBS, AND GRASSES THAT PROTECT SOIL FROM EROSION.

- SUITABLE APPLICATIONS:

PRESERVATION OF EXISTING VEGETATION IS SUITABLE FOR USE ON MOST PROJECTS. LARGE PROJECT SITES OFTEN PROVIDE THE GREATEST OPPORTUNITY FOR USE OF THIS BMP. ONE OF MANY SUITABLE APPLICATIONS INCLUDE AREAS WITHIN THE SITE WHERE NO CONSTRUCTION ACTIVITY OCCURS, OR OCCURS AT A LATER DATE. THIS BMP IS ESPECIALLY SUITABLE TO MULTI YEAR PROJECTS WHERE GRADING CAN BE PHASED.

- LIMITATIONS:

REQUIRES FORWARD PLANNING BY THE OWNER/DEVELOPER.

- IMPLEMENTATION:

THE BEST WAY TO PREVENT EROSION IS TO NOT DISTURB THE LAND. IN ORDER TO REDUCE THE IMPACTS OF NEW DEVELOPMENT AND REDEVELOPMENT, PROJECTS MAY BE DESIGNED TO AVOID DISTURBING LAND IN SENSITIVE AREAS OF THE SITE (E.G., NATURAL WATERCOURSES, STEEP SLOPES), AND TO INCORPORATE UNIQUE OR DESIRABLE EXISTING VEGETATION INTO THE SITE'S LANDSCAPING PLAN. CLEARLY MARKING AND LEAVING A BUFFER AREA AROUND THESE UNIQUE AREAS DURING CONSTRUCTION WILL HELP TO PRESERVE THESE AREAS AS WELL AS TAKE ADVANTAGE OF NATURAL EROSION PREVENTION AND SEDIMENT TRAPPING.

- INSPECTION AND MAINTENANCE:

DURING CONSTRUCTION, THE LIMITS OF DISTURBANCE SHOULD REMAIN CLEARLY MARKED AT ALL TIMES.

4 / - PRESERVATION OF EXISITING VEGETATION EC-2

- DESCRIPTION AND PURPOSE:

SOIL PREPARATION/ROUGHENING INVOLVES ASSESSMENT AND PREPARATION OF SURFACE SOILS FOR BMP INSTALLATION.

- SUITABLE APPLICATIONS:

SOIL PREPARATION: SOIL PREPARATION IS SUITABLE FOR USE IN COMBINATION WITH ANY SOIL STABILIZATION METHOD.

ROUGHENING: SOIL ROUGHENING IS REFERRED TO AS TRACK WALKING A SLOPE, WHERE TREADS FROM HEAVY EQUIPMENT RUN PARALLEL TO THE CONTOURS OF THE SLOPE AND ACT AS MINI TERRACES. ROUGHENING IS NOT INTENDED TO BE USED AS A STAND-ALONE BMP, AND SHOULD BE USED WITH PERIMETER CONTROLS, ADDITIONAL EROSION CONTROL MEASURES, GRADE BREAKS, AND VEGETATION ESTABLISHMENT FOR MAXIMUM EFFECTIVENESS. ROUGHENING IS INTENDED TO ONLY AFFECT SURFACE SOILS AND SHOULD NOT COMPROMISE SLOPE STABILITY OR OVERALL COMPACTION. ROUGHNESS MAY ALSO APPLY TO TILLAGE OF THE SOIL PRIOR TO SEEDING.

- LIMITATIONS:

CONSIDERATION SHOULD BE GIVEN TO THE TYPE OF EROSION CONTROL BMP THAT FOLLOWS SURFACE PREPARATION, AS SOME BMP'S ARE NOT DESIGNED TO BE INSTALLED OVER VARIOUS TYPES OF TILLAGE/ROUGHENING.

- IMPLEMENTATION:

FOR IMPLEMENTATION SEE THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) DOCUMENT.

5 / - SOIL PREPARATION/ROUGHENING EC-15

- DESCRIPTION AND PURPOSE:

STREET SWEEPING AND VACUUMING INCLUDES USE OF SELF-PROPELLED AND WALK BEHIND EQUIPMENT TO REMOVE SEDIMENT FROM STREETS AND ROADWAYS, AND TO CLEAN PAVED SURFACES IN PREPARATIONS FOR FINAL PAVING. SWEEPING AND VACUUMING PREVENTS SEDIMENT FROM THE PROJECT SITE FROM ENTERING STORM DRAINS OR RECEIVING WATERS.

- SUITABLE APPLICATIONS:

SWEEPING AND VACUUMING ARE SUITABLE ANYWHERE SEDIMENT IS TRACKED FROM THE PROJECT SITE ONTO PUBLIC OR PRIVATE PAVED STREETS AND ROADS, TYPICALLY AT POINTS OF EGRESS. SWEEPING AND VACUUMING ARE ALSO APPLICABLE DURING PREPARATION OF PAVED SURFACES FOR FINAL PAVING.

- LIMITATIONS:
SWEEPING AND VACUUMING MAY NOT BE EFFECTIVE WHEN SEDIMENT IS WET OR WHEN TRACKED SOIL IS CAKED (CAKED SOIL MAY NEED TO BE SCRAPED LOOSE).

- IMPLEMENTATION:

CONTROLLING THE NUMBER OF POINTS WHERE VEHICLES CAN LEAVE THE SITE WILL ALLOW SWEEPING AND VACUUMING EFFORTS TO BE FOCUSED, AND PERHAPS SAVE MONEY.

INSPECT POTENTIAL SEDIMENT TRACKING LOCATIONS DAILY.

VISIBLE SEDIMENT TRACKING SHOULD BE SWEPT OR VACUUMED ON A DAILY BASIS.

DO NOT USE KICK BROOMS OR SWEEPER ATTACHMENTS. THESE TEND TO SPREAD THE DIRT RATHER THAN RMOVE IT.

IF NOT MIXED WITH DEBRIS OR TASH, CONSIDER INCORPORATING THE REMOVED SEDIMENT BACK INTO THE PROJECT.

13 / - STREET SWEEPING AND VACUUMING SE-7

- DESCRIPTION AND PURPOSE:

HYDROSEEDING TYPICALLY CONSISTS OF APPLYING A MIXTURE OF A HYDRAULIC MULCH, SEED, FERTILIZER, AND STABILIZING EMULSION WITH A HYDRAULIC MULCHER, TO TEMPORARILY PROTECT EXPOSED SOILS FROM EROSION BY WATER AND WIND. HYDRAULIC SEEDING, OR HYDROSEEDING, IS THE METHOD BY WHICH TEMPORARY OR PERMANENT SEED IS APPLIED TO THE SOIL SURFACE.

- SUITABLE APPLICATIONS:

HYDROSEEDING IS SUITABLE FOR DISTURBED AREAS REQUIRING TEMPORARY PROTECTION UNTIL PERMANENT STABILIZATION IS ESTABLISHED, FOR DISTURBED AREAS THAT WILL BE RE-DISTURBED FOLLOWING AN EXTENDED PERIOD OF INACTIVITY, OR TO APPLY PERMANENT STABILIZATION MEASURES. HYDROSEEDING WITHOUT MULCH OR OTHER COVER IS NOT A STAND-ALONE EROSION CONTROL BMP AND SHOULD BE COMBINED WITH ADDITIONAL MEASURES UNTIL VEGETATION ESTABLISHMENT.

- LIMITATIONS:

HYDRAULIC SEED SHOULD BE APPLIED WITH HYDRAULIC MULCH OR AN ACCEPTABLE STAND-ALONE HYDROSEED APPLICATION. HYDRAULIC SEED MAY BE USED ALONE ONLY ON SMALL FLAT SURFACES WHEN THERE IS SUFFICIENT TIME IN THE SEASON TO ENSURE ADEQUATE VEGETATION ESTABLISHMENT AND COVERAGE TO PROVIDE ADEQUATE EROSION CONTROL.

- IMPLEMENTATION:

HYDRAULIC SEED CAN BE APPLIED USING A MULTIPLE STEP OR ONE STEP PROCESS.

- IN A MULTIPLE STEP PROCESS, HYDRAULIC SEED IS APPLIED FIRST FOLLOWED BY MULCH OR A ROLLED EROSION CONTROL PRODUCT (RECP).
- IN THE ONE STEP PROCESS, HYDRAULIC SEED IS APPLIED WITH HYDRAULIC MULCH IN A HYDRAULIC MATRIX. WHEN THE ONE STEP PROCESS IS USED TO APPLY THE MIXTURE OF FIBER, SEED, ETC., THE SEED RATE SHOULD BE INCREASED TO COMPENSATE FOR ALL SEEDS NOT HAVING DIRECT CONTACT WITH THE SOIL.

- INSPECTION AND MAINTENANCE:

BMP'S MUST BE INSPECTED IN ACCORDANCE WITH THE GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT AT AT MINIMUM, BMP'S BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.

6 / - HYDROSEEDING EC-4

- DESCRIPTION AND PURPOSE:

AN EARTHEN DIKE IS A TEMPORARY BERM OR RIDGE OF COMPACTED SOIL USED TO DIVERT RUNOFF OR CHANNEL WATER TO A DESIRED LOCATION. A DRAINAGE SWALE IS A SHAPED AND SLOPED DEPRESSION IN THE SOIL SURFACE USED TO CONVEY RUNOFF TO A DESIRED LOCATION. THEY ARE USED TO DIVERT: OFF SITE RUNOFF AROUND THE CONSTRUCTION SITE, FROM STABILIZED AREAS AND DISTURBED AREAS, AND DIRECT RUNOFF INTO SEDIMENT TRAPS OR BASINS.

- SUITABLE APPLICATIONS:

EARTH DIKES AND DRAINAGE SWALES ARE SUITABLE FOR USE, INDIVIDUALLY OR TOGETHER, WHERE RUNOFF NEEDS TO BE DIVERTED FROM ONE AREA AND CONVEYED TO ANOTHER.

- LIMITATIONS:

DIKES SHOULD NOT BE USED FOR DRAINAGE AREAS GREATER THAN 10 ACRES OR ALONG SLOPES GREATER THAN 10 PERCENT.

EARTH DIKES/DRAINAGE SWALES ARE NOT SUITABLE AS SEDIMENT TRAPPING DEVICES.

EARTH DIKES MAY CREATE MORE DISTURBED AREA ON SITE AND BECOME BARRIERS TO CONSTRUCTION EQUIPMENT.

- IMPLEMENTATION: GENERAL

- CARE MUST BE APPLIED TO CORRECTLY SIZE AN LOCATE EARTH DIKES, DRAINAGE SWALES. EXCESSIVELY STEEP, UNLINED DIKES, AND SWALES ARE SUBJECT TO EROSION AND GULLY FORMATION.
- CONVEYANCES SHOULD BE STABILIZED.
- USE A LINED DITCH FOR HIGH FLOW VELOCITIES.
- SELECT FLOW VELOCITY BASED ON CAREFUL EVALUATION OF THE RISKS DUE TO EROSION MEASURE, SOIL TYPES, OVERTOPPING, FLOW BACKUPS, WASHOUT, AND DRAINAGE FLOW PATTERNS FOR EACH PROJECT SITE.
- COMPACT ANY FILLS TO PREVENT UNEQUAL SETTLEMENT.
- DO NOT DIVERT RUNOFF ONTO OTHER PROPERTY WITHOUT SECURING WRITTEN AUTHORIZATION FROM THE PROPERTY OWNER.
- WHEN POSSIBLE, INSTALL AND UTILIZE PERMANENT DIKES, SWALES, AND DITCHES EARLY IN THE CONSTRUCTION PROCESS.
- PROVIDE STABILIZED OUTLETS.

- INSPECTION AND MAINTENANCE:

INSPECT BMP'S PRIOR TO FORECAST RAIN, DAILY DURING EXTENDED RAIN EVENTS, AFTER RAIN EVENTS, WEEKLY DURING THE RAINY SEASON, AND AT TWO WEEK INTERVALS DURING THE NON-RAINY SEASON.

INSPECT BMP'S SUBJECT TO NON-STORMWATER DISCHARGES DAILY WHILE NON-STORMWATER DISCHARGES OCCUR.

INSPECT DITCHES AND BERMS FOR WASHOUTS

INSPECT CHANNEL LININGS, EMBANKMENTS, AND BEDS OF DITCHES AND BERMS FOR EROSION ACCUMULATION AND DEBRIS AND SEDIMENT. REMOVE DEBRIS AND REPAIR LININGS AND EMBANKMENTS AS NEEDED.

TEMPORARY CONVEYANCES SHOULD BE COMPLETELY REMOVED WHEN AREA HAS BEEN STABALIZED OR AT THE COMPLETION OF CONSTRUCTION.

7 / - EARTH DIKES AND DRAINAGE SWALES EC-9

- DESCRIPTION AND PURPOSE:

WIND EROSION OR DUST CONTROL CONSISTS OF APPLYING WATER OR OTHER CHEMICAL DUST SUPPRESSANTS AS NECESSARY TO PREVENT OR ALLEVIATE DUST NUISANCE GENERATED BY CONSTRUCTION ACTIVITIES. WIND EROSION CONTROL IS REQUIRED BY THE GENERAL PERMIT DUE TO THE CONSTRUCTION SITE BEING GREATER THAN 1 ACRE.

- SUITABLE APPLICATIONS:

MOST BMP'S THAT PROVIDE PROTECTION AGAINST WATER-BASED EROSION WILL ALSO PROTECT AGAINST WIND-BASED EROSION AND DUST CONTROL REQUIREMENTS.

- LIMITATIONS:

WATERING PREVENTS DUST ONLY FOR A SHORT PERIOD AND SHOULD BE APPLIED DAILY TO DISTURBED AREAS TO BE EFFECTIVE.

OIL OR OIL-TREATED SUBGRADE SHOULD NOT BE USED FOR DUST CONTROL BECAUSE THE OIL MAY MIGRATE INTO DRAINAGE WAYS AND/OR SEEP INTO THE SOIL.

- IMPLEMENTATION:

FOR IMPLEMENTATION SEE THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) DOCUMENT.

- INSPECTION AND MAINTENANCE:

INSPECT AND VERIFY THAT ACTIVITY-BASED BMP'S ARE IN PLACE PRIOR TO THE COMMENCEMENT OF ASSOCIATED ACTIVITIES.

8 / - WIND EROSION CONTROL WE-1

- DESCRIPTION AND PURPOSE:

STOCKPILE MANAGEMENT PROCEDURES AND PRACTICES ARE DESIGNED TO REDUCE OR ELIMINATE AIR AND STORMWATER POLLUTION FROM STOCKPILES OF SOIL, SOIL AMENDMENTS, SAND, PAVING MATERIALS SUCH AS PORTLAND CEMENT CONCRETE (PCC) RUBBLE, ASPHALT CONCRETE (AC), ASPHALT CONCRETE RUBBLE, AGGREGATE BASE, AGGREGATE SUB BASE OR PRE MIXED AGGREGATE, ASPHALT BINDER (SO CALLED "COLD MIX" ASPHALT), AND PRESSURE TREATED WOOD.

- SUITABLE APPLICATIONS:

IMPLEMENT IN ALL PROJECTS THAT STOCKPILE SOIL AND OTHER LOOSE MATERIALS.

- LIMITATIONS:

THE USE OF PLASTIC MATERIALS, SUCH AS PLASTIC SHEETING, SHOULD BE AVOIDED WHEN FEASIBLE AND PHOTODEGRADABLE PLASTICS SHOULD NOT BE USED.

- IMPLEMENTATION:

PROTECTION OF STOCKPILES IS A YEAR ROUND REQUIREMENT. TO PROPERLY MANAGE STOCKPILES;
- ON LARGER SITES, A MINIMUM OF 50 FT SEPARATION FROM CONCENTRATED FLOWS OF STORMWATER DRAINAGE COURSES, AND INLETS IS RECOMMENDED.
- ALL STOCKPILES ARE REQUIRED TO BE PROTECTED IMMEDIATELY IF THEY ARE NOT SCHEDULED TO USED WITHIN 14 DAYS.
- PROTECT ALL STOCKPILES FROM STORMWATER RUN-ON USING TEMPORARY PERIMETER SEDIMENT BARRIERS SUCH AS FIBER ROLLS (SE-5) OR SILT FENCES (SE-1).
- IMPLEMENT WIND EROSION CONTROL PRACTICES AS APPROPRIATE ON ALL STOCKPILED MATERIAL. FOR SPECIFIC INFORMATION, SEE WE-1.
- MANAGE STOCKPILES OF CONTAMINATED SOIL IN ACCORDANCE WITH WM-7, CONTAMINATED SOIL MANAGEMENT.
- PLACE BAGGED MATERIAL ON PALLETS AND UNDER COVER.
- ENSURE THAT STOCKPILE COVERING ARE INSTALLED SECURELY TO PROTECT FROM WIND AND RAIN.

- PROTECTION OF NON-ACTIVE SOIL STOCKPILES;
  - COVER AND PROTECT SOIL STOCKPILES WITH SOIL STABILIZATION MEASURES AND A TEMPORARY PERIMETER SEDIMENT BARRIER AT ALL TIMES.
  - CONSIDER TEMPORARY VEGETATION FOR TOPSOIL PILES THAT WILL STOCKPILED FOR EXTENDED PERIODS.

SEE BMP FACT SHEET IN SWPPP FOR PROTECTION OF OTHER NON-ACTIVE AND ACTIVE SOIL STOCKPILES.

- INSPECTION AND MAINTENANCE:

BMP'S MUST BE INSPECTED IN ACCORDANCE WITH THE GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT AT AT MINIMUM, BMP'S BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.

REPAIR AND/OR REPLACE PERIMETERS CONTROLS AND COVERS AS NEEDED TO KEEP THEM FUNCTIONING PROPERLY.

SEDIMENT SHALL BE REMOVED WHEN IT REACHES ONE-THIRD OF THE BARRIER HEIGHT.

9 / - / - STOCKPILE MANAGEMENT WM-03

- DESCRIPTION AND PURPOSE:

ACCESS ROADS, SUBDIVISION ROADS, PARKING AREAS, AND OTHER ONSITE VEHICLE TRANSPORTATION ROUTES SHALL BE STABILIZED IMMEDIATELY AFTER GRADING, AND FREQUENTLY MAINTAINED TO PREVENT EROSION AND CONTROL DUST.

- SUITABLE APPLICATIONS:

TEMPORARY CONSTRUCTION TRAFFIC AND CONSTRUCTION ROADWAYS

- LIMITATIONS:

MANAGEMENT OF CONSTRUCTION TRAFFIC IS SUBJECT TO AIR QUALITY CONTROL MEASURES. SEE DUST CONTROL PLAN C-RPT-000-003.

- IMPLEMENTATION AND INSTALLATION:

AREAS THAT ARE GRADED FOR CONSTRUCTION VEHICLE TRANSPORT AND PARKING PURPOSES ARE ESPECIALLY SUSCEPTIBLE TO EROSION AND DUST. THE EXPOSED SOIL SURFACE IS CONTINUALLY DISTURBED, LEAVING NO OPPORTUNITY FOR VEGETATIVE STABILIZATION. ROAD SHOULD FOLLOW TOPOGRAPHIC CONTOURS TO REDUCE EROSION OF THE ROADWAY. PROPERLY GRADE ROADWAY TO PREVENT RUNOFF FROM LEAVING CONSTRUCTION SITE. CONTRACTOR SHALL REFER TO DETAIL 1 AND 3 FOR CONSTRUCTION ACCESS ROAD SECTION AND LAYDOWN AREA/PARKING SECTION ON DRAWING D-000-C-0084.

- INSPECTION AND MAINTENANCE:

BMP'S MUST BE INSPECTED IN ACCORDANCE WITH THE GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT AT AT MINIMUM, BMP'S BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.

PERIODICALLY APPLY ADDITIONAL AGGREGATE ON GRAVEL ROADS.

ACTIVE DIRT CONSTRUCTION ROADS ARE COMMONLY WATERED THREE OR MORE TIMES PER DAY DURING THE DRY SEASON.

10 / - STABILIZED CONSTRUCTION ROADWAY TC-2

- DESCRIPTION AND PURPOSE:

SCHEDULING IS THE DEVELOPMENT OF A WRITTEN PLAN THAT INCLUDES SEQUENCING OF CONSTRUCTION ACTIVITIES AND THE IMPLEMENTATION OF BMP'S SUCH AS EROSION CONTROL AND SEDIMENT CONTROL WHILE TAKING LOCAL CLIMATE (RAINFALL, WIND, ETC.) INTO CONSIDERATION.

- SUITABLE APPLICATIONS:

PROPER SEQUENCING OF CONSTRUCTION ACTIVITIES TO REDUCE EROSION POTENTIAL SHOULD BE INCORPORATED INTO THE SCHEDULE OF EVERY CONSTRUCTION PROJECT ESPECIALLY DURING RAINY SEASON. USE OF OTHER, MORE COSTLY YET LESS EFFECTIVE, EROSION AND SEDIMENT CONTROL BMP'S MAY OFTEN BE REDUCED THROUGH PROPER CONSTRUCTION SEQUENCING.

- LIMITATIONS:

ENVIRONMENTAL CONSTRAINTS SUCH AS NESTING SEASON PROHIBITIONS REDUCE THE FULL CAPABILITIES OF THIS BMP.

- IMPLEMENTATION:

AVOID RAINY PERIODS. SCHEDULING MAJOR GRADING OPERATIONS DURING DRY MONTHS WHEN PRACTICAL. ALLOW ENOUGH TIME BEFORE RAINFALL BEGINS TO STABILIZE THE SOIL WITH VEGETATION OR PHYSICAL MEANS OR TO INSTALL SEDIMENT TRAPPING DEVICES

PLAN THE PROJECT AND DEVELOP A SCHEDULE SHOWING EACH PHASE OF CONSTRUCTION. INCORPORATE THE CONSTRUCTION SCHEDULE INTO THE SWPPP.

MONITOR THE WEATHER FORECAST FOR RAINFALL.

BE PREPARED YEAR ROUND TO DEPLOY EROSION AND SEDIMENT CONTROL BMP'S

APPLY PERMANENT EROSION CONTROL TO AREAS DEEMED SUBSTANTIALLY COMPLETE DURING THE PROJECT'S DEFINED SEEDING WINDOW.

- INSPECTION AND MAINTENANCE:

VERIFY THAT WORK IS PROGRESSING IN ACCORDANCE WITH THE SCHEDULE

AMEND THE SCHEDULE WHEN CHANGES ARE WARRANTED.

AMEND THE SCHEDULE PRIOR TO THE RAINY SEASON TO SHOW UPDATED INFORMATION ON THE DEPLOYMENT AND IMPLEMENTATION OF CONSTRUCTION SITE BMP'S.

11 / - SCHEDULING EC-1

- DESCRIPTION AND PURPOSE:

SOIL BINDING CONSISTS OF APPLICATION AND MAINTENANCE OF A SOIL STABILIZER TO EXPOSED SOIL SURFACES. THESE MATERIALS ARE APPLIED TO THE SOIL SURFACE TO TEMPORARILY PREVENT WATER AND WIND INDUCED EROSION OF EXPOSED SOILS ON CONSTRUCTION SITES.

- SUITABLE APPLICATIONS:

SOIL BINDERS ARE TYPICALLY APPLIED TO DISTURBED AREAS REQUIRING TEMPORARY PROTECTION.

- LIMITATIONS:

SOIL BINDERS ARE TEMPORARY IN NATURE AND MAY NEED REAPPLICATION.

SOIL BINDERS MAY NOT SUFFICIENTLY PENETRATE COMPACTED SOILS.

- IMPLEMENTATION:

SOIL BINDERS SHOULD CONFORM TO LOCAL MUNICIPALITY SPECIFICATIONS AND REQUIREMENTS.

SITE SOIL TYPES WILL DICTATE APPROPRIATE SOIL BINDERS TO BE USED.

STORMWATER RUNOFF FROM PAM TREATED SOILS SHOULD PASS THROUGH A SEDIMENT CONTROL BMP PRIOR TO DISCHARGING TO SURFACE WATERS.

SOIL BINDER MUST BE ENVIRONMENTALLY BENIGN AND SHOULD NOT POLLUTE STORMWATER WHEN CURED.

AVOID OVER SPRAY ONTO ROADS, SIDEWALKS, DRAINAGE CHANNELS, EXISTING VEGETATION, ETC..

- INSPECTION AND MAINTENANCE:

BMP'S MUST BE INSPECTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS FOR THE ASOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT A MINIMUM, BMP'S BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.

AREAS WHERE EROSION IS EVIDENT SHOULD BE REPAIRED AND BMP'S RE-APPLIED AS SOON AS POSSIBLE.

REAPPLY THE SELECTED SOIL BINDER AS NEEDED TO MAINTAIN EFFECTIVENESS.

12 / - SOIL BINDERS EC-5

- FOR THE FOLLOWING NON-STORMWATER MANAGEMENT & MATERIAL MANAGEMENT BMP'S REFER TO THE PROJECT SWPPP FOR COMPLETE INFORMATION AND CASQA CONSTRUCTION BMP HANDBOOK FACT SHEETS ON EACH DESCRIBED BMP:

•• NS - 1 WATER CONSERVATION PRACTICES

•• NS - 3 PAVING AND GRINDING OPERATION

•• NS - 6 ILLICIT CONNECTION - ILLEGAL DISCHARGE CONNECTION

•• 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

- FOR THE FOLLOWING WASTE MANAGEMENT & MATERIALS POLLUTION CONTROL BMP'S REFER TO THE PROJECT SWPPP FOR COMPLETE INFORMATION AND CASQA CONSTRUCTION BMP HANDBOOK FACT SHEETS ON EACH DESCRIBED BMP:

•• WM - 1 MATERIAL DELIVERY AND STORAGE

•• WM - 2 MATERIAL USE

•• WM - 4 SPILL PREVENTION AND CONTROL

•• WM - 5 SOLID WASTE MANAGEMENT

•• WM - 6 HAZARDOUS WASTE MANAGEMENT

•• WM - 9 SANITARY/SEPTIC WASTE MANAGEMENT

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
9. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
10. ALL EROSION CONTROL PRODUCTS SHALL BE NON-WOVEN SUCH AS NON-WOVEN SILT FENCE, GEOTEXTILES, ETC... CONTRACTOR SHALL AVOID USE OF PLASTIC MONOFILAMENT NETTING. TIGHTLY WOVEN FIBER NETTING OR SIMILAR MATERIAL SHALL NOT BE USED FOR EROSION CONTROL OR OTHER PURPOSES AT THE PROJECT SITE TO ENSURE THAT BLUNT NOSE LEOPARD LIZARDS DO NOT BECOME ENTANGLED OR TRAPPED.
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. ANY FIELD CHANGES OF HYDRAULIC BMPS SHALL BE APPROVED BY ENGINEER (QUALIFIED SWPPP DEVELOPER).

THE INFORMATION LISTED ARE SUMMARIES OF THE BMP'S ONLY. THE CONTRACTOR SHALL REFER TO THE PROJECT SWPPP FOR CASQA CONSTRUCTION BMP HANDBOOK FACT SHEETS FOR COMPLETE INFORMATION ON EACH DESCRIBED EROSION, SEDIMENT, TRACKING, AND WIND EROSION CONTROL APPLICATIONS LISTED IN THE PLANS.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	HRM	DRE	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	HRM	DRE	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JTW	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JTW	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE
REFERENCES		

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	07JUL14
SCALE	PACKAGE CODE	DRN	JTW	08JUL14
NTS		CHK	LEC	07JAN15
		APP	DRE	

PANOCHE VALLEY SOLAR LLC

SUBJECT: CIVIL EROSION CONTROL NOTES & DETAILS

amec

AREA

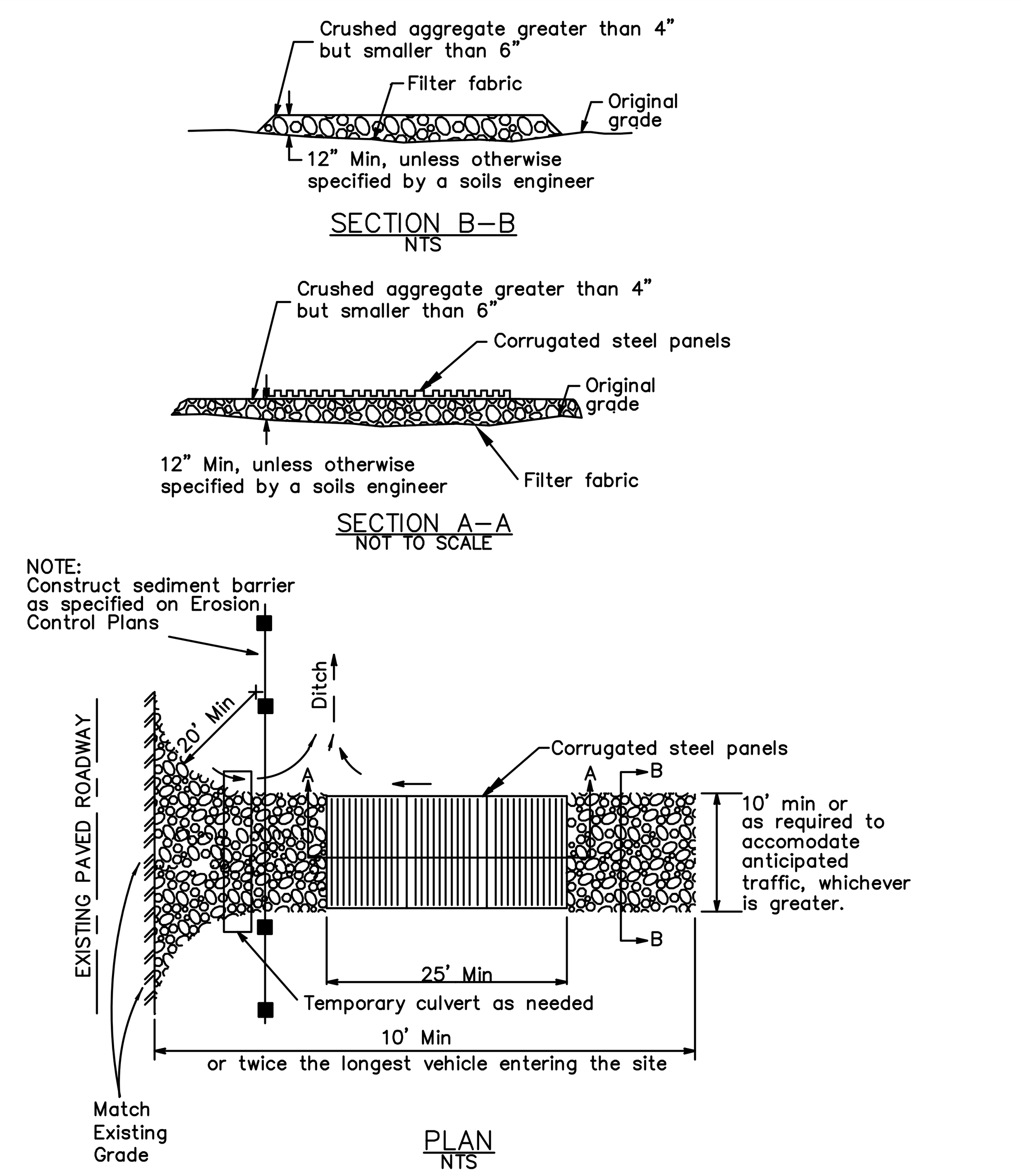
CLIENT DWG. NO.

DRAWING NO. D-000-C-0072 REV. E

CAD FILE: P:\CAD\CIV\D-000-C-0072.DWG

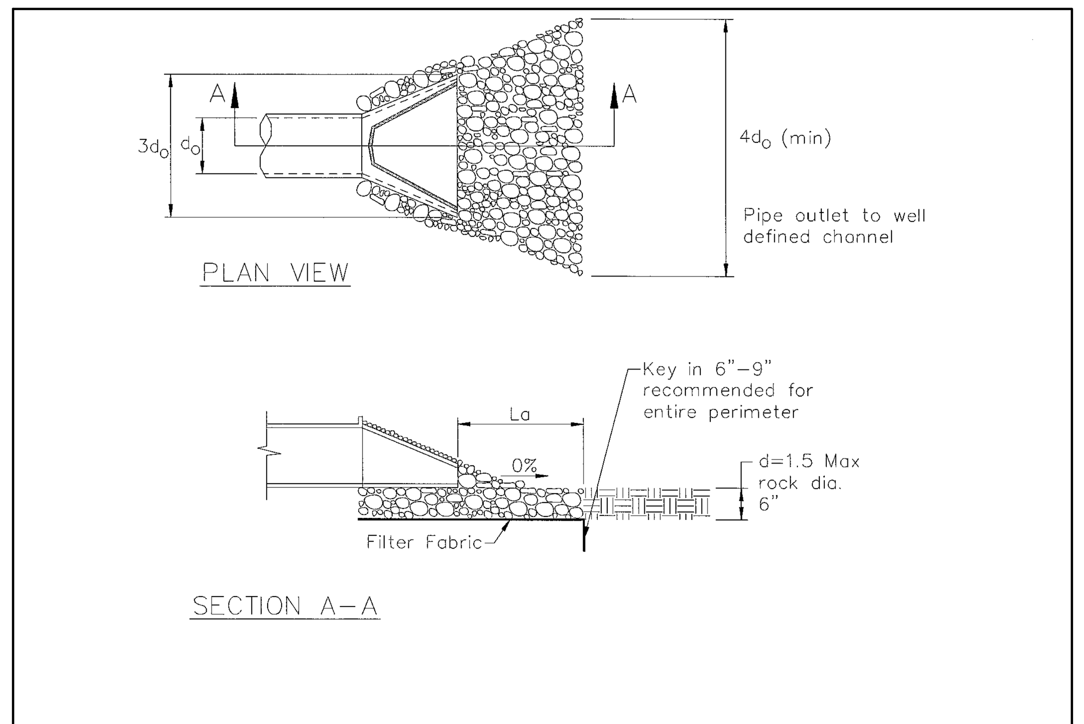
SAVED: 10-Sep-15 11:22 AM PLOTTED: 15-Sep-15 6:47 PM USER: GILL, MATTHEW

ARCH D-24x36



14 STABILIZED CONSTRUCTION ENTRANCE/EXIT TC-01B

NTS



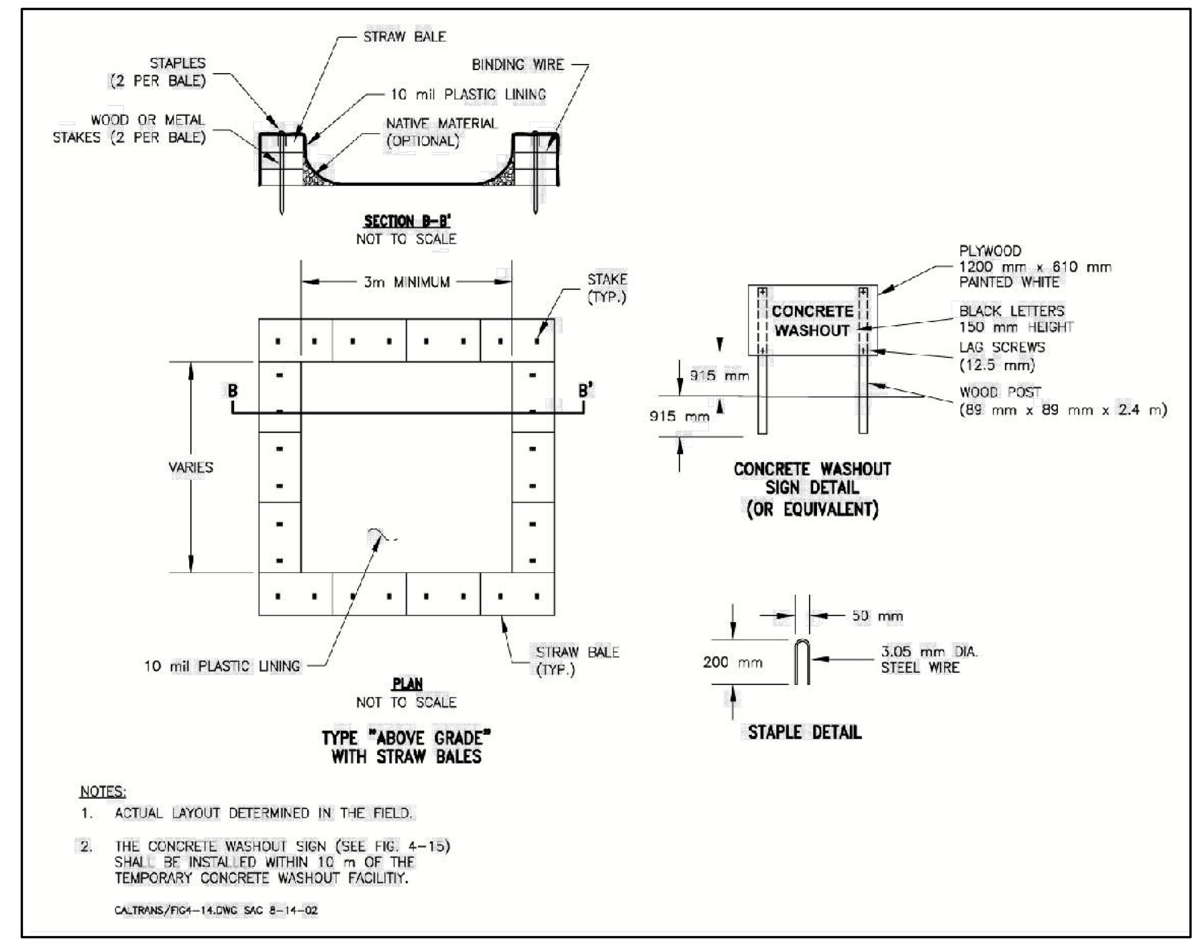
Pipe Diameter inches	Discharge ft^3/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS

15 VELOCITY DISSIPATION DEVICE EC-10

NTS

REFER TO EC-10 FACT SHEET IN SWPPP FOR MORE INFORMATION RELATED TO DESCRIPTION AND PURPOSE, SUITABLE APPLICATIONS, LIMITATIONS, IMPLEMENTATION, INSPECTION AND MAINTENANCE OF THE VELOCITY DISSIPATION DEVICE.



16 CONCRETE WASTE MANAGEMENT WM-8

NTS

REFER TO WM-8 FACT SHEET IN SWPPP FOR MORE INFORMATION RELATED TO DESCRIPTION AND PURPOSE, SUITABLE APPLICATIONS, LIMITATIONS, IMPLEMENTATION, INSPECTION AND MAINTENANCE FOR CONCRETE WASTE MANAGEMENT.

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow.

Type 1 (18" high with no wire mesh): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approx. 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

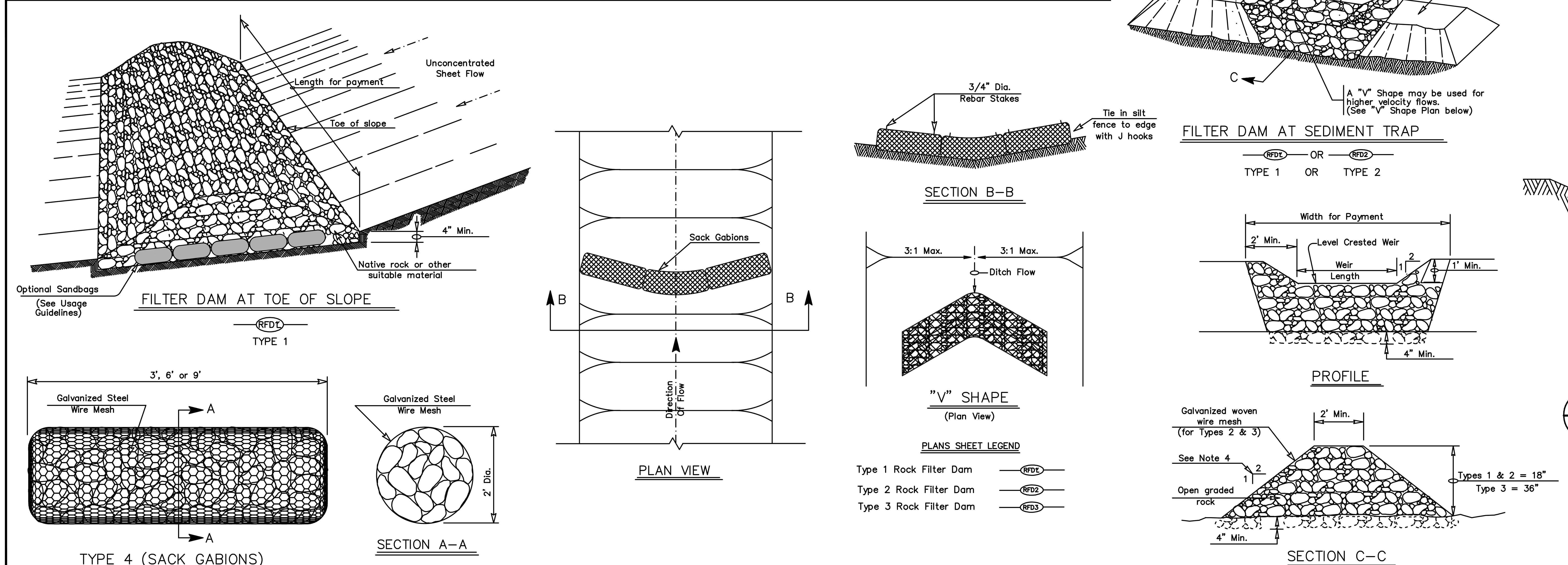
Type 2 (18" high with wire mesh): Type 2 may be used in ditches and at dike or swale outlets.

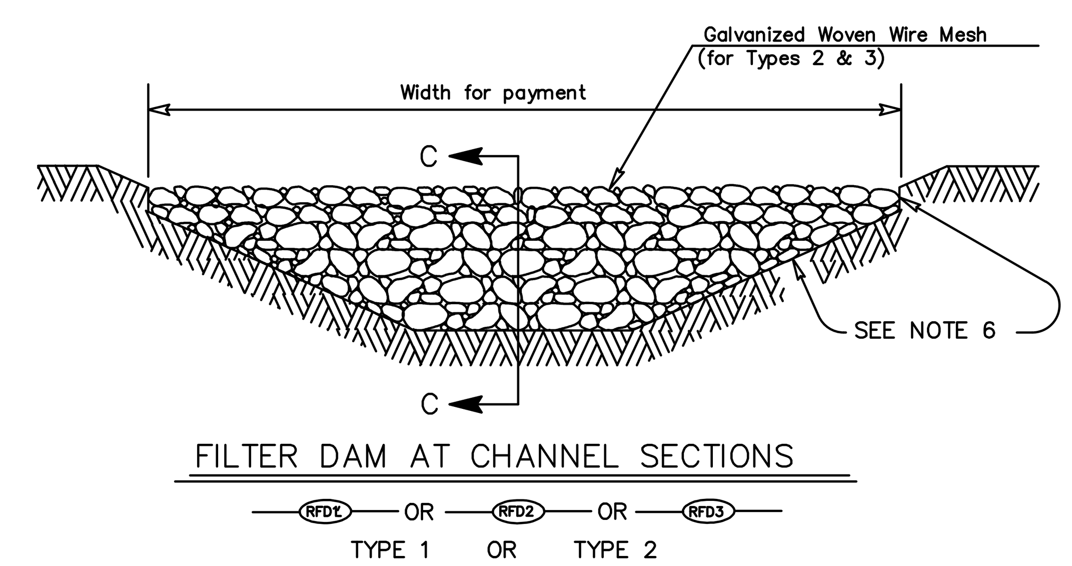
Type 3 (36" high with wire mesh): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Unless otherwise specified all aggregate used for the construction of the rock filter dam shall be hard, durable, clean, open graded, and shall naturally resist crumbling, flaking and eroding. Aggregate gradation shall be 3 to 6 inches for filter dams Types 1, 2 and 4 and shall be 4 to 8 inches for Type 3. The galvanized steel wire mesh and tie wires for Types 2 and 3 shall be a minimum 20 gauge unless specified otherwise on the plans. For Type 4: steel wire mesh shall utilize a double twisted hexagonal weave, mesh, opening shall be nominal 2.50" x 3.25"; steel wire for netting shall be 0.866" (U.S. Gauge No. 13) minimum; steel wire for selvedges and corners shall be 0.1063" (U.S. Gauge No. 13) minimum; and binding or tie wire shall be 0.0866" (U.S. Gauge No. 13) minimum.
3. The rock filter dam dimensions shall be as indicated on the Erosion Control Plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have side slopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. In stream use the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes.
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. Contractor may employ gabion baskets in lieu of gabion sacks (See drawing D-000-C-0171).
12. Detail taken from Texas Department of Transportation, Temporary Erosion, Sediment and Water Pollution Control Measures (Rock Filter Dams), EC(2)-93.





17 CHECK DAM SE-4 "ROCK FILTER DAM"

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
9. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
10. ALL EROSION CONTROL PRODUCTS SHALL BE NON-WOVEN SUCH AS NON-WOVEN SILT FENCE, GEOTEXTILES, ETC... CONTRACTOR SHALL AVOID USE OF PLASTIC MONOFILAMENT NETTING. TIGHTLY WOVEN FIBER NETTING OR SIMILAR MATERIAL SHALL NOT BE USED FOR EROSION CONTROL OR OTHER PURPOSES AT THE PROJECT SITE TO ENSURE THAT BLUNT NOSE LEOPARD LIZARDS DO NOT BECOME ENTANGLED OR TRAPPED.
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. ANY FIELD CHANGES OF HYDRAULIC BMPS SHALL BE APPROVED BY ENGINEER (QUALIFIED SWPPP DEVELOPER).

KEYPLAN

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	TDC	MTG	HRM	DRE	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	HRM	DRE	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JTW	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JTW	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055 | ACTIVITY NO. | SCALE NTS | PACKAGE CODE

	BY	DDMMMYY
DES	MTG	07JUL14
DRN	JTW	08JUL14
CHK	LEC	07JAN15
APP	DRE	

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL EROSION CONTROL NOTES & DETAILS

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0073 REV. E

CAD FILE: P:\CAD\CIV\D-000-C-0073.DWG

SAVED: 10-Sep-15 11:22 AM PLOTTED: 15-Sep-15 6:47 PM USER: GILL, MATTHEW

DESCRIPTION AND PURPOSE:

MATTINGS, OR ROLLED EROSION CONTROL PRODUCTS (RECPS), CAN BE MADE OF NATURAL OR SYNTHETIC MATERIALS OR A COMBINATION OF THE TWO. RECPS ARE USED TO COVER THE SOIL SURFACE TO REDUCE EROSION FROM RAINFALL IMPACT, HOLD SOIL IN PLACE, AND ABSORB AND HOLD MOISTURE NEAR THE SOIL SURFACE. ADDITIONALLY, RECPS MAY BE USED TO STABILIZE SOILS UNTIL VEGETATION IS ESTABLISHED OR TO REINFORCE NON-WOODY SURFACE VEGETATION.

SUITABLE APPLICATIONS:

RECPS ARE TYPICALLY APPLIED ON SLOPES WHERE EROSION HAZARD IS HIGH AND VEGETATION WILL BE SLOW TO ESTABLISH, SUCH AS THE DRAINAGE CHANNEL.

LIMITATIONS:

RECPS MAY HAVE LIMITATIONS BASED ON SOIL TYPE, SLOPE GRADIENT, OR CHANNEL FLOW RATE.

IMPLEMENTATION:

NATURAL RECPS HAVE BEEN FOUND TO BE EFFECTIVE WHERE RE-VEGETATION WILL BE PROVIDED BY RE-SEEDING. THE CHOICE OF MATERIAL SHOULD BE BASED ON THE SIZE OF AREA, SIDE SLOPES, SURFACE CONDITIONS SUCH AS HARDNESS, MOISTURE, WEED GROWTH, AND AVAILABILITY OF MATERIALS.

GEOTEXTILE TO BE PLACED UNDER SPECIFIED AREAS OF RIP-RAP. FOR INSTALLATION OF GEOTEXTILES REFER TO EC-7 FACT SHEET IN SWPPP.

SPECIFIED AREAS OF DRAINAGE CHANNEL, AS SHOWN ON DRAWING D-000-C-0152, SHALL HAVE RECP APPLIED TO SIDE SLOPES AND BOTTOM OF CHANNEL IN CONJUNCTION WITH REVEGETATION OR HYDROSEEDING, EC-4. REFER TO TYPICAL INSTALLATION DETAIL AT RIGHT, AND THE EC-7 FACT SHEET IN SWPPP.

BLANKETS SHOULD BE FURNISHED IN ROLLED STRIPS WITH MINIMUM 6.5 FT WIDE, A MINIMUM OF 80 FT LONG AND A MINIMUM OF 3LB/SF. BLANKETS MUST BE SECURED IN PLANE WITH WIRE STAPLES. STAPLES SHOULD BE MADE OF MINIMUM 11 GAUGE STEEL WIRE AND SHOULD BE U-SHAPED WITH 8 IN. LEGS AND 2 IN. CROWN.

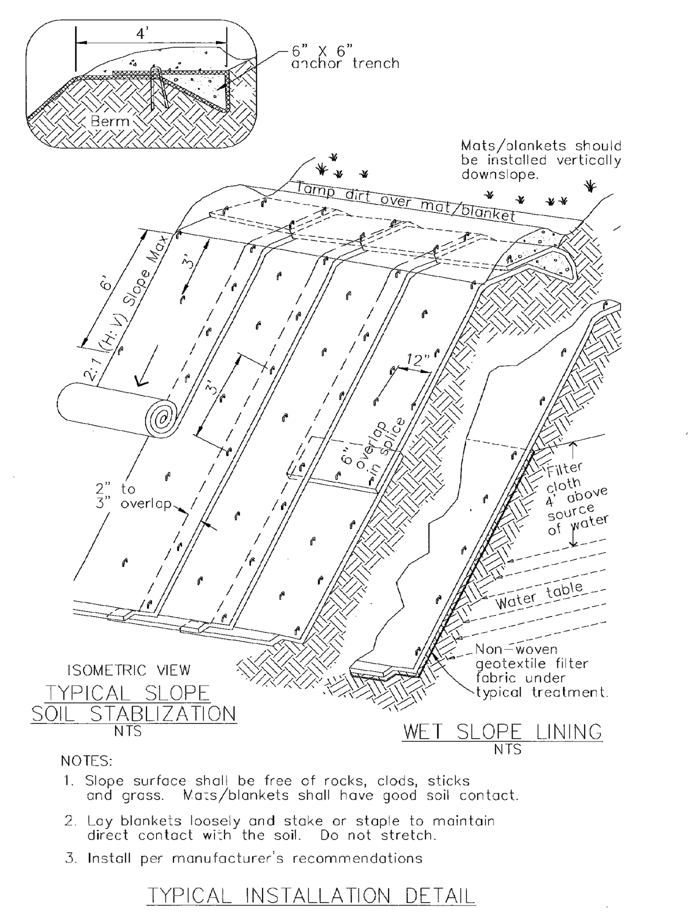
INSPECTION AND MAINTENANCE:

BMP'S MUST BE INSPECTED IN ACCORDANCE WITH THE GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT AT A MINIMUM, BMP'S BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.

IF WASHOUT OR BREAKAGE OCCURS, RE-INSTALL THE MATERIAL AFTER REPAIRING THE DAMAGE TO THE SLOPE OR CHANNEL.

MAKE SURE MATTING IS UNIFORMLY IN CONTACT WITH THE SOIL.

Geotextiles and Mats EC-7

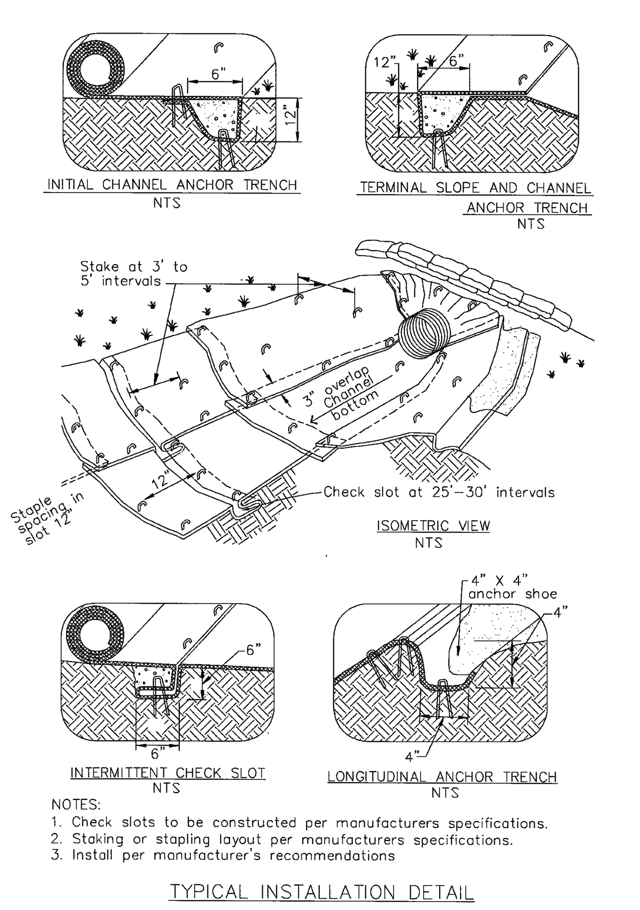


NOTES:
1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL

November 2009 California Stormwater BMP Handbook Construction www.casqa.org 11 of 12

Geotextiles and Mats EC-7

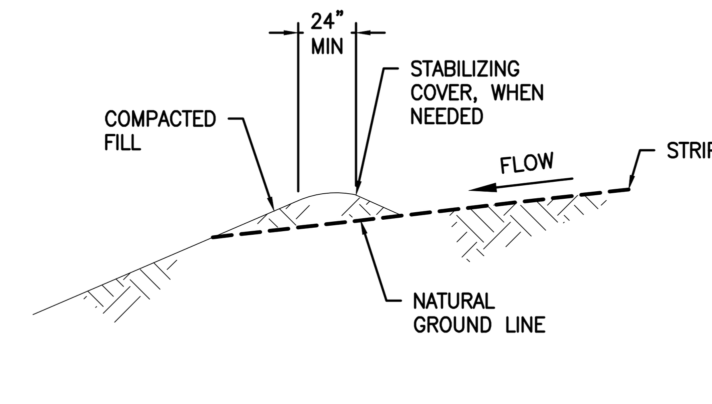


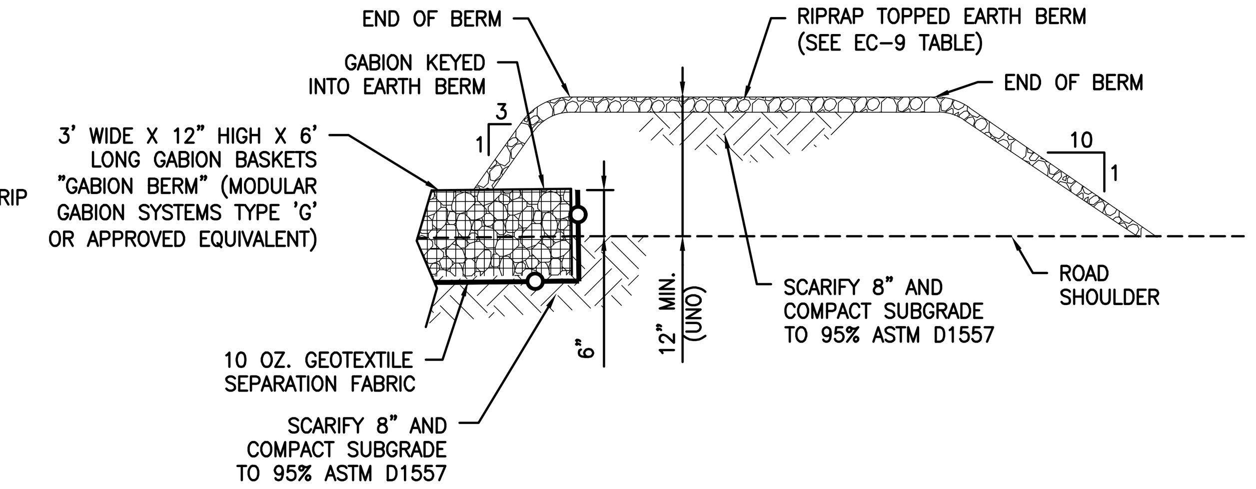
NOTES:
1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL

November 2009 California Stormwater BMP Handbook Construction www.casqa.org 12 of 12

18 GEOTEXTILES AND MATS EC-7
NTS





GENERAL NOTES:

- ALL DIKES SHOULD BE COMPACTED TO 95% ASTM D1557 BY EARTH MOVING EQUIPMENT.
- ALL DIKES SHOULD HAVE POSITIVE DRAINAGE TO AN OUTLET.
- ALL SHOULD HAVE 2:1 OR FLATTER SLOPES, 18 IN. MINIMUM HEIGHT, AND A MINIMUM TOP WIDTH OF2 24 IN. WIDE TOP WIDTHS AND FLAT SLOPES ARE USUALLY NEEDED AT CROSSINGS FOR CONSTRUCTION TRAFFIC.
- TEMPORARY STABILIZATION MAY BE ACHIEVED USING SEED AND MULCHING FOR SLOPES LESS THAN 5% AND EITHER RIP-RAP OR SOD FOR SLOPES IN EXCESS OF 5%. IN EITHER CASE, STABILIZATION OF THE EARTH DIKE SHOULD BE COMPLETED IMMEDIATELY AFTER CONSTRUCTION OR PRIOR TO THE FIRST RAIN.
- IF RIP RAP IS CALLED FOR, THE FOLLOWING TYPICAL SPECIFICATIONS APPLY:

CHANNEL GRADE	RIPRAP STABILIZATION
0.5%-1.0%	4 In. Rock
1.1-2.0%	6 In. Rock
2.1-4.0%	8 In. Rock
4.1-5.0%	8 In. - 12 In. Rock

- THE STONE RIPRAP, RECYCLED CONCRETE, ETC. USED FOR STABILIZATION SHOULD BE PRESSED INTO THE SOIL WITH CONSTRUCTION EQUIPMENT.
- FILTER CLOTH MAY BE USED TO COVER DIKES IN USE FOR LONG PERIODS.
- CONSTRUCTION ACTIVITY ON THE EARTH DIKE SHOULD BE KEPT TO A MINIMUM.

20 EARTH DIKES EC-9
NTS

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
9. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
10. ALL EROSION CONTROL PRODUCTS SHALL BE NON-WOVEN SUCH AS NON-WOVEN SILT FENCE, GEOTEXTILES, ETC... CONTRACTOR SHALL AVOID USE OF PLASTIC MONOFILAMENT NETTING. TIGHTLY WOVEN FIBER NETTING OR SIMILAR MATERIAL SHALL NOT BE USED FOR EROSION CONTROL OR OTHER PURPOSES AT THE PROJECT SITE TO ENSURE THAT BLUNT NOSE LEOPARD LIZARDS DO NOT BECOME ENTANGLED OR TRAPPED.
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. ANY FIELD CHANGES OF HYDRAULIC BMPS SHALL BE APPROVED BY ENGINEER (QUALIFIED SWPPP DEVELOPER).

DESCRIPTION AND PURPOSE:

A SLOPE DRAIN IS A PIPE, SERIES OF PIPES, OR ROCK LINED CHANNEL USED TO INTERCEPT AND DIRECT SURFACE RUNOFF OR GROUNDWATER INTO A STABILIZED WATERCOURSE, TRAPPING DEVICE OR STABILIZED AREA. SLOPE DRAINS ARE USED WITH EARTH DIKES AND DRAINAGE DITCHES TO INTERCEPT AND DIRECT SURFACE FLOW AWAY FROM SLOPE AREAS TO PROTECT CUT OR FILL SLOPES.

SUITABLE APPLICATIONS:
- WHERE CONCENTRATED FLOW OF SURFACE RUNOFF MUST BE CONVEYED DOWN A SLOPE IN ORDER TO PREVENT EROSION.
- DRAINAGE FOR TOP OF SLOPE DIVERSION DIKES OR SWALES.
- DRAINAGE FOR TOP OF CUT AND FILL SLOPES WHERE WATER CAN ACCUMULATE.
- EMERGENCY SPILLWAY FOR A SEDIMENT BASIN.

LIMITATIONS:
- INSTALLATION IS CRITICAL FOR EFFECTIVE USE OF THE SLOPE DRAIN TO MINIMIZE POTENTIAL GULLY EROSION.
- MAXIMUM DRAINAGE AREA PER SLOPE PIPE DRAIN IS 10 ACRES. FOR LARGER AREAS USE A PAVED CHUTE, ROCK LINED CHANNEL, OR ADDITIONAL PIPES.
- SEVERE EROSION MAY RESULT WHEN SLOPE DRAINS FAIL BY OVERTOPPING, PIPING, OR PIPE SEPARATION.
- DURING LARGE STORMS, SLOPE DRAINS MAY BECOME CLOGGED OR OVER CHARGED, FORCING WATER AROUND THE SLOPE DRAIN CAUSING EXTREME SLOPE EROSION.
- DISSIPATION OF HIGH FLOW VELOCITIES AT THE SLOPE DRAIN OUTLET IS REQUIRED TO AVOID DOWNSTREAM EROSION.

IMPLEMENTATION:
THE SLOPE DRAIN IS APPLICABLE FOR ANY CONSTRUCTION SITE WHERE CONCENTRATED SURFACE RUNOFF CAN ACCUMULATE AND MUST BE CONVEYED DOWN THE SLOPE IN ORDER TO PREVENT EROSION. THE SLOPE DRAIN IS EFFECTIVE BECAUSE IT PREVENTS THE STORMWATER FROM FLOWING DIRECTLY DOWN THE SLOPE BY CONFINING ALL THE RUNOFF INTO AN ENCLOSED PIPE OR CHANNEL. DUE TO THE TIME LAG BETWEEN GRADING SLOPES AND INSTALLATION OF PERMANENT STORMWATER COLLECTION SYSTEMS AND SLOPE STABILIZATION MEASURES, TEMPORARY PROVISIONS TO INTERCEPT RUNOFF ARE SOMETIMES NECESSARY. PARTICULARLY IN STEEP TERRAIN, SLOPE DRAINS CAN PROTECT UNSTABILIZED AREAS FROM EROSION.

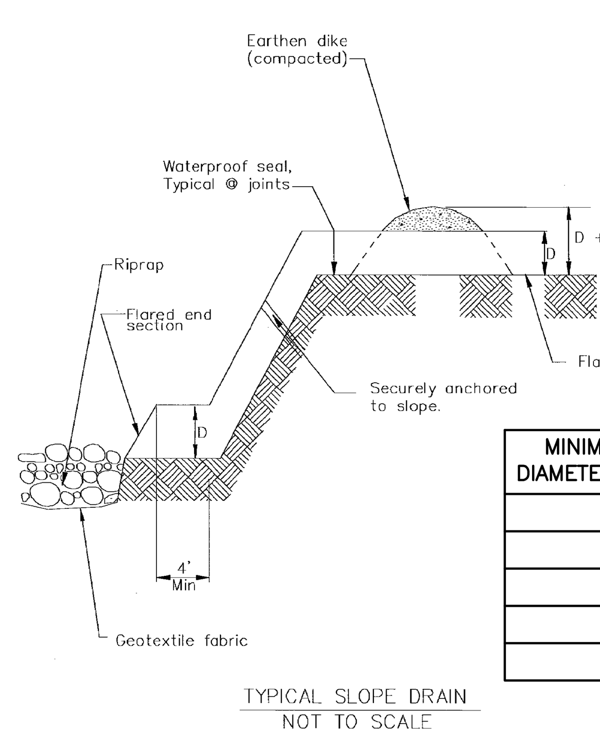
INSTALLATION:
THE SLOPE DRAIN MAY BE A RIGID PIPE, SUCH AS CORRUGATED METAL, A FLEXIBLE CONDUIT, A LINED TERRACE DRAIN, A ROCK LINED CHANNEL WITH THE INLET PLACED ON THE TOP OF A SLOPE AND THE OUTLET AT THE BOTTOM OF THE SLOPE. THIS BMP TYPICALLY IS USED IN COMBINATION WITH A DIVERSION CONTROL, SUCH AS AN EARTH DIKE OR DRAINAGE SWALE AT THE TOP OF THE SLOPE.

THE FOLLOWING IS SOME BUT NOT ALL OF THE IMPORTANT INSTALLATION CONSIDERATIONS, PLEASE REFERENCE THE CASQA CONSTRUCTION BMP HANDBOOK FOR FURTHER INFORMATION;
- PERMANENT STRUCTURES INCLUDED IN THE PROJECT PLANS CAN OFTEN SERVE AS CONSTRUCTION BMPs IF IMPLEMENTED EARLY. HOWEVER, THE PERMANENT STRUCTURE MUST MEET OR EXCEED THE CRITERIA FOR THE TEMPORARY STRUCTURE.
- INLET STRUCTURES MUST BE SECURELY ENTRENCHED AND COMPACTED TO AVOID SEVERE GULLY EROSION.
- SLOPE DRAINS MUST BE SECURELY ANCHORED TO THE SLOPE AND MUST BE ADEQUATELY SIZED TO CARRY THE CAPACITY OF THE DESIGN STORM AND ASSOCIATED FORCES.
- OUTLETS MUST BE STABILIZED WITH RIPRAP, CONCRETE, OR OTHER TYPE OF ENERGY DISSIPATER, OR DIRECTED INTO A STABLE SEDIMENT TRAP OR BASIN. SEE EC-10 VELOCITY DISSIPATION DEVICES.
- SECURE INLET AND SURROUND WITH DIKES TO PREVENT GULLY EROSION AND ANCHOR PIPE TO SLOPE.
- MAXIMUM SLOPE GENERALLY LIMITED TO 2:1 (H:V) AS ENERGY DISSIPATION BELOW STEEPER SLOPES IS DIFFICULT.

WHEN INSTALLING SLOPE DRAINS:
- INSTALL SLOPE DRAINS PERPENDICULAR TO SLOPE CONTOURS.
- COMPACT SOIL AROUND AND UNDER ENTRANCE, OUTLET, AND ALONG LENGTH OF DRAIN.
- SECURELY ANCHOR AND STABILIZE PIPE (DRAIN) AND APPURTENANCES INTO SOIL
- CHECK TO ENSURE THAT PIPE CONNECTIONS ARE WATERTIGHT.
- PROTECT AREA AROUND INLET WITH FILTER CLOTH. PROTECT OUTLET WITH RIPRAP OR OTHER ENERGY DISSIPATION DEVICE. FOR HIGH ENERGY DISCHARGES, REINFORCE RIPRAP WITH CONCRETE OR USE REINFORCED CONCRETE DEVICE.
- A FLARED END SECTION INSTALLED AT THE INLET WILL IMPROVE FLOW INTO THE SLOPE DRAIN AND PREVENT EROSION AT THE PIPE ENTRANCE. USE A FLARED END SECTION WITH A 6 INCH MINIMUM TOE PLATE TO HELP PREVENT UNDERCUTTING. THE FLARED SECTION SHOULD SLOPE TOWARDS THE PIPE INLET.

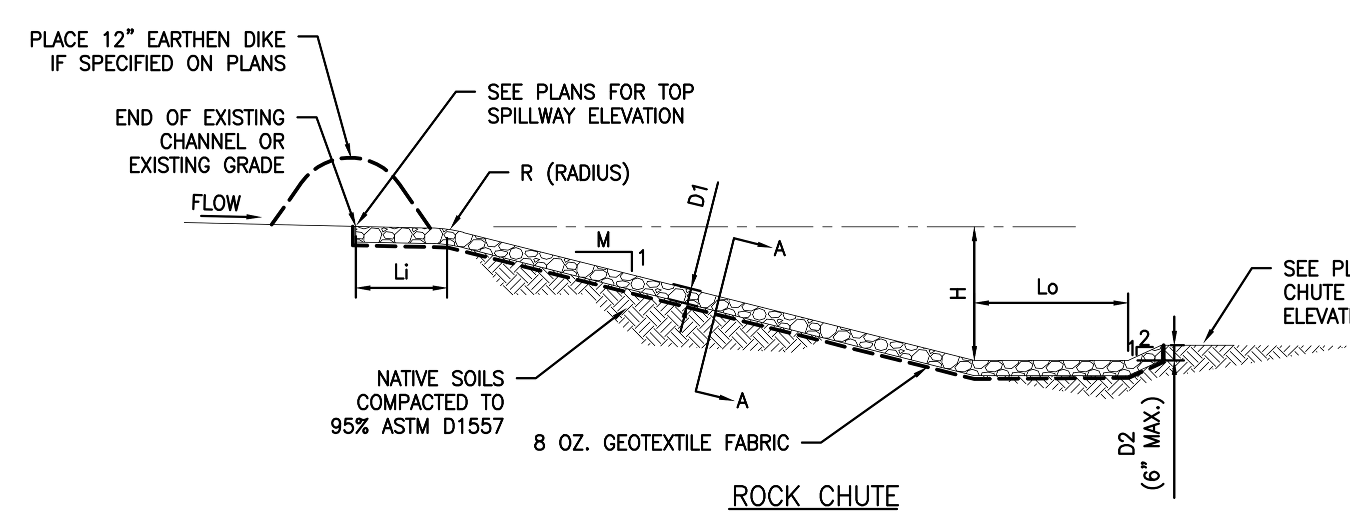
INSPECTION AND MAINTENANCE:
- INSPECT BMPS IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT AT A MINIMUM, BMPs BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.
- INSPECT BMPS SUBJECTED TO NON-STORMWATER DISCHARGES DAILY WHILE NON-STORMWATER DISCHARGES OCCUR. MINIMIZE AREAS OF STANDING WATER BY REMOVING SEDIMENT BLOCKAGES AND FILLING SCOUR DEPRESSIONS.
- INSPECT OUTLET FOR EROSION AND DOWNSTREAMS SCOUR. IF ERODED, REPAIR DAMAGE AND INSTALL ADDITIONAL ENERGY DISSIPATION MEASURES. IF DOWNSTREAM SCOUR IS OCCURRING, IT MAY BE NECESSARY TO REDUCE FLOWS BEING DISCHARGED INTO THE CHANNEL UNLESS OTHER PREVENTATIVE MEASURES ARE IMPLEMENTED.
- INSPECT INLET FOR CLOGGING OR UNDERCUTTING. REMOVE DEBRIS FROM INLET TO MAINTAIN FLOWS. REPAIR UNDERCUTTING AT INLET AND IF NEEDED, INSTALL FLARED SECTION OR RIP RAP AROUND THE INLET TO PREVENT FURTHER UNDERCUTTING.
- INSPECT PIPES FOR LEAKAGE. REPAIR LEAKS AND RESTORE DAMAGED SLOPES.
- INSPECT SLOPE DRAINAGE FOR ACCUMULATIONS OF DEBRIS AND SEDIMENT.
- REMOVE BUILT UP SEDIMENT FROM ENTRANCES AND OUTLETS AS REQUIRED. FLUSH DRAINS IF NECESSARY; CAPTURE AND SETTLE OUT SEDIMENT FROM DISCHARGE.
- MAKE SURE WATER IS NOT PONDING ONTO INAPPROPRIATE AREAS (E.G., ACTIVE TRAFFIC LANES, MATERIAL STORAGE AREAS, ETC.).
- PIPE ANCHORS MUST BE CHECKED TO ENSURE THAT THE PIPE REMAINS ANCHORED TO THE SLOPE. INSTALL ADDITIONAL ANCHORS IF PIPE MOVEMENT IS DETECTED.

Slope Drains EC-11

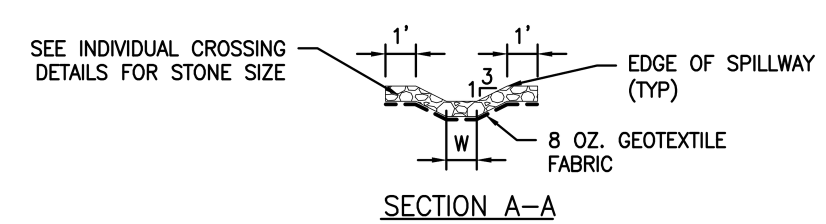


MINIMUM PIPE DIAMETER (INCHES)	MAXIMUM DRAINAGE AREA (ACRES)
12	1.0
18	3.0
21	5.0
24	7.0
30	10.0

TYPICAL SLOPE DRAIN
NOT TO SCALE



ROCK CHUTE



SECTION A-A

19 SLOPE DRAINS/"ROCK CHUTES" EC-11
NTS

ROCK CHUTE DIMENSIONS TABLE

CROSSING #	Li (ft.)	Lo (ft.)	H (ft.)	M (X:1)	W (ft.)	R (ft.)	D1 (in.)	D2 (in.)	D50 (in.)
12	5	8	2	5	10	16	12.2	0	6
16	2	5	1.5	3	10	10	8	1.2	4
19	4	7	3.1	5	15	14	12	6	6
21	8	8	1.6	26.3	15	8	12.1	6	6
39	3	6	9.5	3	10	14	12	6	6

NOTE:

1. THIS TABLE IS SHOWN DUE TO LIMITED SPACE PROVIDED ON OTHER DRAWINGS.
2. PIPE DOWN DRAINS SHALL BE USED AS TEMPORARY EROSION CONTROL MEASURE. AS DEEMED NECESSARY.
3. EARTHEN DIKES IF SPECIFIED ON PLANS SHALL BE COMPACTED TO 95% ASTM D1557.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

THE INFORMATION LISTED ARE SUMMARIES OF THE BMP'S ONLY. THE CONTRACTOR SHALL REFER TO THE PROJECT SWPPP FOR CASQA CONSTRUCTION BMP HANDBOOK FACT SHEETS FOR COMPLETE INFORMATION ON EACH DESCRIBED EROSION, SEDIMENT, TRACKING, AND WIND EROSION CONTROL APPLICATIONS LISTED IN THE PLANS.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	TOC	MTG	DRE	HRM	JCG	
D	03SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JTW	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JTW	MTG	LEC	HRM	JCG	

REF | NUMBER | TITLE — REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW
CLIENT PROJECT MGR. | DEPARTMENT MGR. DRE | PROJECT MGR. HRM

PANOCHE VALLEY SOLAR LLC

amec

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	07JUL14
SCALE	PACKAGE CODE	DRN	JTW	08JUL14
NTS		CHK	LEC	07JAN15
		APP	DRE	

SUBJECT: CIVIL EROSION CONTROL NOTES & DETAILS

AREA

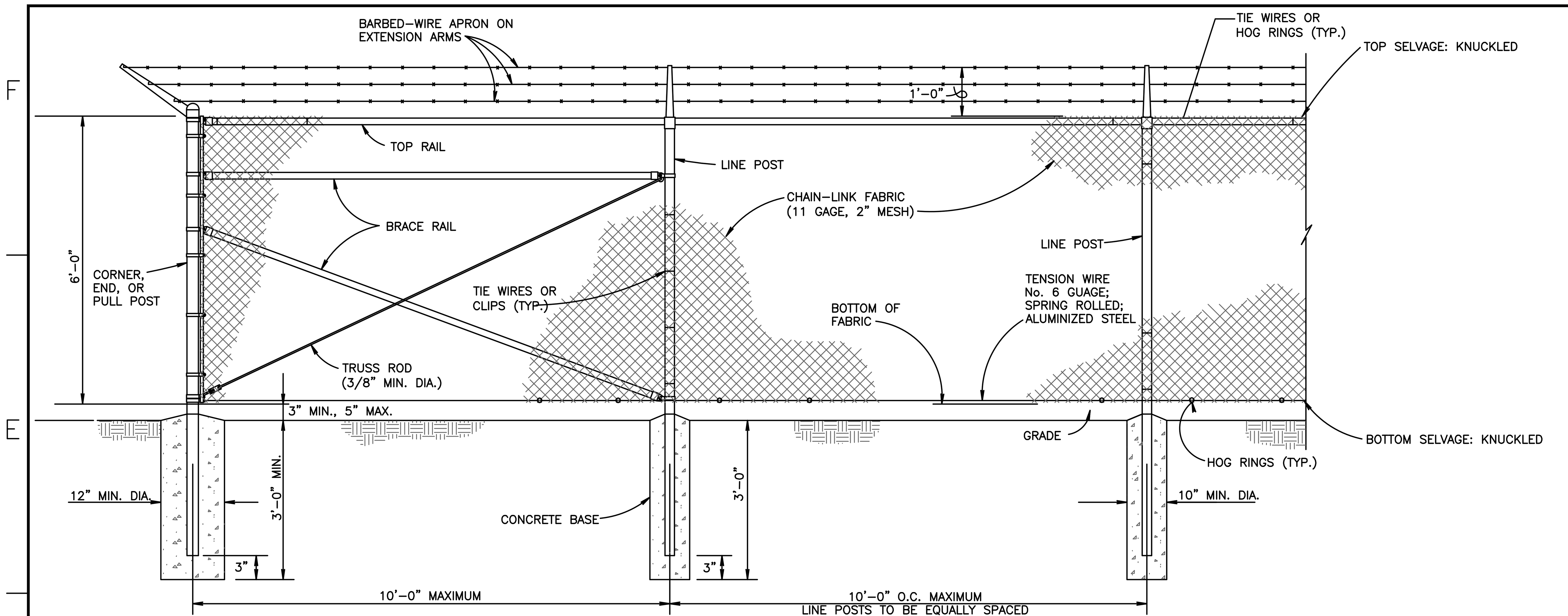
CLIENT DWG. NO.

DRAWING NO. D-000-C-0074 REV. E

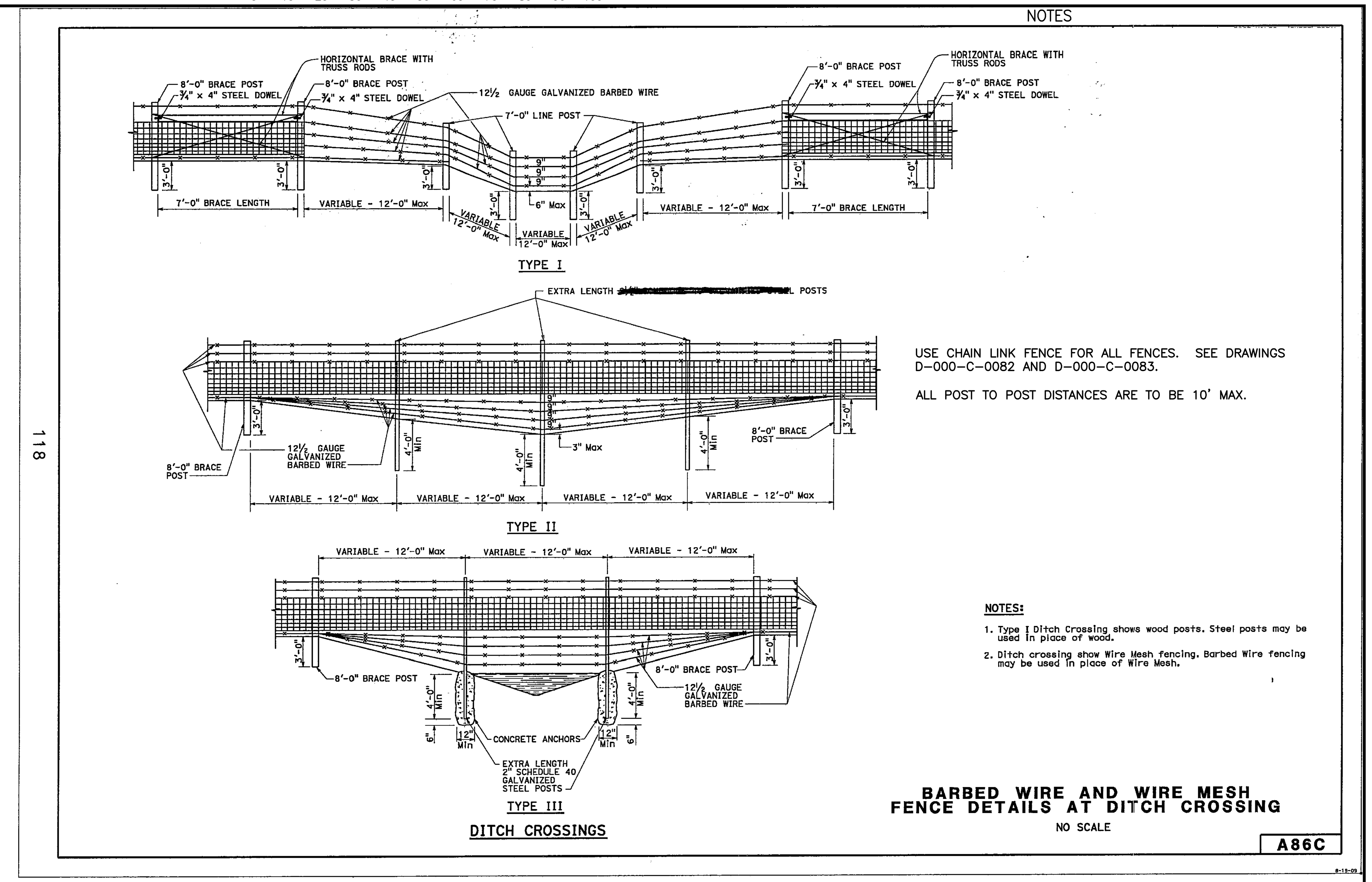
SAVED: 15-Sep-15 2:35 PM PLOTTED: 15-Sep-15 6:47 PM USER: GILL, MATTHEW

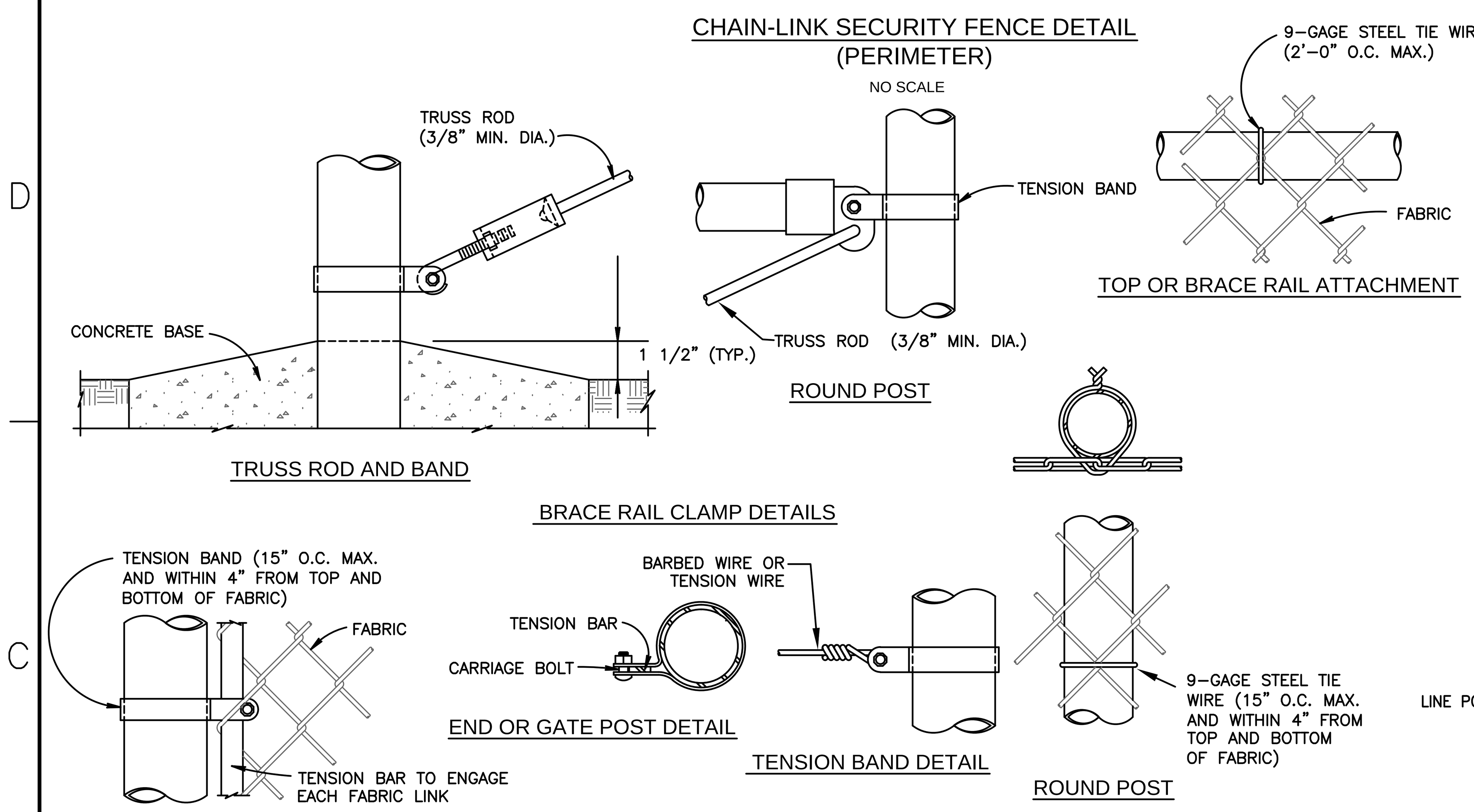
CAD FILE: P:\CAD\CIV\D-000-C-0074.DWG

ARCH D-24x36



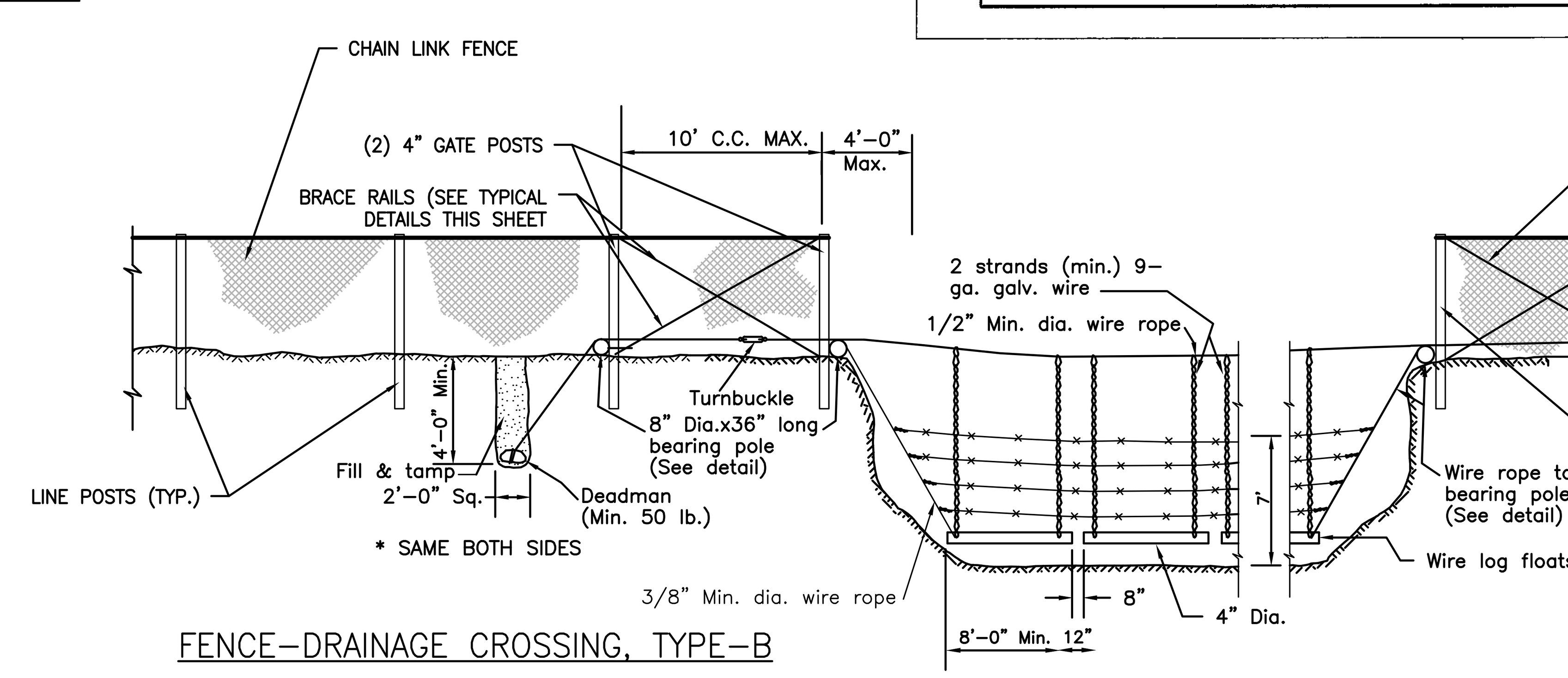
CHAIN-LINK SECURITY FENCE DETAIL
(PERIMETER)
NO SCALE





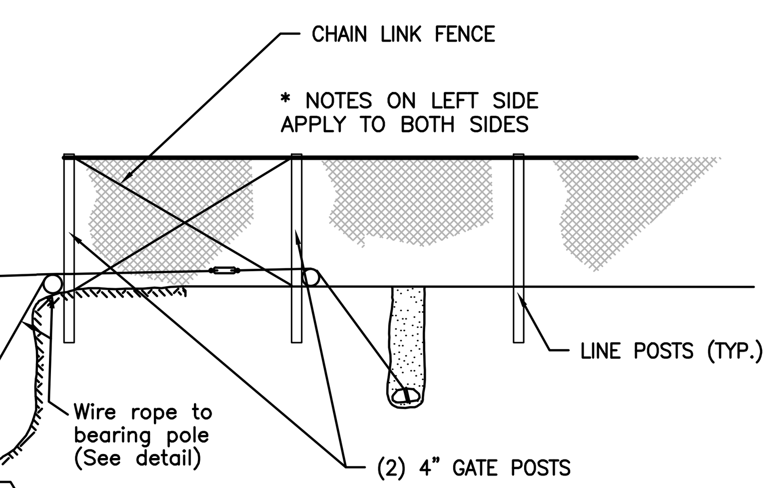
FASTENING DETAILS
NO SCALE

LINE POST ATTACHMENTS
NO SCALE

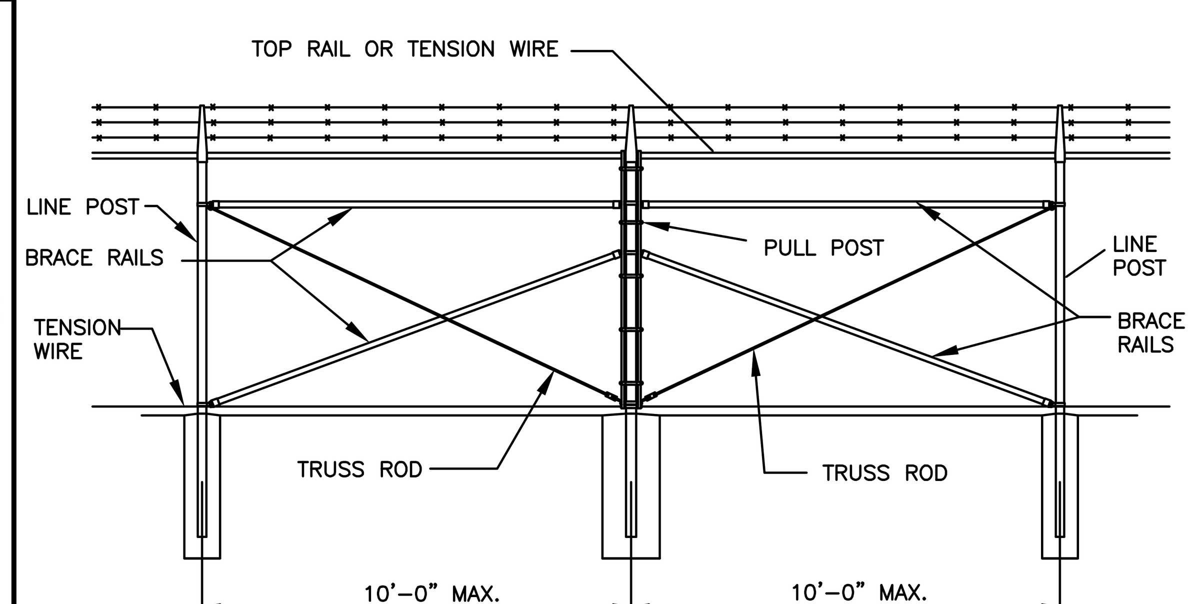


FENCE-DRAINAGE CROSSING, TYPE-B

FENCE-DRAINAGE CROSSING, TYPE-A



1. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPES OF FENCE SECTIONS AND METHODS OF INSTALLATION THAT COMPLY WITH THE SPECIFICATIONS.
2. WIRE TIES, RAILS, POSTS, AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN-LINK FABRIC SHALL BE PLACED ON THE SIDE OPPOSITE THE SECURE AREA.
3. UNLESS SPECIFICALLY SHOWN OR SPECIFIED, ALL PERIMETER FENCE SHALL HAVE AN APRON EXTENDED OUTWARD FROM THE AREA BEING PROTECTED.
4. SEE SHEET D-000-C-0082 FOR ADDITIONAL NOTES AND DETAILS
5. FOR FENCE CONSTRUCTION AND INSTALLATION SPECIFICATIONS SEE C-SPC-000-002.
6. FOR GENERAL NOTES, LEGEND AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.

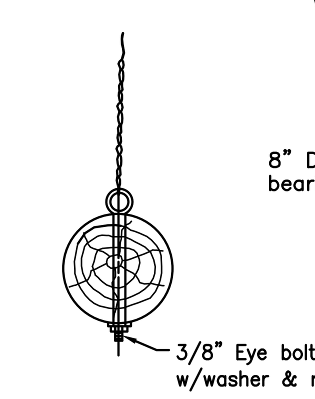


BRACE PANEL DETAIL
NO SCALE

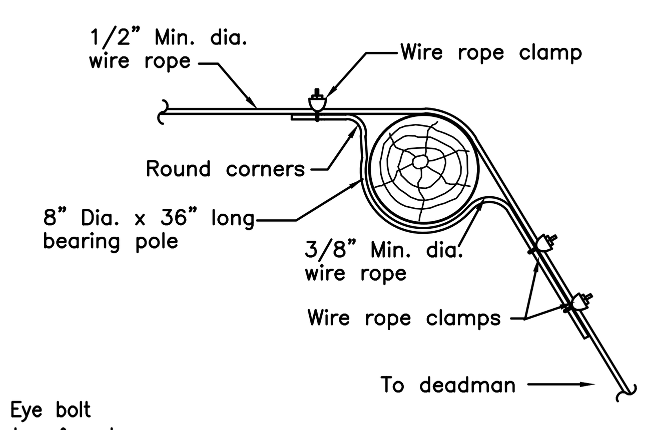
NOTE:
PROVIDE BRACE PANEL WHENEVER STRAIGHT RUNS EXCEED 500 FEET.

STEEL POST SCHEDULE		
USE AND SECTION	MINIMUM OUTSIDE DIMENSIONS (NOMINAL)	
	FABRIC WIDTH 72" OR LESS	FABRIC WIDTH 84" OR MORE
CORNER, END & PULL POSTS TUBULAR – ROUND	2.375" O.D.	4.00" O.D.
LINE POSTS TUBULAR – ROUND	1.90" O.D.	2.875" O.D.
TOP, BOTTOM & BRACE RAILS TUBULAR – ROUND	1.66" O.D.	

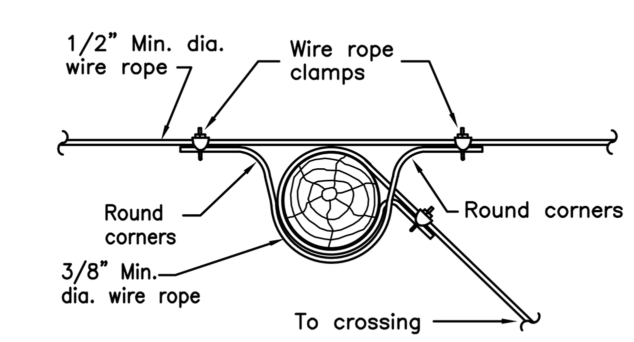
USE THIS SIZE POST FOR PERIMETER FENCE



FLOAT LOG FASTENER



WIRE ROPE CONNECTION TO END BEARING POLE DETAIL



WIRE ROPE CONNECTION TO INTERMEDIATE BEARING POLE DETAIL

NOTES FOR TYPE B:
1. PLACE CABLE SYSTEM ON DOWNSTREAM SIDE OF FENCE.
2. PLACE IN JURISDICTIONAL WATERS WHERE POST TO POST SPACING ACROSS TOP OF BANK IS GREATER THAN 10' MAX.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	24FEB15	ISSUED FOR PERMIT REVIEW	MSN	MTG	LEC	HRM	JCG	
C	30JAN15	REVISED FOR BID	MSN	MTG	LEC	HRM	JCG	
B	12JAN15	ISSUED FOR BID	JCS	MTG	LEC	HRM	JCG	
A	19JUN14	ISSUED FOR CONCEPTUAL REVIEW	MSN	MTG	LEC	HRM		

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL
NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MSN	24MAR14
SCALE	PACKAGE CODE	DRN	MSN	24MAR14
NTS		CHK	MTG	25APR14
		APP	LEC	25APR14

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT
GENERAL DETAILS
PERIMETER FENCE

AREA

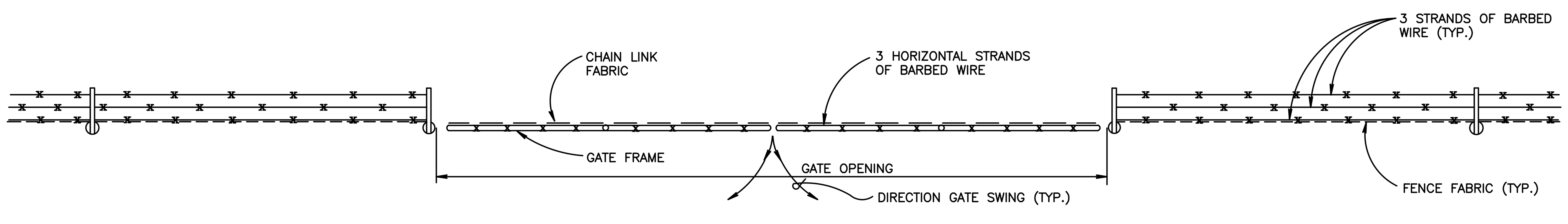
CLIENT DWG. NO.

DRAWING NO. D-000-C-0081 REV. E

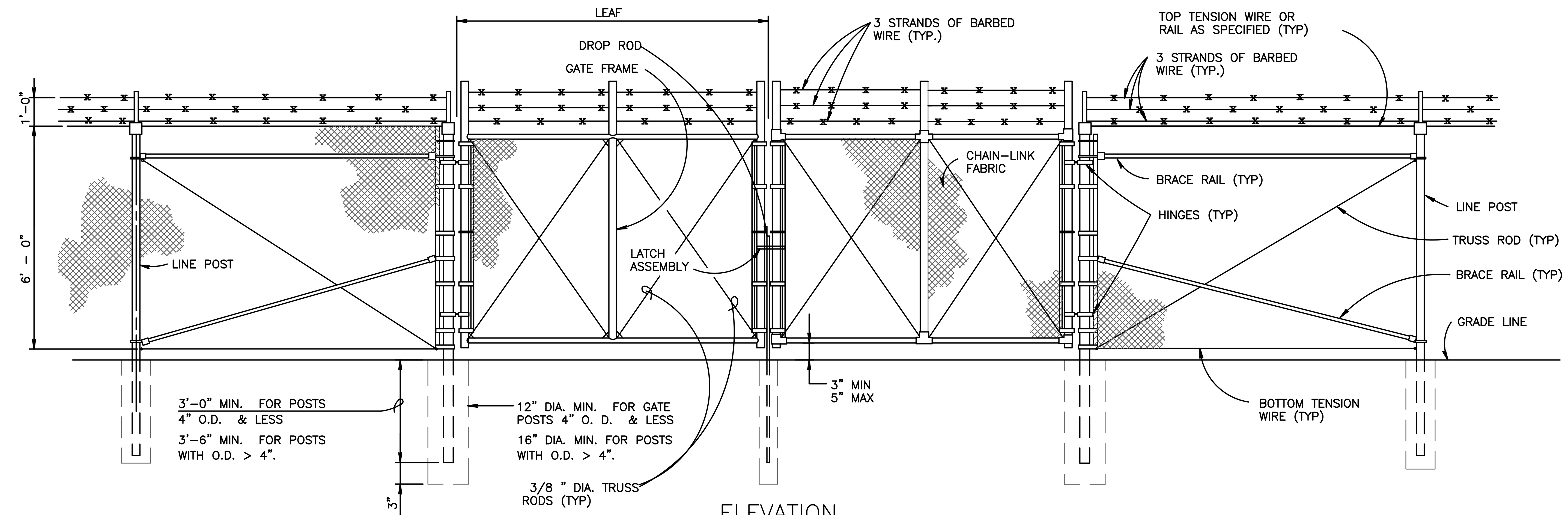
SAVED: 10-Sep-15 11:23 AM PLOTTED: 16-Sep-15 12:04 AM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIV\D-000-C-0081.DWG

ARCH D-24x36



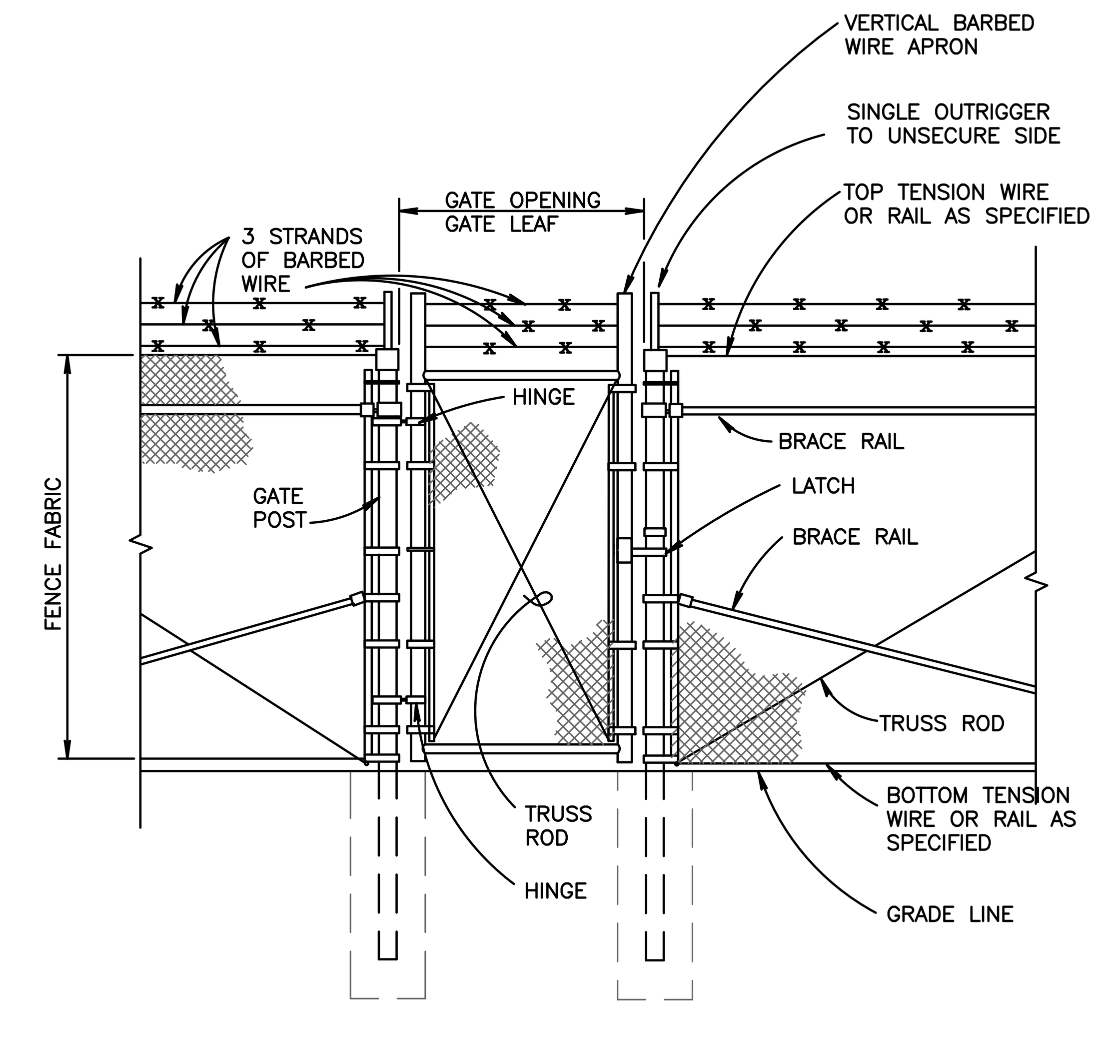
PLAN



ELEVATION

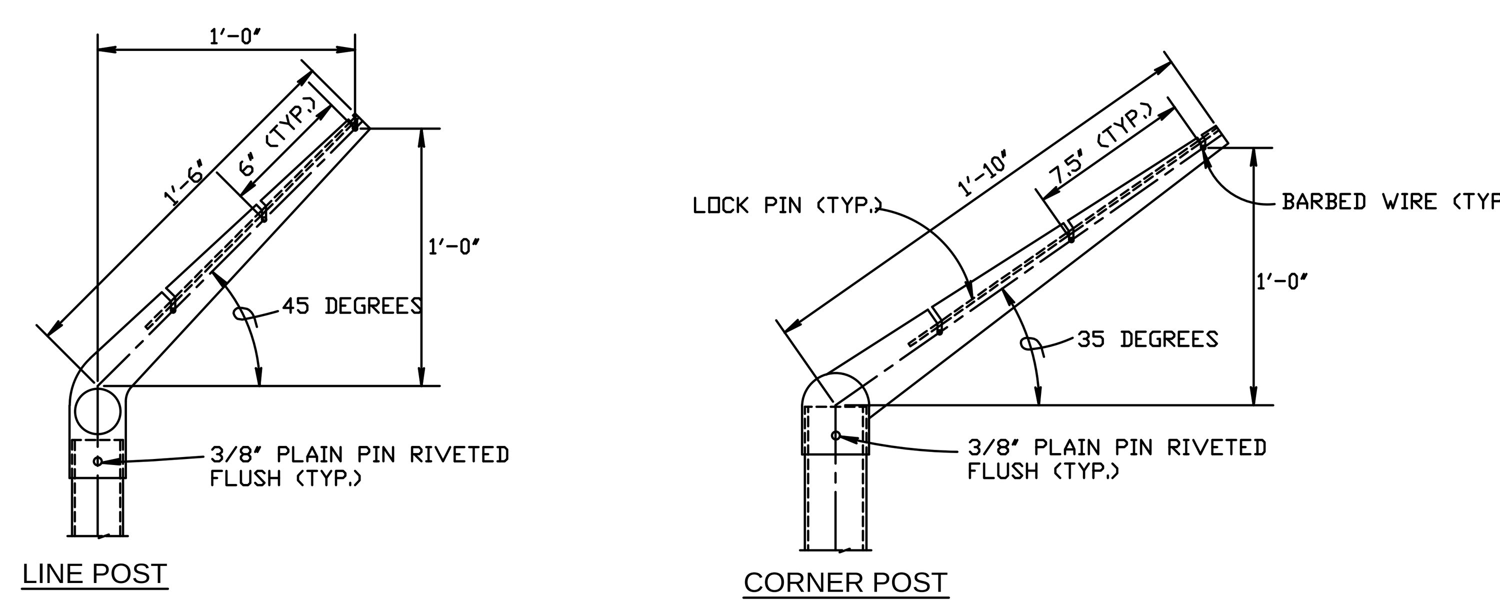
DOUBLE SWING GATE

NO SCALE



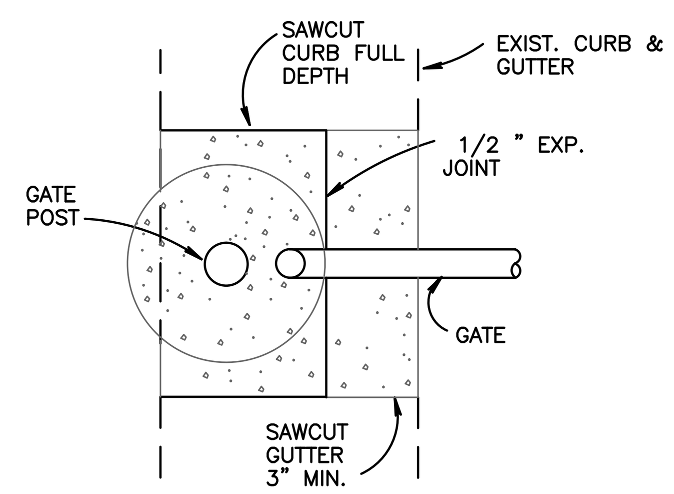
PERSONNEL GATE

NO SCALE

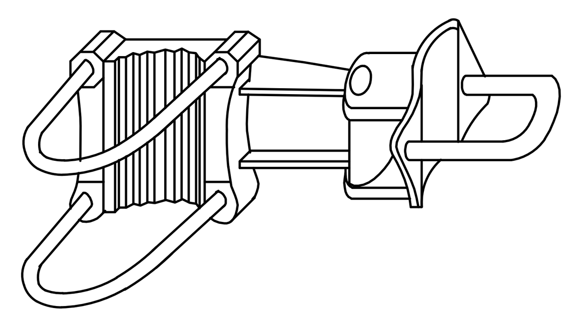


EXTENSION ARM DETAILS

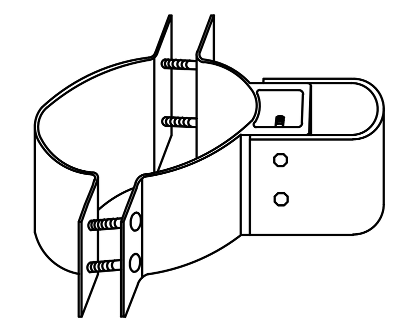
NO SCALE



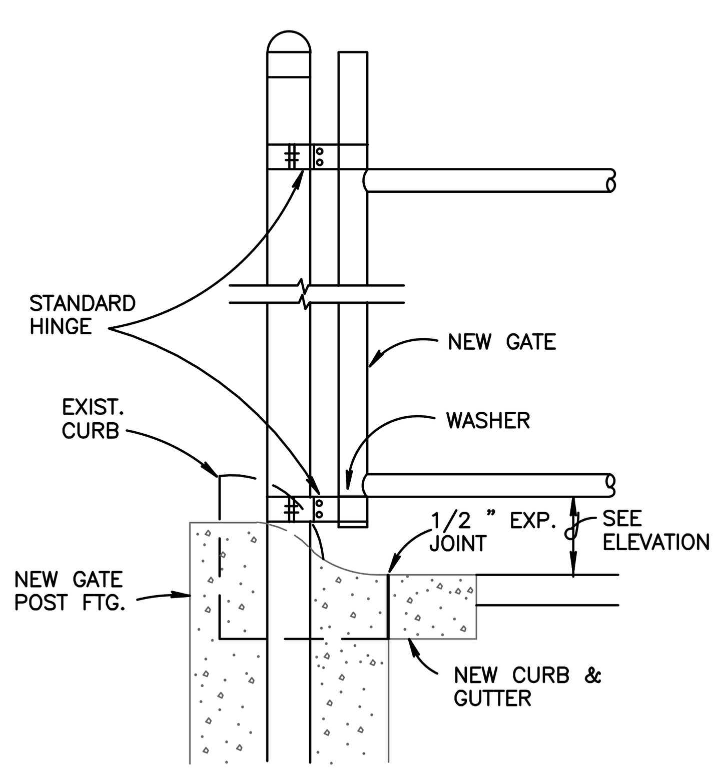
PLAN



OFFSET HINGE

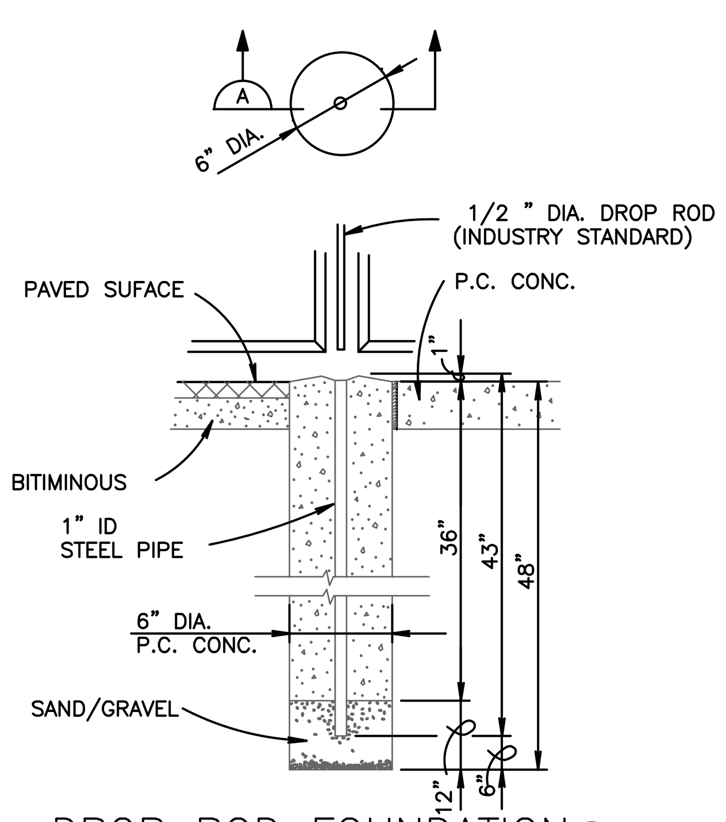


STANDARD HINGE

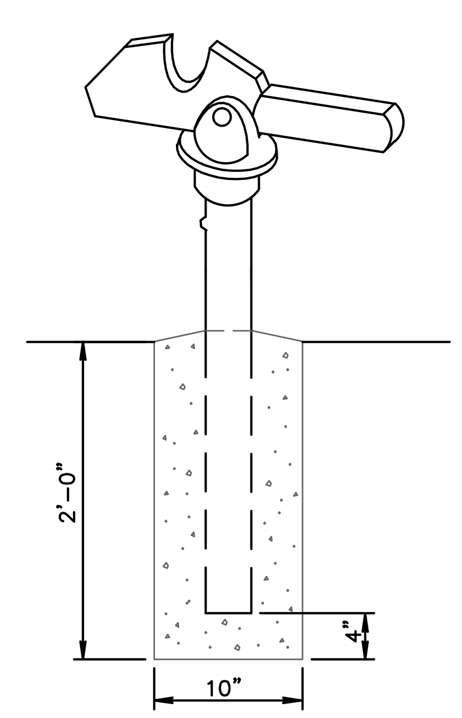


GATE POST SECTION
AT CURB AND GUTTER

NO SCALE

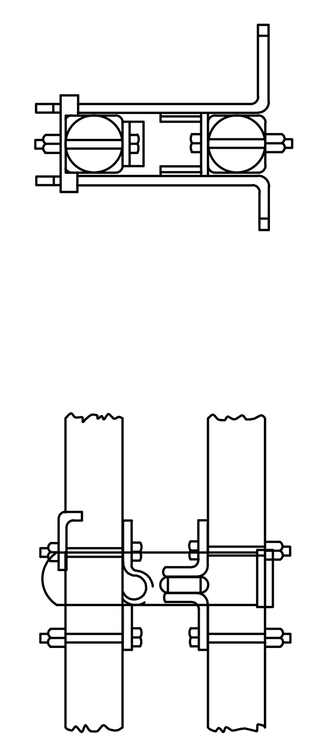


DROP ROD FOUNDATION (A)

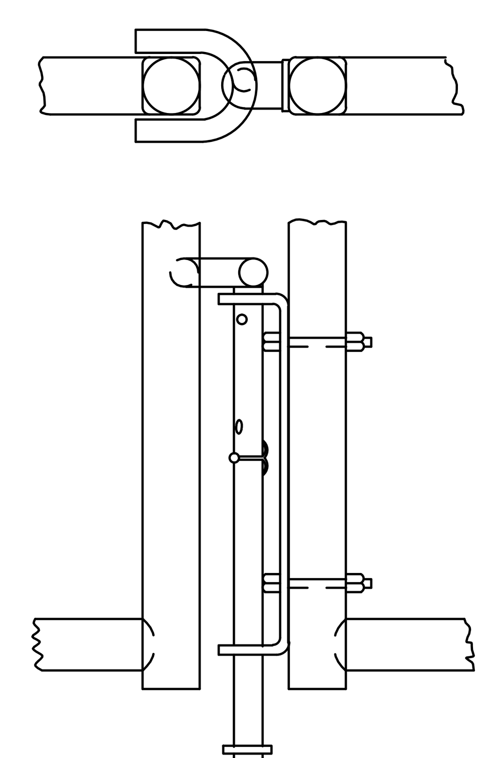


GATE KEEPER

(TO HOLD GATE OPEN)



LATCH ASSEMBLY



DROP ROD ASSEMBLY

SWING GATE DETAILS

NO SCALE

GATE POST SCHEDULE	
GATE LEAF WIDTH (NOMINAL)	OUTSIDE DIMENSION (NOMINAL)
6' OR LESS	2.875" OD
GREATER THAN 6' TO 12'	4.0" OD
GREATER THAN 12' TO 18'	6.625" OD

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

NOTES

1. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPE OF FENCE SECTIONS AND METHODS OF INSTALLATION WHICH COMPLY WITH THE SPECIFICATIONS.
2. SWING GATES SHALL BE CONSTRUCTED WITH DROP RODS, PADLOCKS, LATCH ASSEMBLY AND GATE KEEPERS EXCEPT AS NOTED.
3. ALL GATE FRAMES SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM F900 1.90" WELDED CONSTRUCTION OR SHALL BE ASSEMBLED USING HEAVY FITTINGS. AT CONTRACTOR'S OPTION A WELDED HORIZONTAL BRACE MAY BE USED IN LIEU OF TRUSS RODS TO BRACE ALL-WELDED GATE FRAMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER RIGID CONSTRUCTION OF ALL GATES SUPPLIED.
4. FOR GENERAL NOTES, LEGEND, AND KEYPLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
5. FOR FENCE CONSTRUCTION AND INSTALLATION SPECIFICATIONS SEE C-SPC-000-002.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUE FOR PERMIT REVIEW	AFK	MTG	LEC	HRM	JCG	
D	24FEB15	ISSUED FOR PERMIT REVIEW	MSN	MTG	LEC	HRM	JCG	
C	30JAN15	REVISED FOR BID	MSN	MTG	LEC	HRM	JCG	
B	12JAN15	ISSUED FOR BID	MSN	MTG	LEC	HRM	JCG	
A	19JUN14	ISSUED FOR CONCEPTUAL REVIEW	MSN	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

	DRE	HRM
CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MSN	24MAR14
SCALE	PACKAGE CODE	DRN	MSN	24MAR14
NTS		CHK	MTG	25APR14
		APP	LEC	25APR14

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT
GENERAL DETAILS
PERIMETER FENCE GATES

AREA

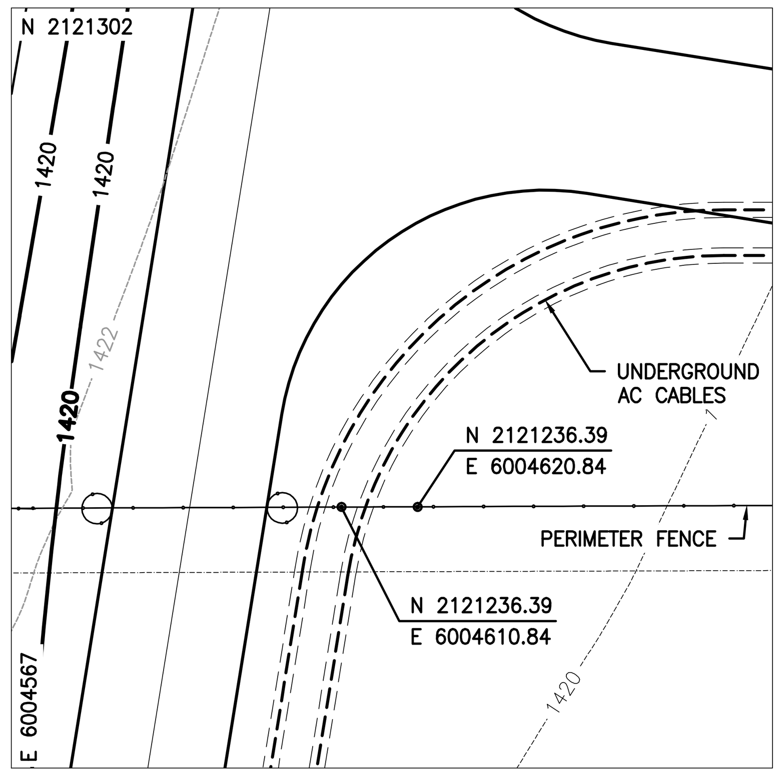
CLIENT DWG. NO.

DRAWING NO. D-000-C-0082

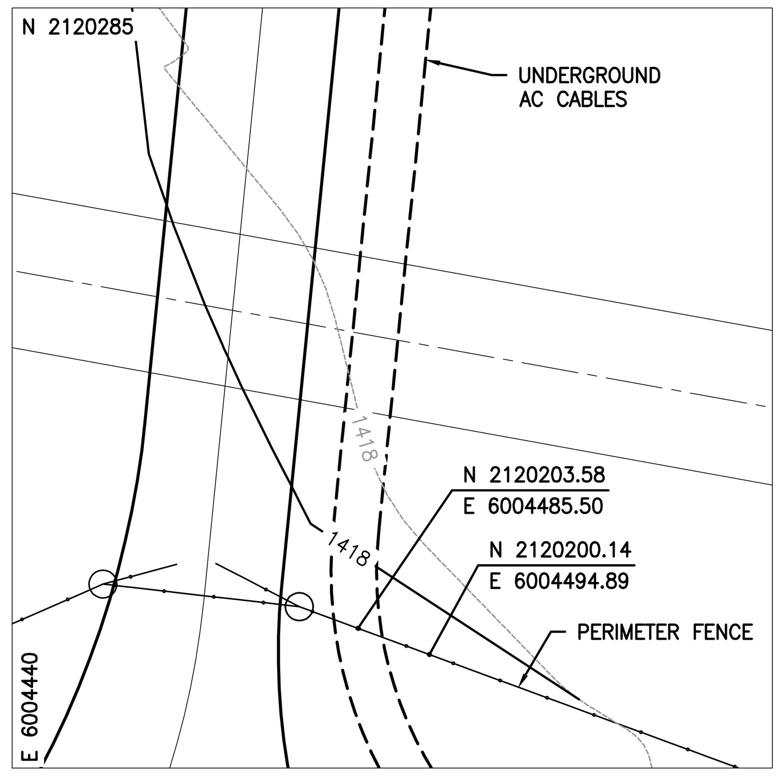
REV. E

ARCH D-24x36

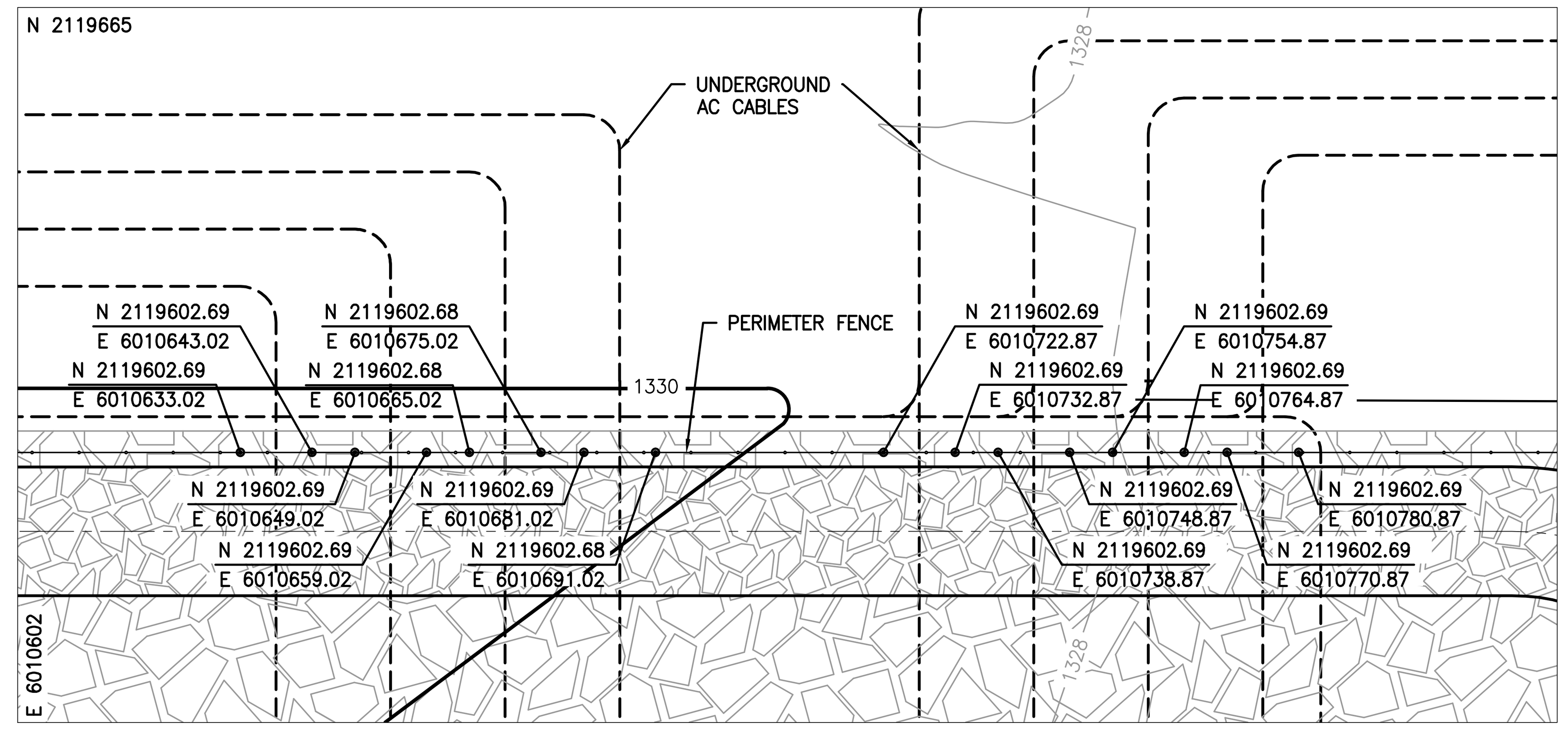
SAVED: 10-Sep-15 10:07 AM PLOTTED: 15-Sep-15 6:47 PM USER: GILL, MATTHEW



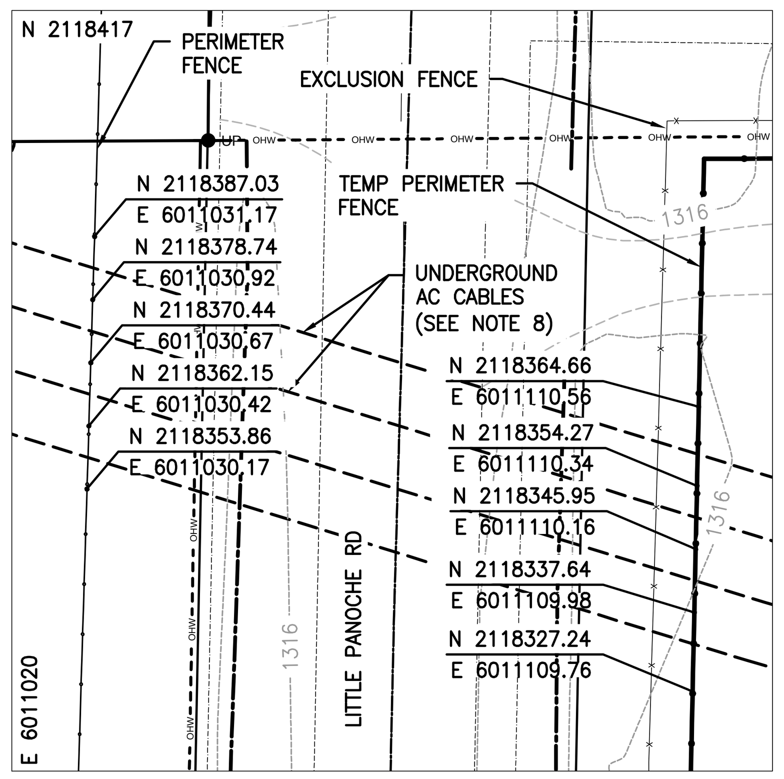
1 DETAIL 0015 SCALE 1" = 20'



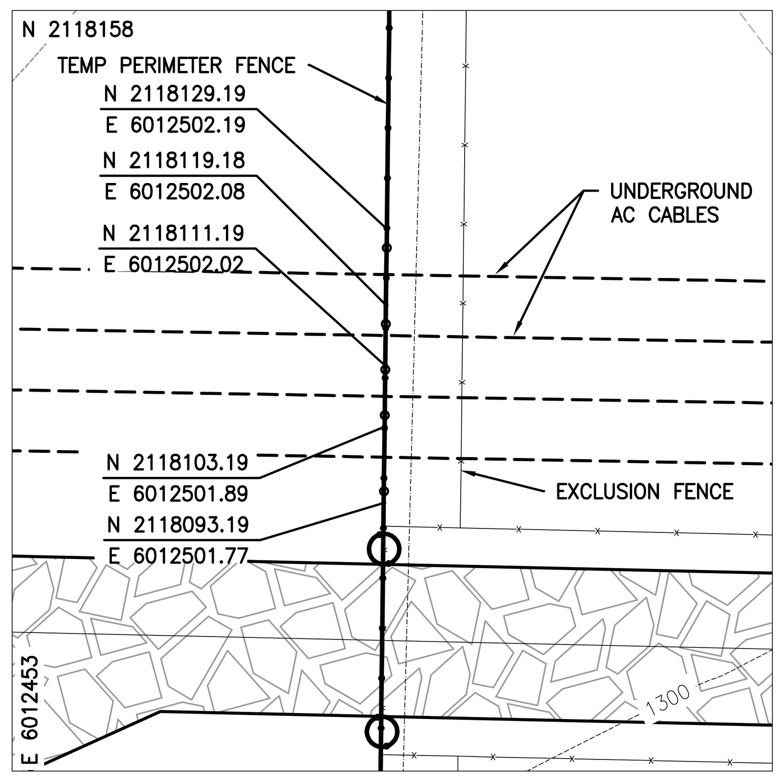
2 DETAIL 0018 SCALE 1" = 20'



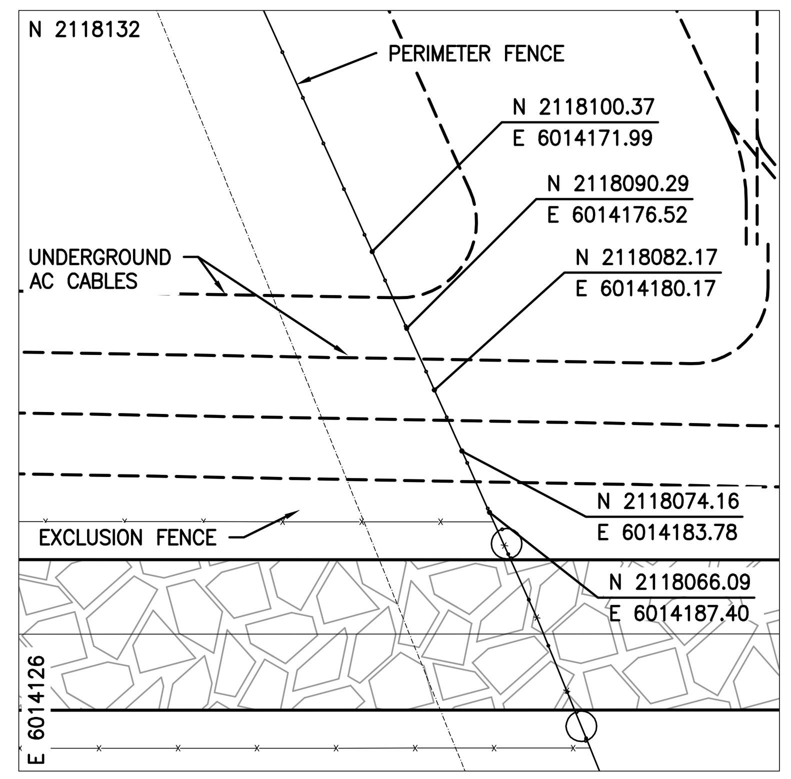
3 DETAIL 0091 SCALE 1" = 20'



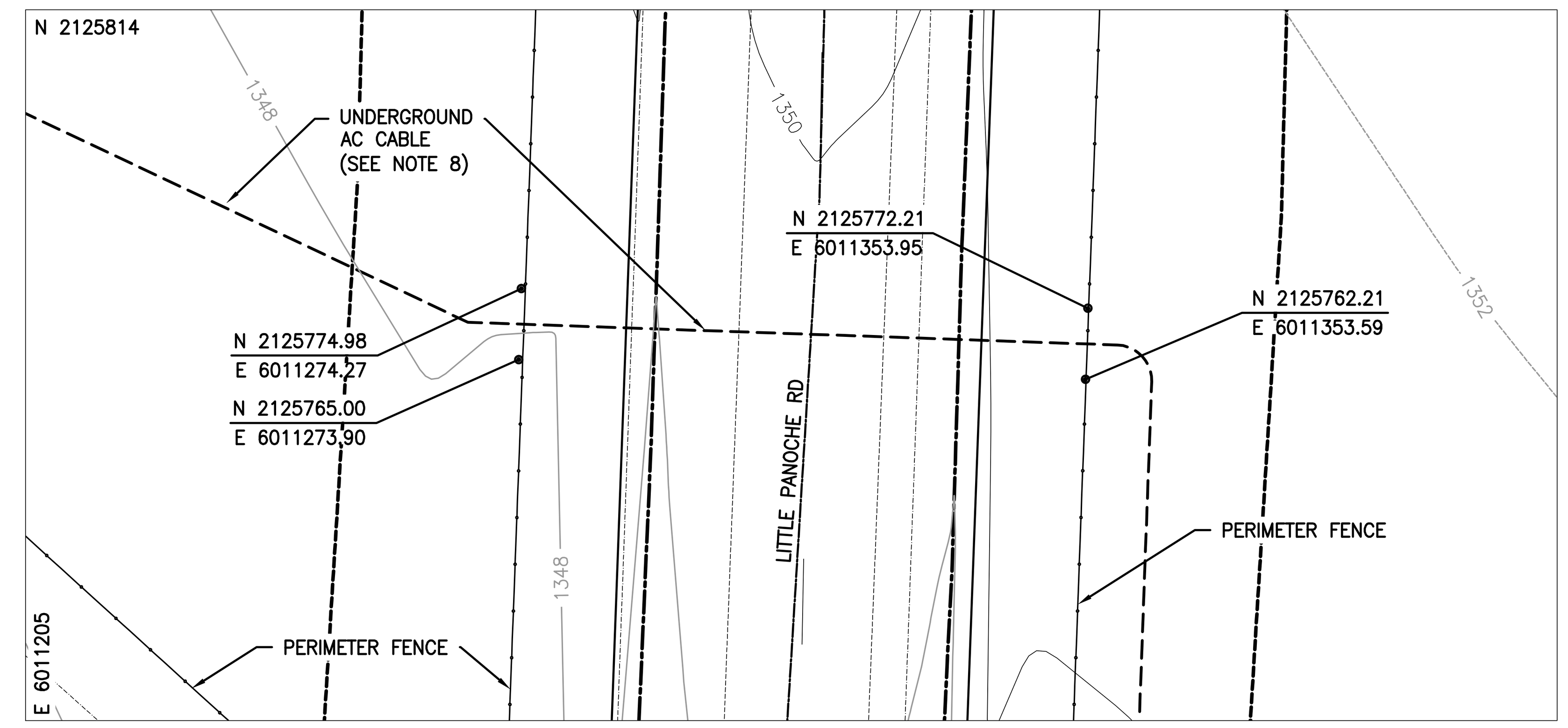
5 DETAIL 0019 SCALE 1" = 20'



6 DETAIL 0020 SCALE 1" = 20'



7 DETAIL 0020 SCALE 1" = 20'



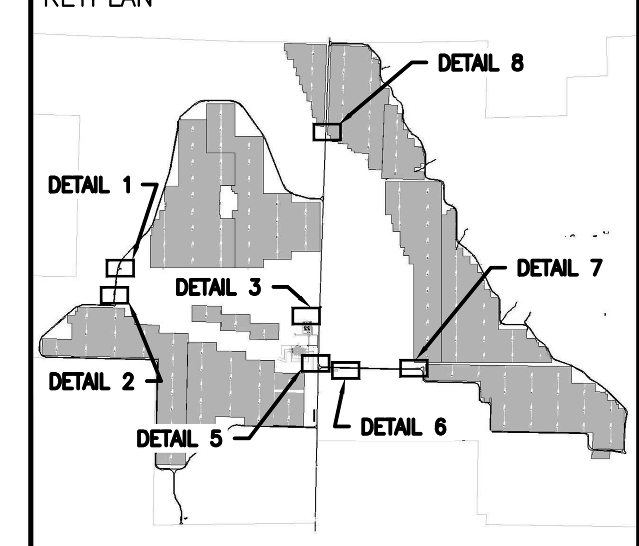
8 DETAIL 0014 SCALE 1" = 20'

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEYPLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. EACH COORDINATE SHOWN REPRESENTS AN INSTALLED FENCE POST.
3. FENCE CONTRACTOR SHALL RECEIVE APPROVAL FROM AMEC FOSTER WHEELER SITE MANAGER PRIOR TO INSTALLATION OF ANY OF THE FENCE POSTS SHOWN ON THIS DRAWING.
4. DESIGNATED FENCE POSTS ARE TO BE INSTALLED PRIOR TO EXCAVATION FOR ELECTRICAL TRENCHES.
5. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
6. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
7. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
8. UNDERGROUND AC LINES CROSSING UNDER LITTLE PANOCHE ROAD SHALL BE DIRECTIONAL BORED. BORING CONTRACTOR SHALL SUBMIT PLANS AND DETAILS OF BORING TO ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

0 5' 10' 20' 40'
1"=20'-0"

KEYPLAN



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUE FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JTW	LEC	DRE	HRM	JCG	
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REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE AS NOTED
PACKAGE CODE

	BY	DDMMMYY
DES	MTG	03NOV14
DRN	DRD	03NOV14
CHK	LEC	08JAN15
APP	DRE	16FEB15

PANOCHE VALLEY SOLAR LLC

amec

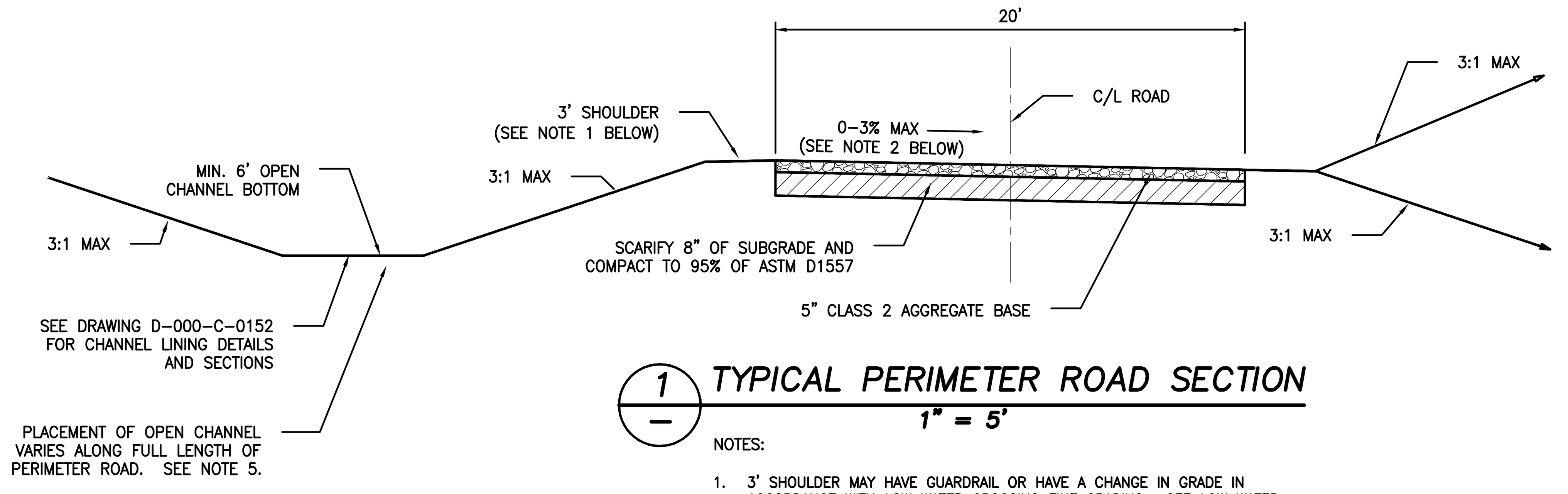
SUBJECT
GENERAL DETAILS
PERIMETER FENCE POST LOCATIONS
AT AC TRENCHES

AREA
CLIENT DWG. NO.
DRAWING NO. D-000-C-0083
REV. D

ARCH D-24x36

CAD FILE: P:\CAD\CIV\D-000-C-0083.DWG

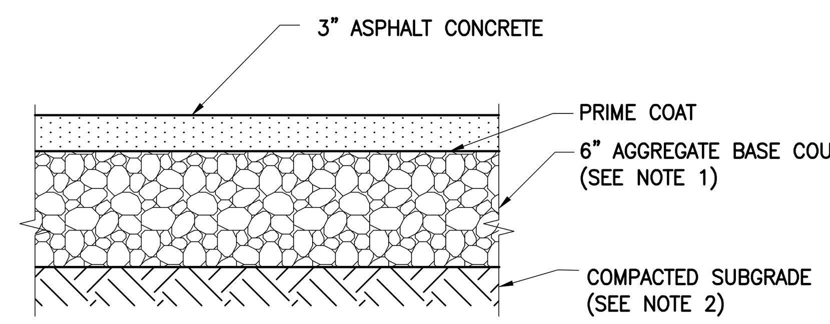
SAVED: 10-Sep-15 10:22 AM PLOTTED: 16-Sep-15 12:11 AM USER: GILL, MATTHEW



1 TYPICAL PERIMETER ROAD SECTION
1" = 5'

NOTES:

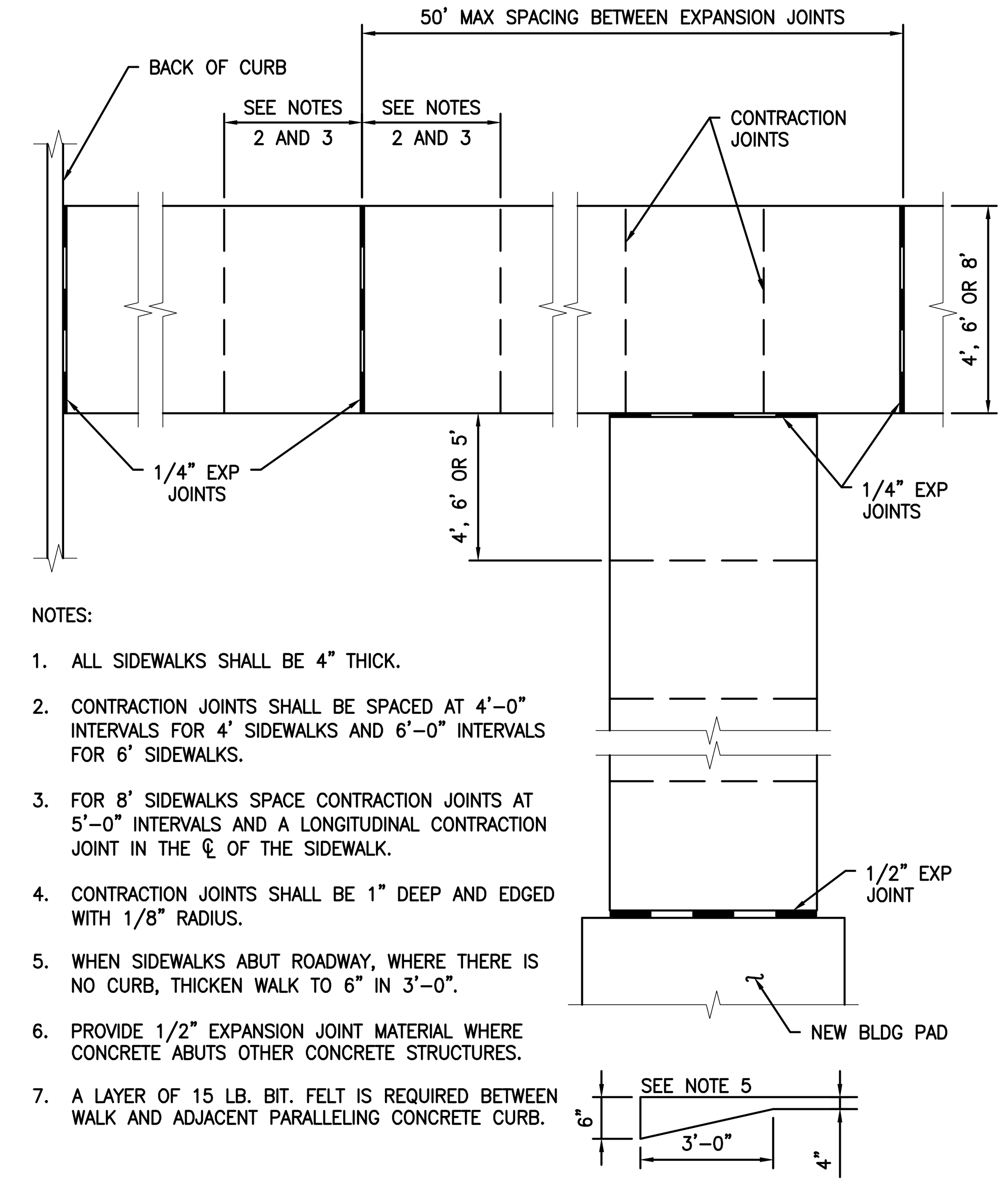
1. 3' SHOULDER MAY HAVE GUARDRAIL OR HAVE A CHANGE IN GRADE IN ACCORDANCE WITH LOW WATER CROSSING FINE GRADING. SEE LOW WATER CROSSING DETAILS D–000–C–0171 TO D–000–C–0190.
2. ROAD CROSS SLOPE IS 2% TYPICAL. CONTRACTOR SHALL ONLY GRADE CROSS SLOPE LESS THAN OR GREATER THAN 2% IF SHOWN ON GRADING PLANS OR LOW WATER DETAILS.



2 ASPHALT PAVEMENT SECTION
NTS

NOTES:

1. THE AGGREGATE BASE FOR DRIVEWAY SECTIONS SHOULD MEET CALTRANS SPECIFICATIONS FOR CLASS 2 BASE OR THE SPECIFICATIONS FOR PROCESSED MISCELLANEOUS BASE (PMB), AS CONTAINED IN THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION. AGGREGATE BASE SHOULD BE COMPACTED TO AT LEAST 95 PERCENT RELATIVE COMPACTION WITH UNIFORM MOISTURE CONTENT NEAR THE OPTIMUM PERCENT, AS DETERMINED BY ASTM STANDARD D 1557.
2. COMPACT SHOULDER, SUBGRADE, AND ANY FILL USED TO CONSTRUCT ROAD TO A MINIMUM 95% RELATIVE COMPACTION WITH A UNIFORM MOISTURE CONTENT OF 0 TO 2 PERCENT OVER OPTIMUM MOISTURE CONTENT, AS DETERMINED BY ASTM STANDARD D 1557, TO A DEPTH OF 8 INCHES AT TIME OF BASE PLACEMENT..



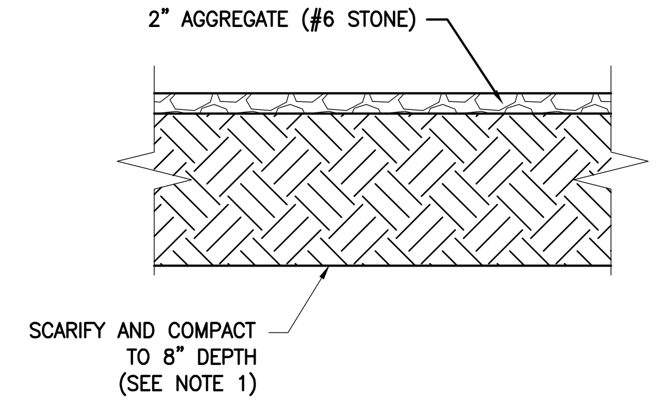
NOTES:

1. ALL SIDEWALKS SHALL BE 4" THICK.
2. CONTRACTION JOINTS SHALL BE SPACED AT 4'–0" INTERVALS FOR 4' SIDEWALKS AND 6'–0" INTERVALS FOR 6' SIDEWALKS.
3. FOR 8' SIDEWALKS SPACE CONTRACTION JOINTS AT 5'–0" INTERVALS AND A LONGITUDINAL CONTRACTION JOINT IN THE ℄ OF THE SIDEWALK.
4. CONTRACTION JOINTS SHALL BE 1" DEEP AND EDGED WITH 1/8" RADIUS.
5. WHEN SIDEWALKS ABUT ROADWAY, WHERE THERE IS NO CURB, THICKEN WALK TO 6" IN 3'–0".
6. PROVIDE 1/2" EXPANSION JOINT MATERIAL WHERE CONCRETE ABUTS OTHER CONCRETE STRUCTURES.
7. A LAYER OF 15 LB. BIT. FELT IS REQUIRED BETWEEN WALK AND ADJACENT PARALLELING CONCRETE CURB.

5 CONCRETE SIDEWALK DETAIL
NTS

NOTES

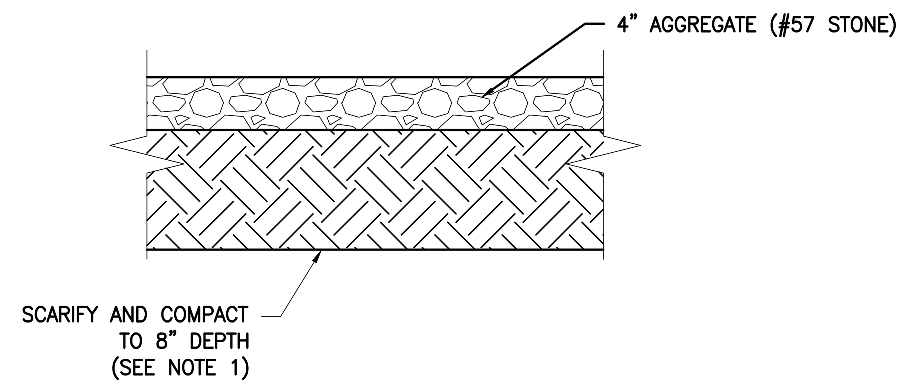
1. FOR GENERAL NOTES, LEGEND, AND KEYPLANS SEE DRAWINGS D–000–C–0002 AND D–000–C–0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D–000–C–0071 THROUGH D–000–C–0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C–RPT–000–001.
3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C–RPT–000–003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D–000–C–0081 THROUGH D–000–C–0089.
5. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D–000–C–0121 THROUGH D–000–C–0146.



3 LAYDOWN AREA/PARKING SECTION
NTS

NOTE:

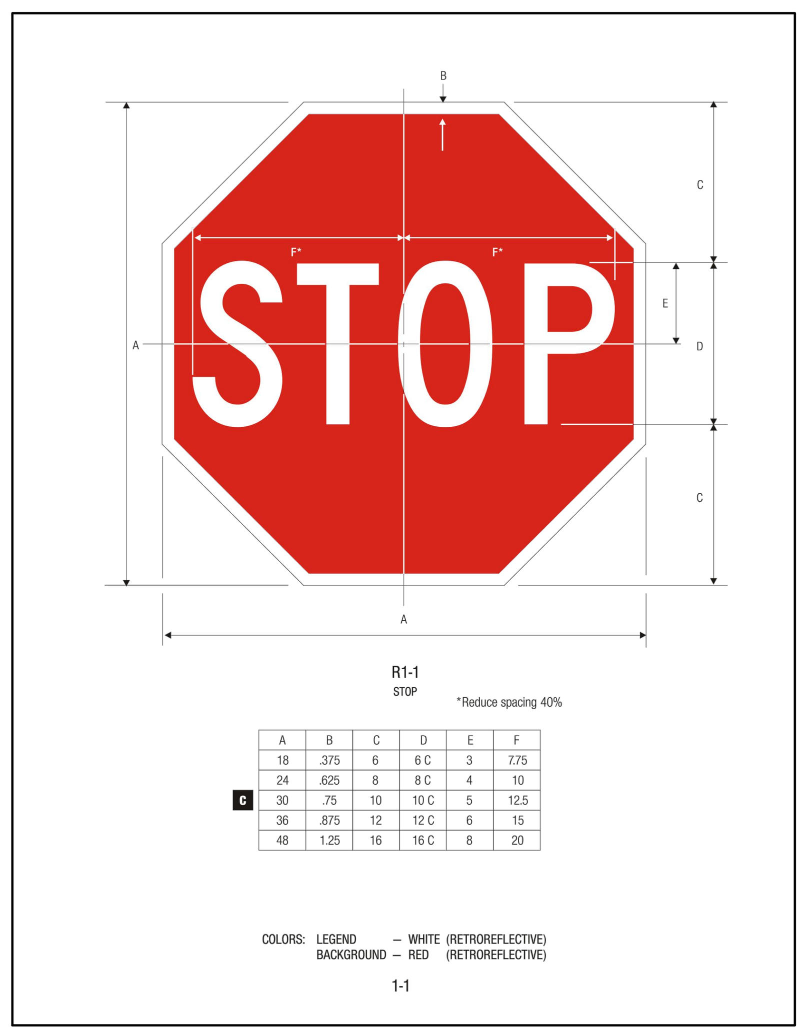
1. UNIFORMLY COMPACT THE SUBGRADE TO AT LEAST 95% RELATIVE COMPACTION WITH UNIFORM MOISTURE CONTENT AT 0 TO 2 PERCENT OVER OPTIMUM MOISTURE CONTENT, AS DETERMINED BY ASTM STANDARD D 1557, TO A DEPTH OF 8 INCHES AT TIME OF BASE PLACEMENT.



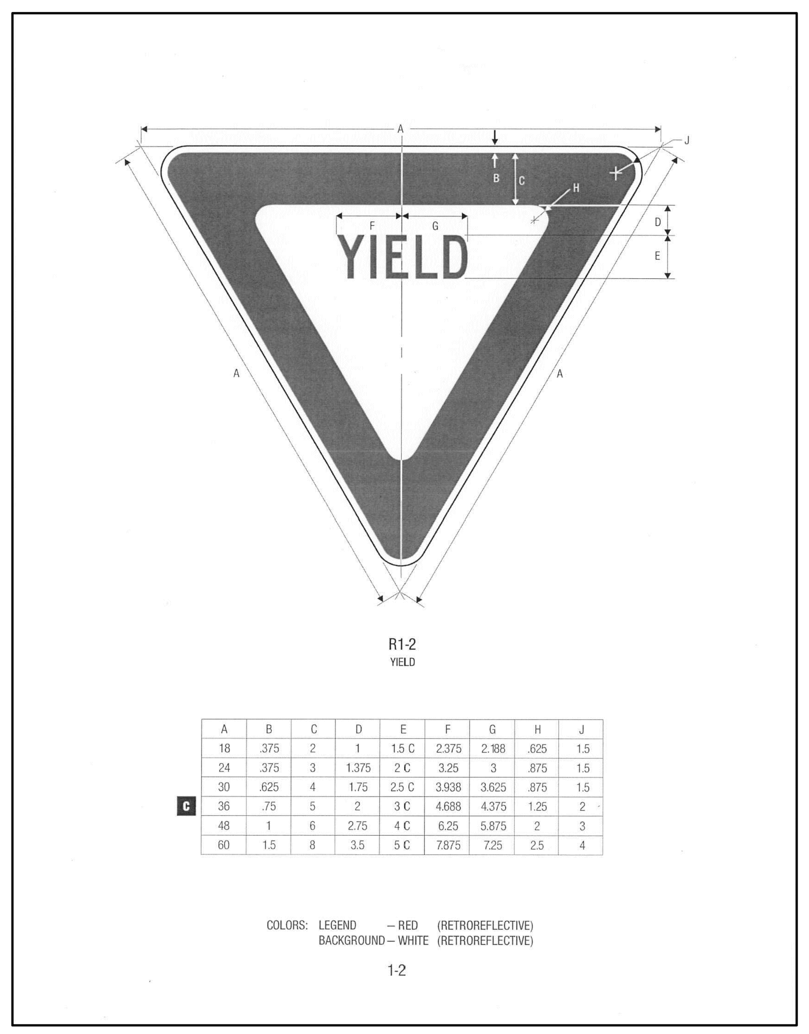
4 SUBSTATION AREA SECTION
NTS

NOTE:

1. UNIFORMLY COMPACT THE SUBGRADE TO AT LEAST 95% RELATIVE COMPACTION WITH UNIFORM MOISTURE CONTENT AT 0 TO 2 PERCENT OVER OPTIMUM MOISTURE CONTENT, AS DETERMINED BY ASTM STANDARD D 1557, TO A DEPTH OF 8 INCHES AT TIME OF BASE PLACEMENT.



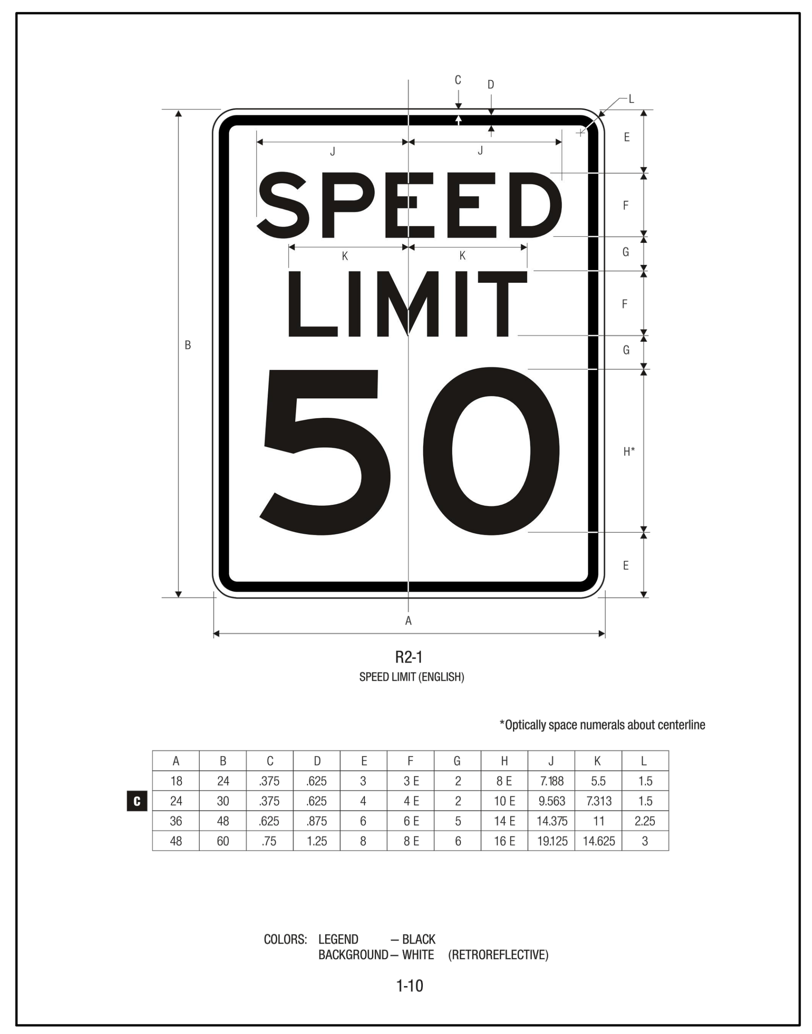
6 STOP SIGN (R1–1)
NTS



7 YIELD SIGN (R1–2)
NTS

NOTES:

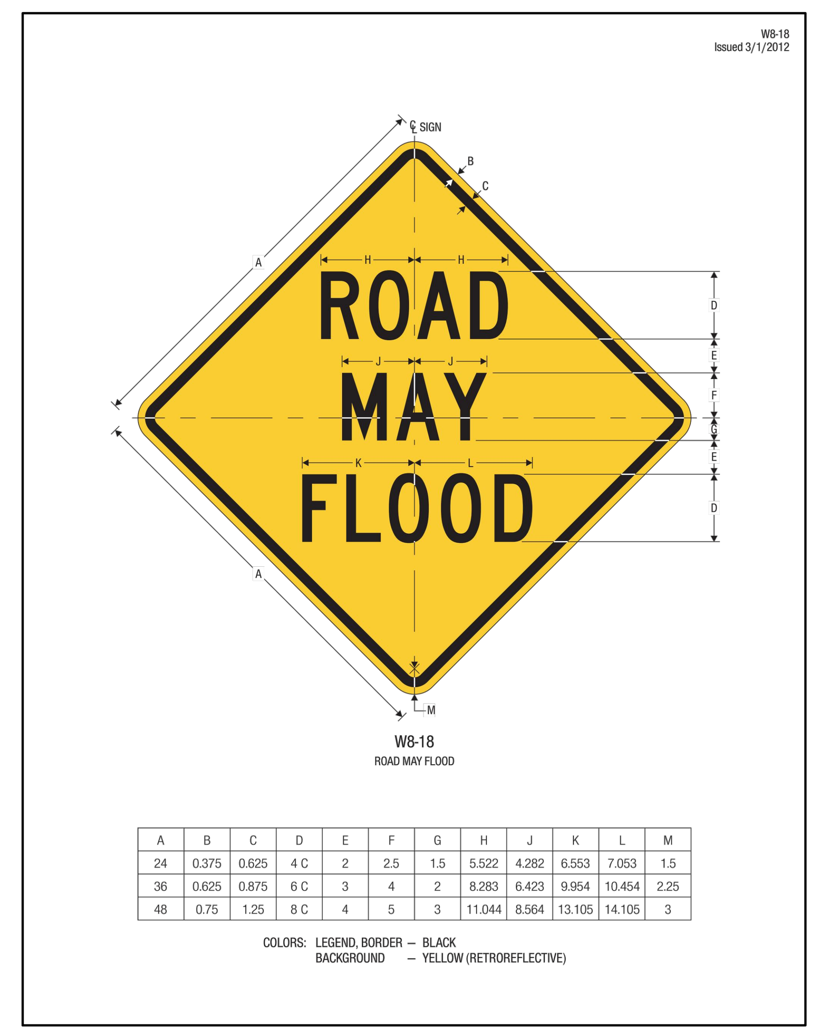
1. ALL ROAD SIGNS SHALL BE IN ACCORDANCE WITH CALIFORNIA MUTCD AND SAN BENITO COUNTY STANDARDS.



8 SPEED LIMIT SIGN (R2–1)
NTS

NOTES:

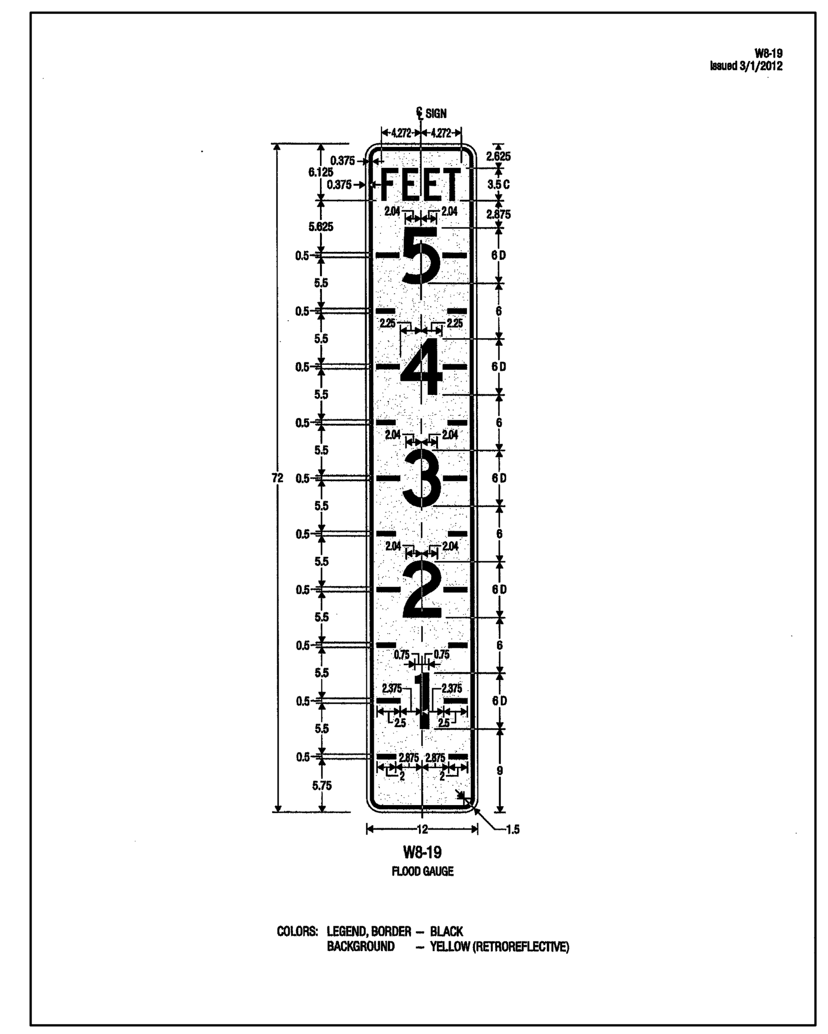
1. ALL ROAD SIGNS SHALL BE IN ACCORDANCE WITH CALIFORNIA MUTCD AND SAN BENITO COUNTY STANDARDS.



9 FLOODING SIGN (W8–18)
NTS

NOTES:

1. ALL ROAD SIGNS SHALL BE IN ACCORDANCE WITH CALIFORNIA MUTCD AND SAN BENITO COUNTY STANDARDS.
2. TO BE INSTALLED BOTH SIDES OF ROAD, ON 4"X4" PRESSURE TREATED POST, 100' FROM EACH END OF LOW WATER CROSSINGS OR AS SPECIFIED ON PLANS.



10 DEPTH GAUGE SIGN (W8–19)
NTS

NOTES:

1. ALL ROAD SIGNS SHALL BE IN ACCORDANCE WITH CALIFORNIA MUTCD AND SAN BENITO COUNTY STANDARDS.
2. TO BE INSTALLED BOTH SIDES OF ROAD, AT LOW POINT OF ALL LOW WATER CROSSINGS AND WEIR AT POND 2 OR AS SPECIFIED ON PLANS.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JCS	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JCS	MTG	DRE	HRM	JCG	

REF | NUMBER | TITLE — REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW
DRE — HRM
CLIENT PROJECT MGR. — DEPARTMENT MGR. — PROJECT MGR.

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.: 176055 — ACTIVITY NO.
SCALE: NTS — PACKAGE CODE

	BY	DDMMMYY
DES	JCS	07JAN15
DRN	JCS	07JAN15
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT: GENERAL DETAILS
SITE DETAILS

amec

AREA
CLIENT DWG. NO.
DRAWING NO. D–000–C–0084 — REV. D

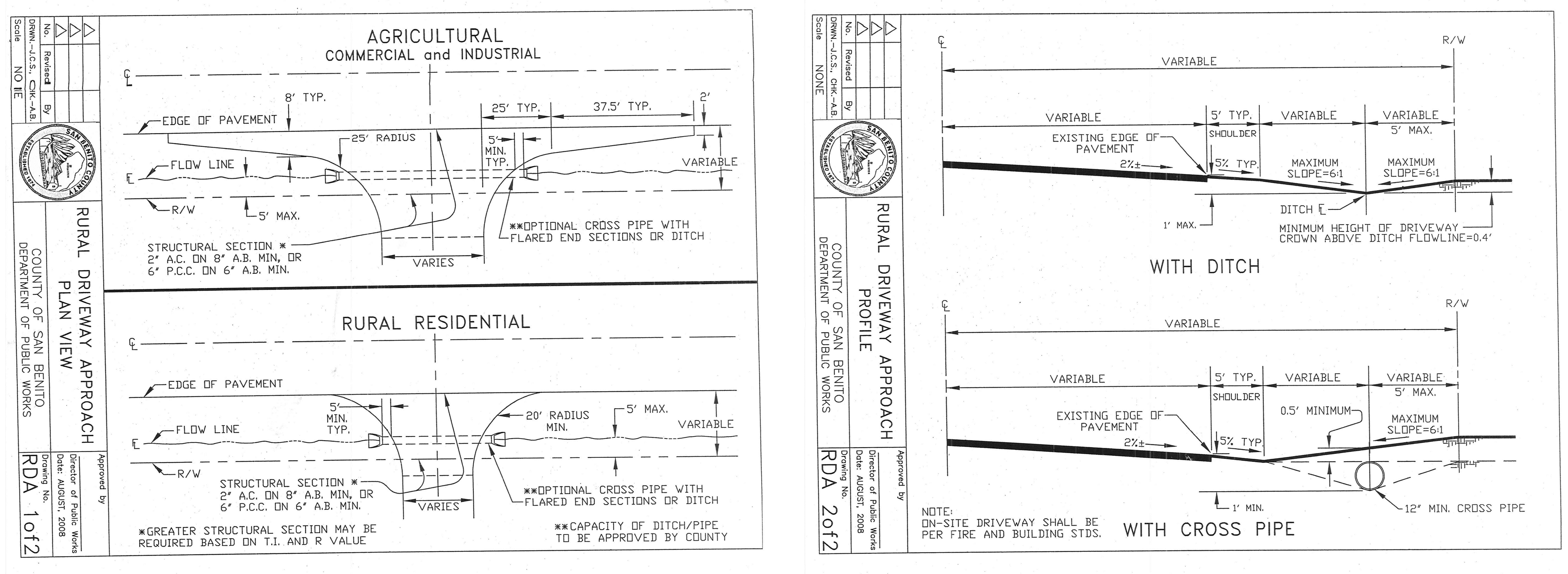
SAVED: 10–Sep–15 3:09 PM PLOTTED: 15–Sep–15 6:49 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIVIL\D–000–C–0084.DWG

ARCH D–24x36

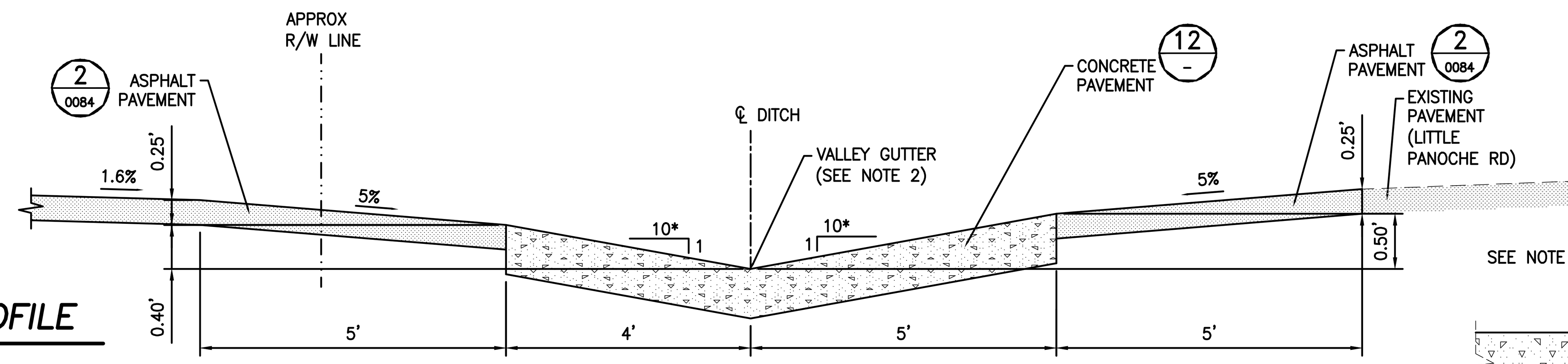
NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEYPLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.



11 SAN BENITO COUNTY RURAL DRIVEWAY APPROACH

NTS



12 DRIVEWAY APPROACH PLAN & PROFILE

SCALE VARIES

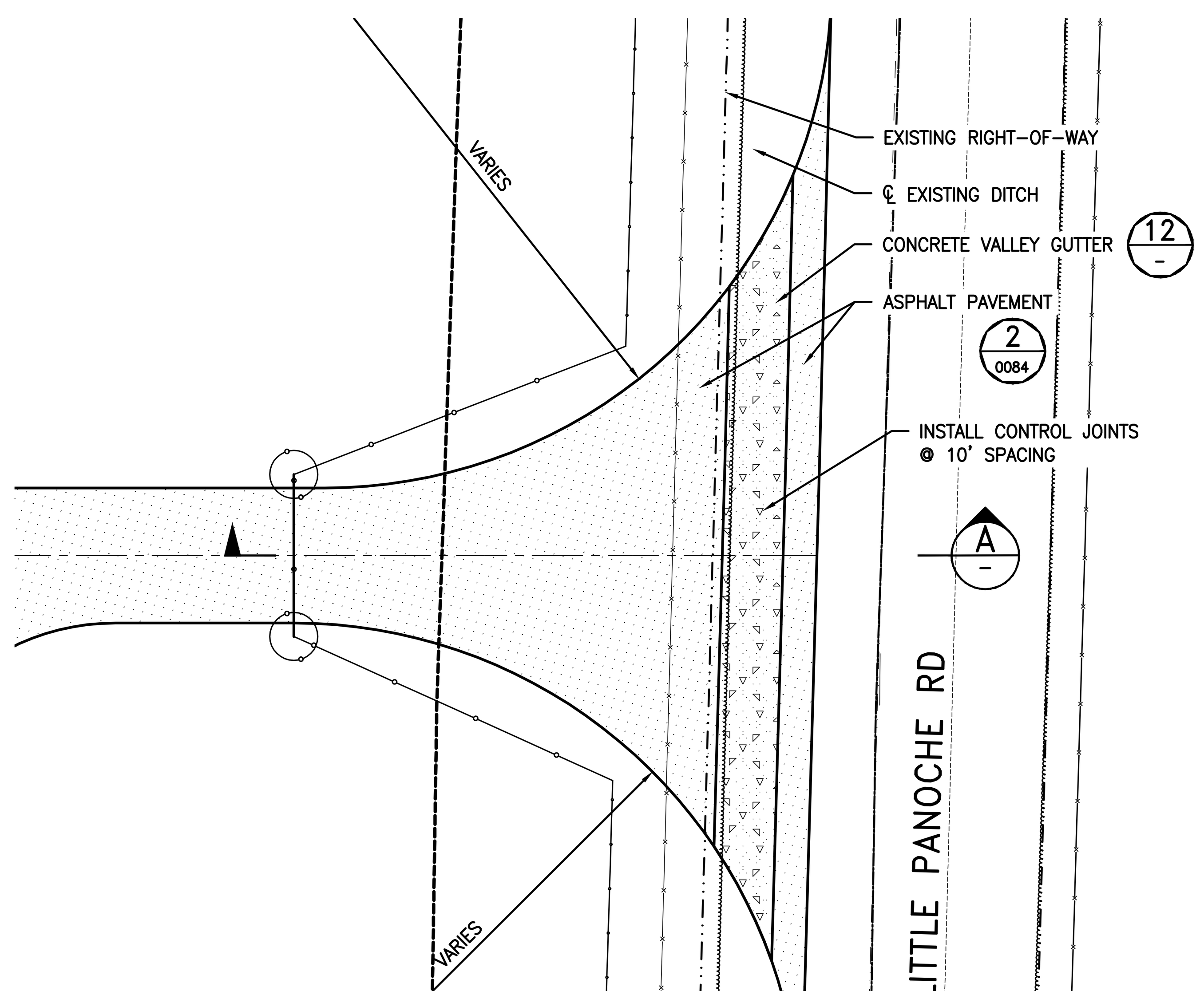
NOTES:

1. DRIVEWAY CROSS-SECTION DETAIL IS BASED ON SAN BENITO COUNTY DEPARTMENT OF PUBLIC WORKS "RURAL DRIVEWAY APPROACH PROFILE" DETAIL RDA 2 OF 2.
2. BOTTOM OF VALLEY GUTTER TO MATCH EXISTING DITCHLINE BOTTOM ELEVATION AS CLOSELY AS POSSIBLE. NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.

*MAXIMUM SIDE SLOPES AT VALLEY GUTTER TO BE 6:1.

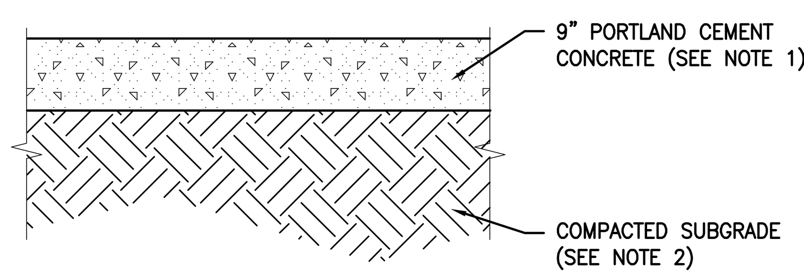
SECTION A–A

NTS



PLAN

SCALE: 1"=20'



NOTES:

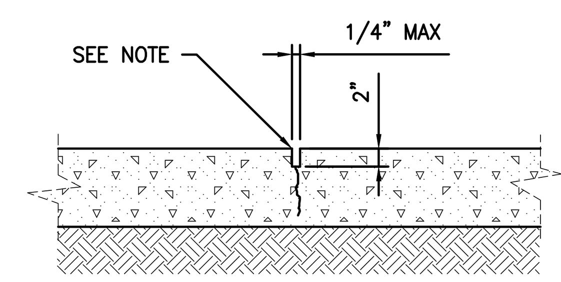
1. CONCRETE SHALL HAVE MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI PER ASTM C-31, WITH FIBER-MESH OR 6"X6" 6/6 GAUGE WIRE MESH LOCATED 2" FROM SURFACE OF SLAB.
2. SUBGRADE SHALL HAVE MINIMUM 90% RELATIVE COMPACTION WITH A UNIFORM MOISTURE CONTENT AT 0 TO 2 PERCENT OVER OPTIMUM MOISTURE CONTENT, AS DETERMINED BY ASTM STANDARD D 1557, TO A DEPTH OF 12 INCHES AT TIME OF BASE PLACEMENT..

13 CONCRETE PAVEMENT SECTION

NTS

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

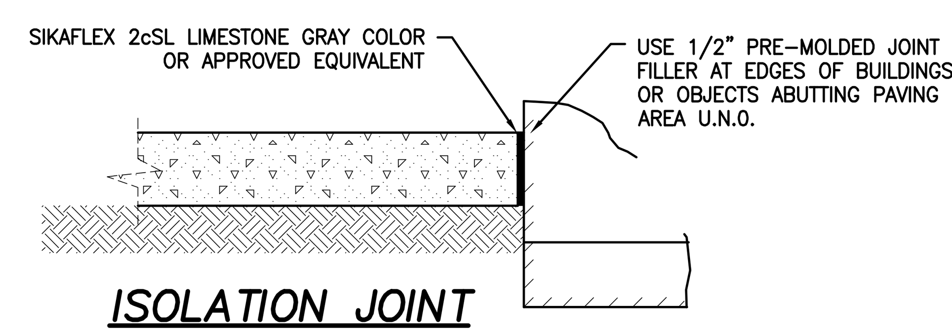
COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)



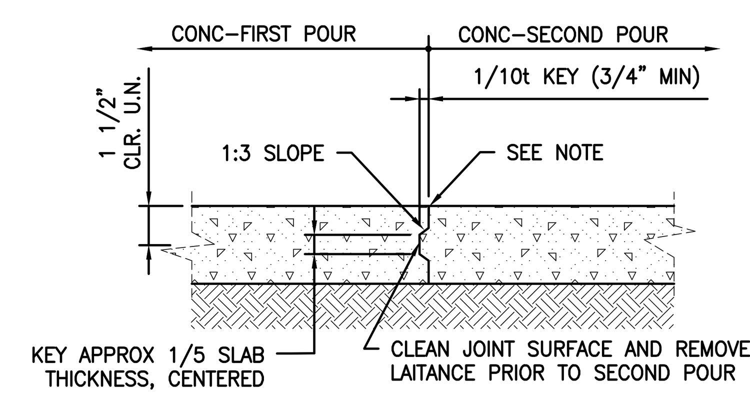
NOTE:

HANDFORM OR SAWED JOINT 1/4" WIDE MAX FOR SERVICE AREA PAVEMENT, 1/4" WIDE MIN W/BACKER ROD AND SIKAFLEX 2cSL LIMESTONE GRAY COLOR OR APPROVED EQUIVALENT.

CONTROL JOINT



ISOLATION JOINT



NOTE:

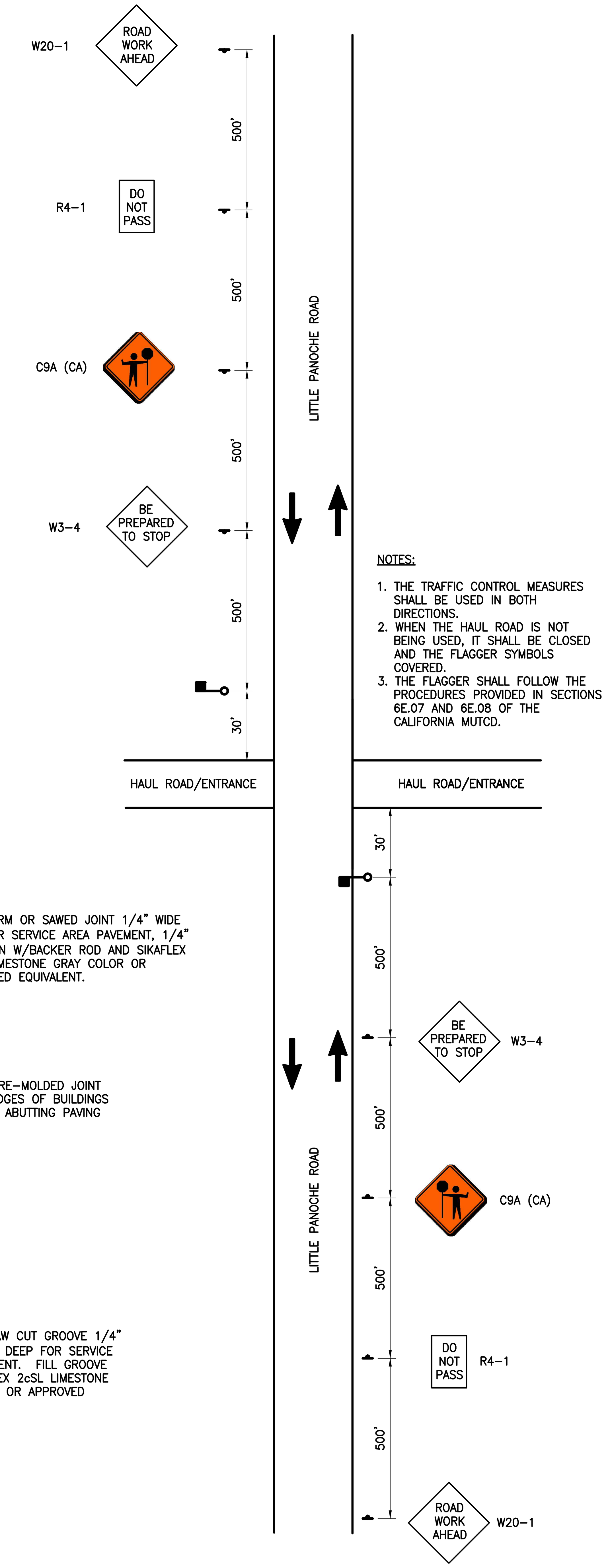
FORM OR SAW CUT GROOVE 1/4" MAX X 3/4" DEEP FOR SERVICE AREA PAVEMENT. FILL GROOVE WITH SIKAFLEX 2cSL LIMESTONE GRAY COLOR OR APPROVED EQUIVALENT.

CONSTRUCTION JOINT

TO BE USED IN LIEU OF CONTROL JOINT TO ACCOMODATE PLACEMENT SEQUENCE.

14 JOINTS IN CONCRETE PAVEMENT

NTS



NOTES:

1. THE TRAFFIC CONTROL MEASURES SHALL BE USED IN BOTH DIRECTIONS.
2. WHEN THE HAUL ROAD IS NOT BEING USED, IT SHALL BE CLOSED AND THE FLAGGER SYMBOLS COVERED.
3. THE FLAGGER SHALL FOLLOW THE PROCEDURES PROVIDED IN SECTIONS 6E.07 AND 6E.08 OF THE CALIFORNIA MUTCD.

15 HAUL CROSSING TRAFFIC CONTROL PLAN

NTS

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JCS	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JCS	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

	DRE	HRM
CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	LEC	07JAN15
SCALE	PACKAGE CODE	DRN	JCS	07JAN15
NTS		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT: GENERAL DETAILS
SITE DETAILS

amec

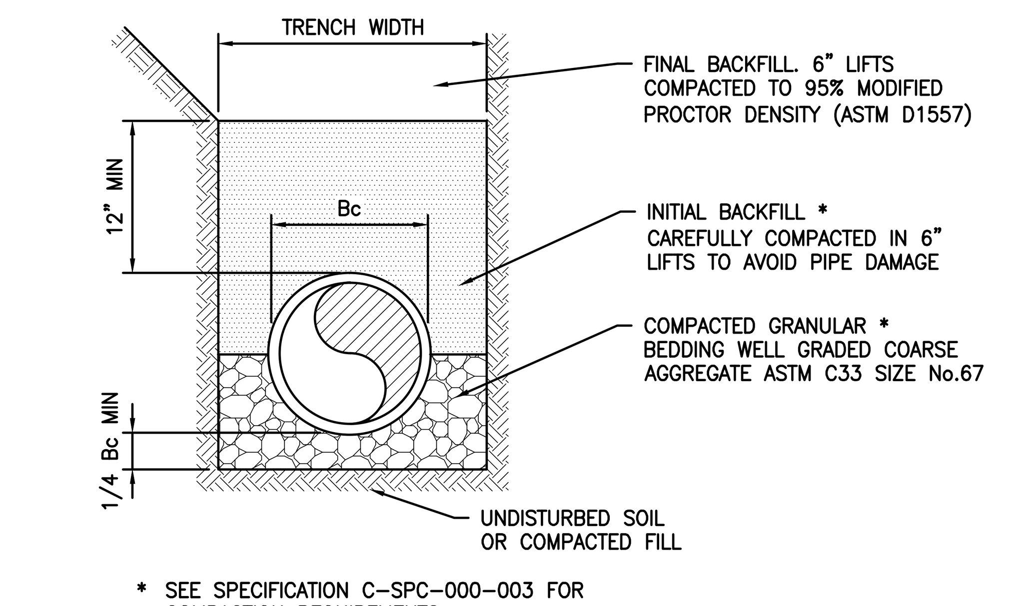
AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0085 REV. D

NOTES

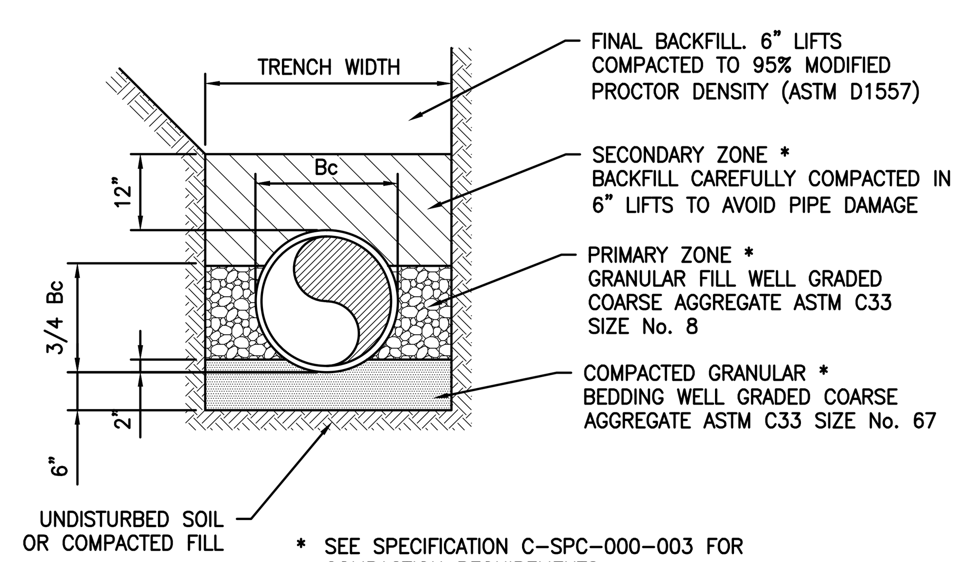
1. FOR GENERAL NOTES, LEGEND, AND KEYPLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.



* SEE SPECIFICATION C-SPC-000-003 FOR COMPACTION REQUIREMENTS.

1 RIGID PIPE BEDDING

NTS



* SEE SPECIFICATION C-SPC-000-003 FOR COMPACTION REQUIREMENTS.

2 FLEXIBLE PIPE BEDDING

NTS

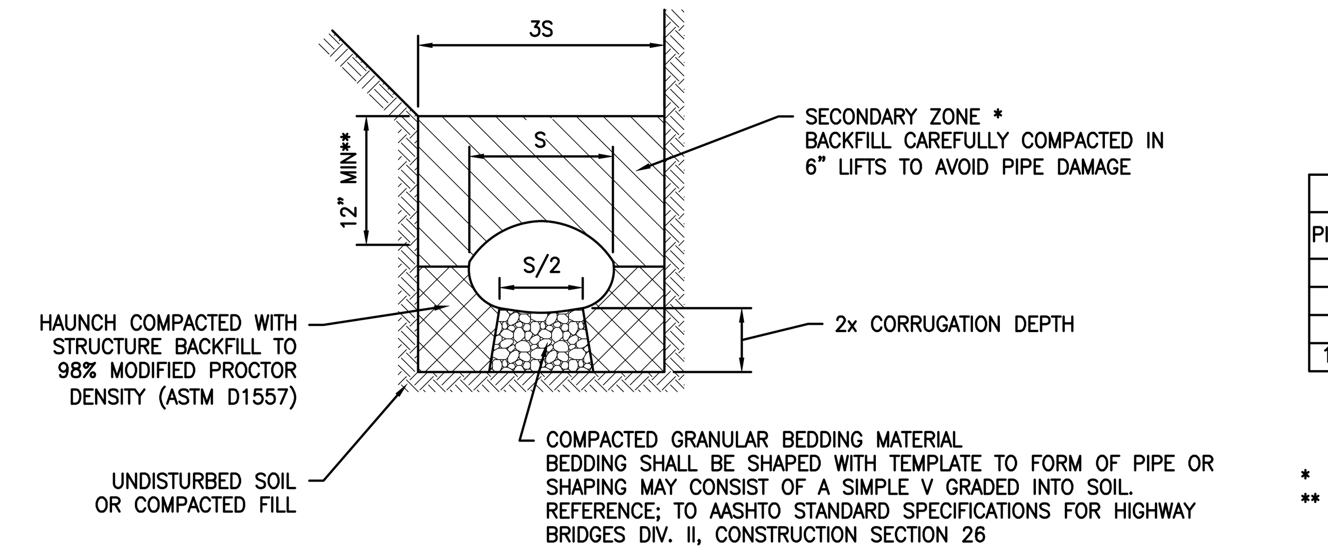


TABLE – MINIMUM COVER FOR CONSTRUCTION LOADS ON PIPE–ARCH

	MINIMUM COVER, FT, FOR INDICATED AXLE LOADS, KIPS			
PIPE SPAN, IN.	18.0–50.0	50.0–75.0	75.0–110.0	110.0–150.0
12.0–42.0	2.0	2.5	3.0	3.0
48.0–72.0	3.0	3.0	3.5	4.0
78.0–120.0	3.0	3.5	4.0	4.0
126.0–144.0	3.5	4.0	4.5	4.5

* SEE SPECIFICATION C-SPC-000-003 FOR COMPACTION REQUIREMENTS.
** SEE TABLE FOR CONSTRUCTION LOADS.

NOTE:

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONSULT WITH THE PIPE ARCH VENDOR TO REVIEW AND ADVISE THE CONTRACTOR(S) AND ENGINEER OF THE MORE CRITICAL FUNCTIONS TO BE PERFORMED DURING BACKFILLING AND TO PRESENT THE INTENDED QUALITY CONTROL STEPS TO BE USED TO CONTROL LOADS, SHAPE AND MOVEMENTS.
2. LIFT DEPTH SHOWN IN DETAIL SUPERCEDES C-SPC-000-003.
3. BEDDOMG SHALL BE LOOSE GRANULAR MATERIAL WITH A MAXIMUM PARTICLE SIZE LESS THAN ONE-HALF THE CORRUGATION DEPTH. BACKFILL FOR METAL CULVERTS SHALL BE GRANULAR MATERIAL, AS SPECIFIED IN THE CONTRACT DOCUMENTS AND SPECIFICATIONS, AND SHALL BE FREE OF ORGANIC MATERIAL, ROCK FRAGMENTS LARGER THAN 3.0 INCHES IN THE GREATEST DIMENSION, AND FROZEN LUMPS, AND SHALL HAVE A MOISTURE CONTENT WITHIN THE LIMITS REQUIRED FOR COMPACTION. AS A MINIMUM, BACKFILL MATERIALS SHALL MEET THE REQUIREMENTS OF AASHTO M145 FOR A-1, A-2, OR A-3.
4. STRUCTURE BACKFILL;

4.1. SUFFICIENT INSPECTION AND TESTING SHOULD BE UNDERTAKEN TO BE CERTAIN THAT THE QUALITY OF HTE SOIL AND COMPACTIVE EFFORT OBTAINED IS AS SPECIFIED.

4.2. BACKFILL MATEIRAL SHALL MEET THE REQUIREMENTS AS LISTED IN NOTE 3 AND C-SPC-000-003 AND SHALL BE PLACED IN LAYERS NOT EXCEEDING 6.0 INCHES LOOSE LIFT THICKNESS TO A MINIMUM 95% MODIFIED PROCTOR DENSITY OR AS OTHERWISE NOTED. EQUIPMENT USED TO COMPACT BACKFILL WITHIN 3.0 FEET FROM SIDES OF PIPE SHALL BE APPROVED BY THE ENGINEER PRIOR TO USE.

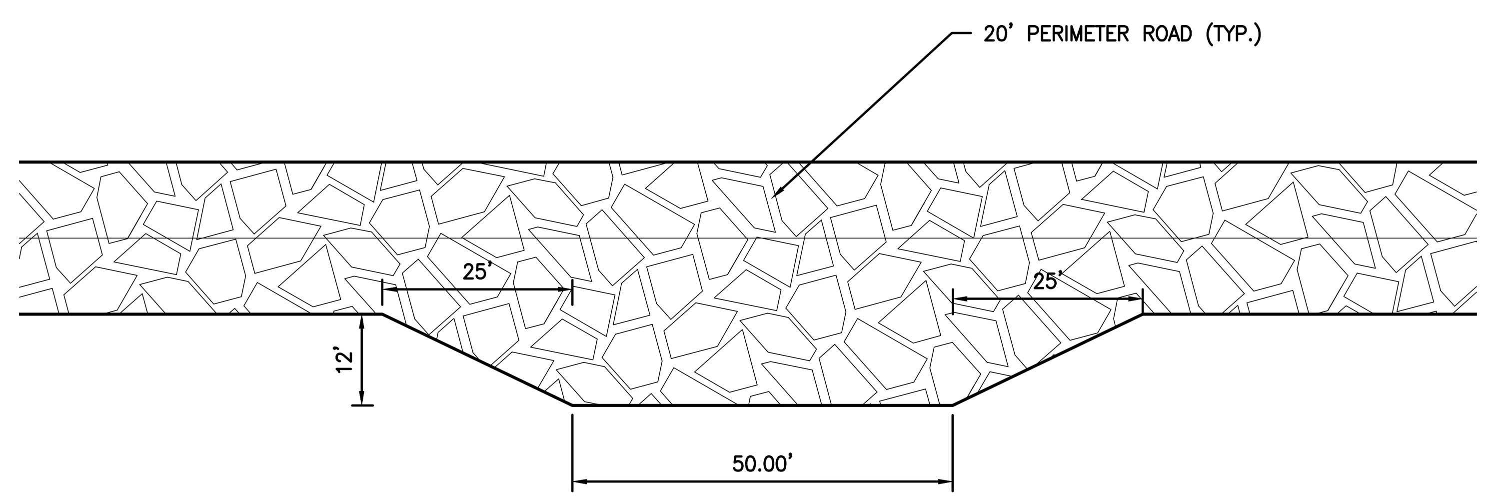
4.3. BACKFILL SHALL BE PLACED AND COMPACTD WITH CARE UNDER THE HAUNCHES OF HTE PIPE AND SHALL BE RAISED EVENLY ON BOTH SIDES OF TEH PIPE BY WORKING BACKFILL OPERATIONS FROM SIDE TO SIDE. THE SIDE TO SIDE BACKFILL DIFFERENTIAL SHALL NOT EXCEED 24.0 INCHES OR ONE-THIRD OF THE RISE OF THE STRUCTURE WHICHEVER IS LESS. BACKFILL SHALL CONTINUE TO NOT LESS THAN 1.0 FOOT ABOVE THE TOP FOR THE FULL LENGTH OF THE PIPE. FILL ABOVE THIS LEVEL SHALL BE EMBANKMENT FILL OR OTHER MATERIALS AS SPECIFIED TO SUPPORT THE PAVEMENT. THE TRENCH SHALL BE KEPT TO THE MINIMUM WIDTH REQUIRED FOR PLACING PIPE, PLACING ADEQUATE BEDDING AND SIDE FILL, AND SAFE WORKING CONDITIONS. PONDING OR JETTING OF BACKFILL SHALL NOT BE PERMITTED EXCEPT UPON WRITTEN PERMISSION BY THE ENGINEER.

4.4. WHERE STRUCTURES ARE INSTALLED AT A SKEW TO THE EMBANKMENT, PROPER SUPPORT FOR THE PIPE SHALL BE PROVIDED. SUPPORT MAY BE ACHIEVED WITH A RIGID, RIENFORCED CONCRETE HEADWALL OR BY WARPING THE EMBANKMENT FILL TO PROVIDE THE NECESSARY BALANCED SIDE SUPPORT.

4.5. FOR FURTHER INFORMATION PLEASE REFERENCE C-SPC-000-003 AND AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES DIV. II, CONSTRUCTION SECTION 26

3 PIPE-ARCH BEDDING

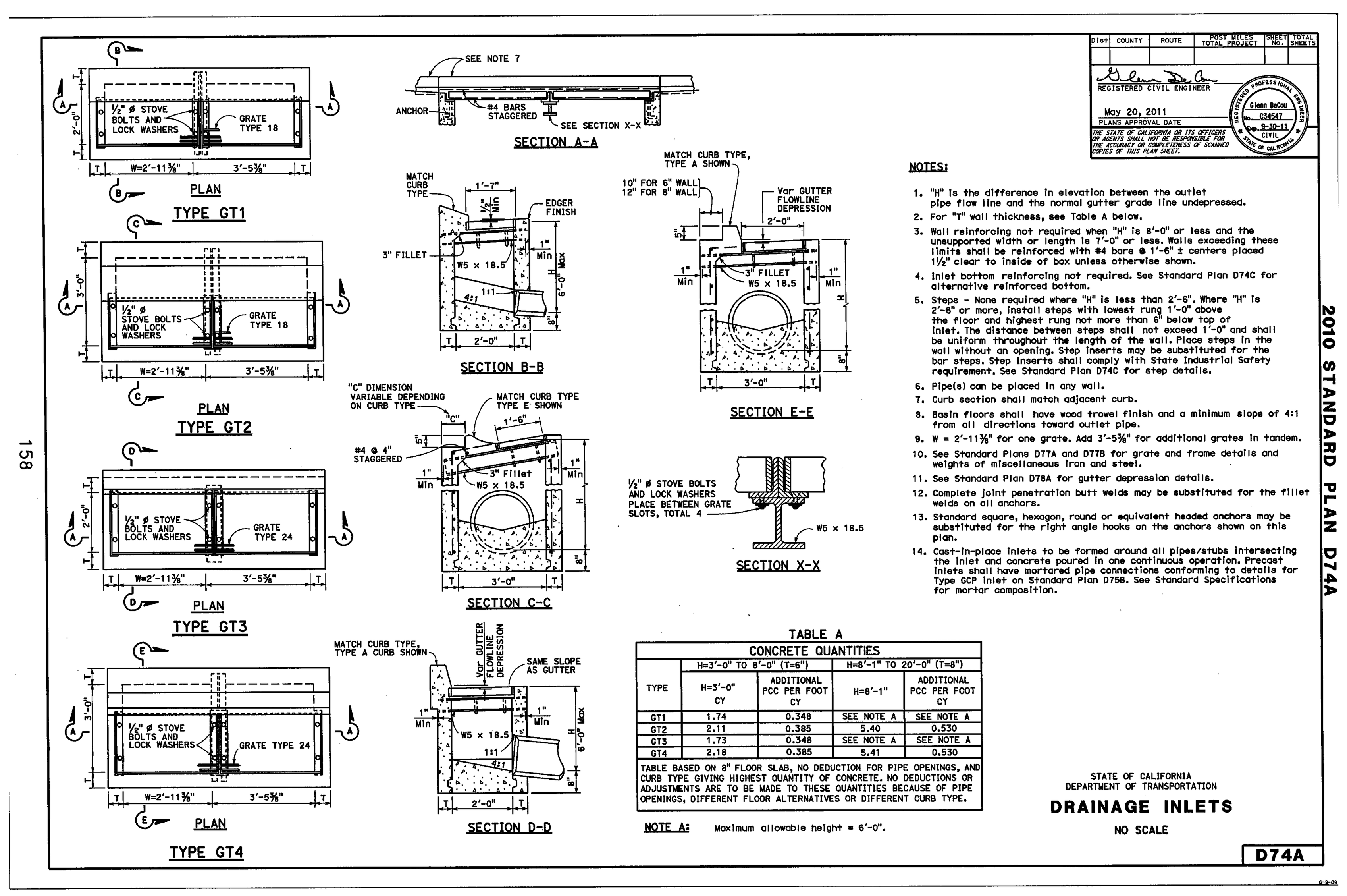
NTS

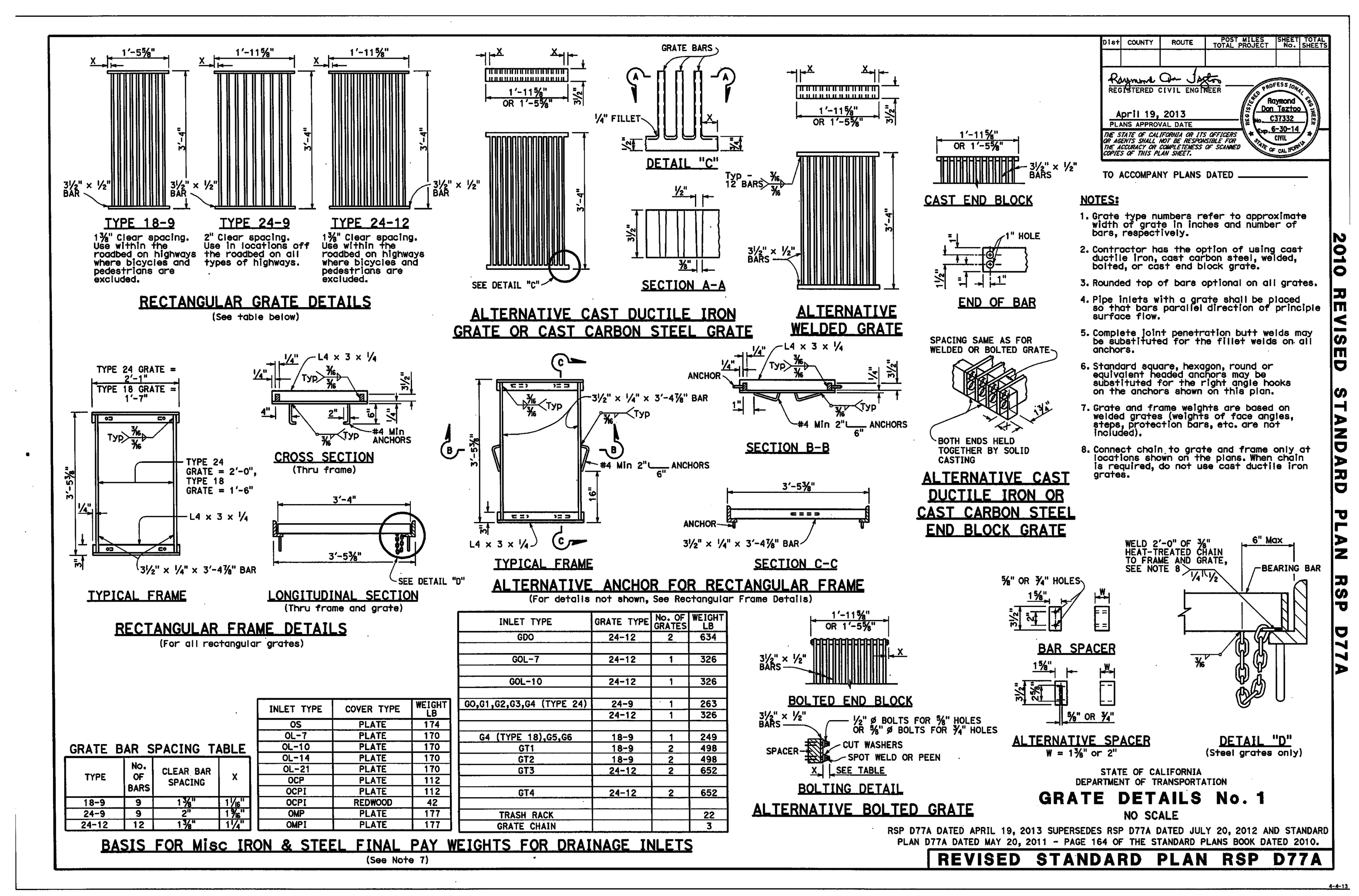


SEE ROAD PLAN AND PROFILE DRAWINGS FOR LOCATIONS. TO BE SPACED APPROXIMATELY EVERY 2000' – 5000' PER FIRE DEPARTMENT LETTER OF OCTOBER 17, 2013.

4 PERIMETER ROAD TURNOUT

NTS





IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JCS	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JCS	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	JCS	07JAN15
		DRN	JCS	07JAN15
SCALE	PACKAGE CODE	CHK	MTG	12JAN15
NTS		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT
GENERAL DETAILS
MISCELLANEOUS

AREA

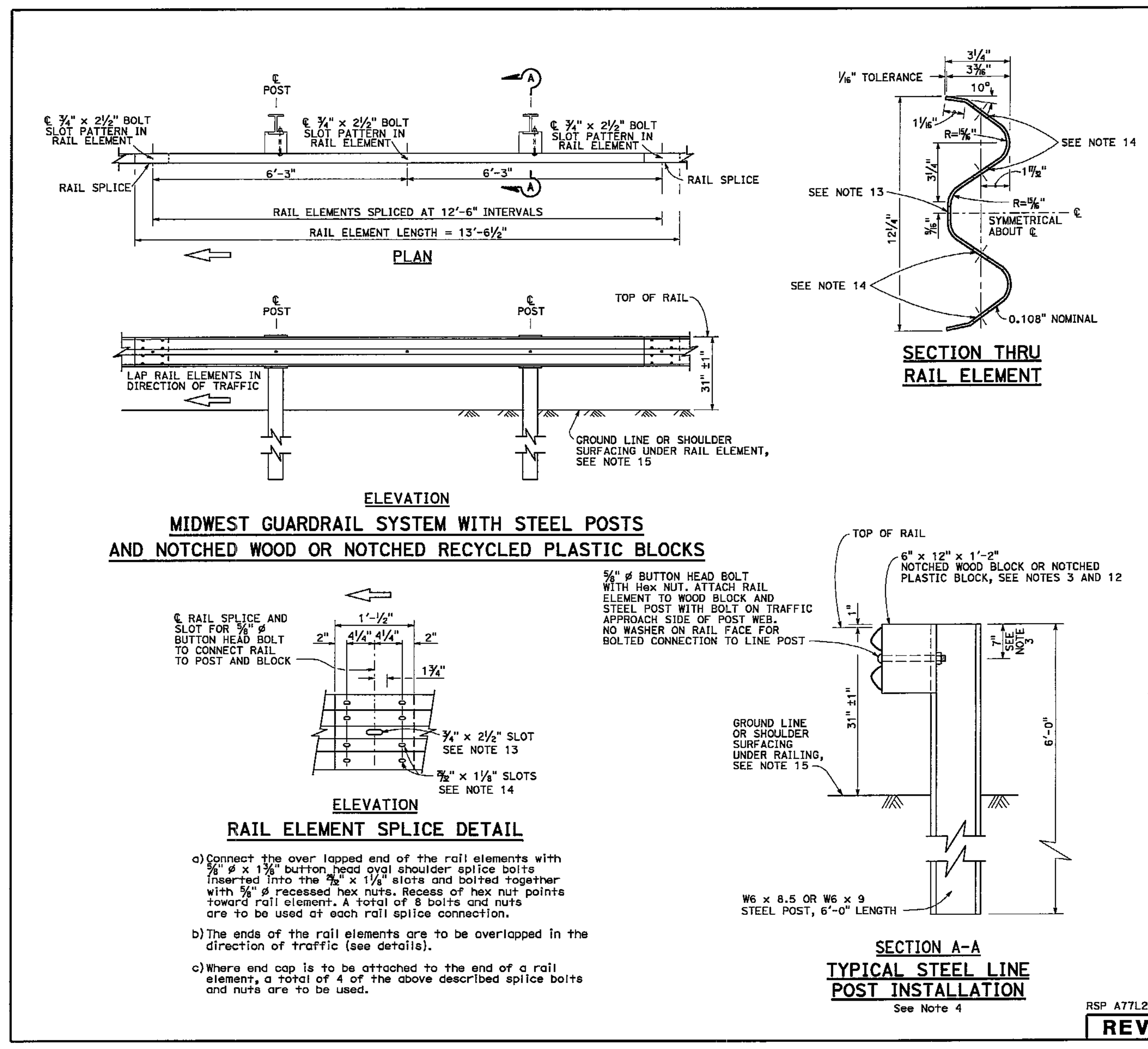
CLIENT DWG. NO.

DRAWING NO. D-000-C-0086 REV. D

CAD FILE: P:\CAD\CIV\D-000-C-0086.DWG

SAVED: 10-Sep-15 3:13 PM PLOTTED: 15-Sep-15 6:51 PM USER: GILL, MATTHEW

ARCH D-24x36



NOTES:

1. For details of wood post installations, see Revised Standard Plan RSP A77L1.
2. For details of standard hardware used to construct MGS, see Revised Standard Plan RSP A77M1.
3. For details of steel posts and notched wood blocks used to construct MGS, see Revised Standard Plan RSP A77N2.
4. For additional installation details, see Revised Standard Plan RSP A77N3.
5. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
6. For MGS typical layouts, see the A77P, A77Q and A77R Series of Standard Plans.
7. If railing is connected to terminal system end treatment, use 31" height terminal system end treatment.
8. For MGS end anchor details, see Revised Standard Plans RSP A77S1 and RSP A77T2.
9. For details of MGS transition to bridge railing, see Revised Standard Plan RSP A77U4.
10. For additional details of MGS connection to bridge railings, see Revised Standard Plans RSP A77U1, RSP A77U2 and RSP A77V1.
11. For dike positioning and MGS delineation details, see Revised Standard Plan RSP A77N4.
12. Notched face of block faces steel post.
13. Slotted hole for bolted connection of rail element to block and post. See "Section Thru Rail Element".
14. Slotted holes for splice bolts to overlap ends of rail element. See "Section Thru Rail Element".
15. Install posts in soil.

REGISTERED CIVIL ENGINEER
July 19, 2013
PLANS APPROVAL DATE
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.
TO ACCOMPANY PLANS DATED ______

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

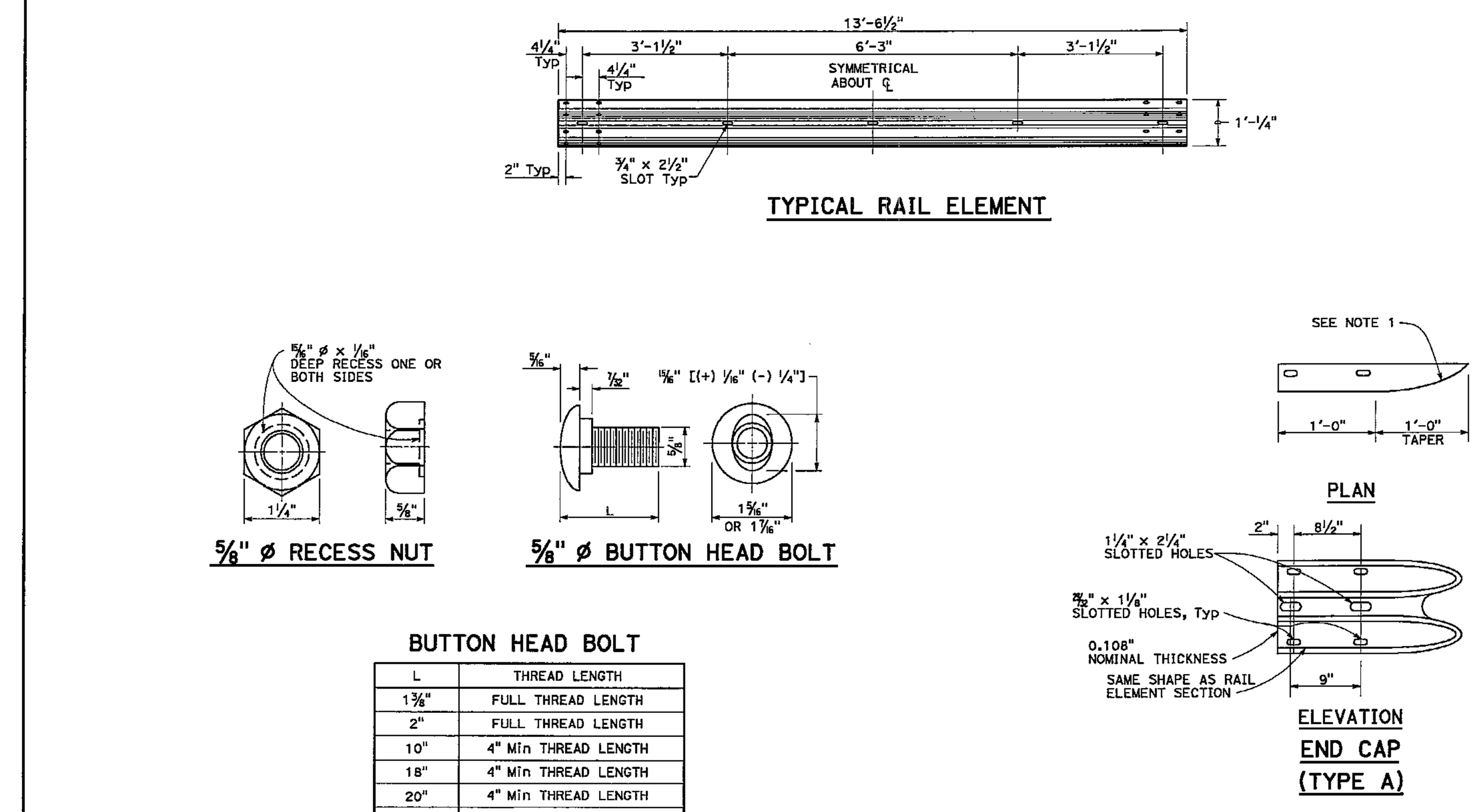
MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION (STEEL POST WITH NOTCHED WOOD OR NOTCHED RECYCLED PLASTIC BLOCK)

NO SCALE

RSP A77L2 DATED JULY 19, 2013 SUPPLEMENTS THE STANDARD PLANS BOOK DATED 2010.

REVISED STANDARD PLAN RSP A77L2

2010 REVISED STANDARD PLAN RSP A77L2



NOTE:
1. Slotted holes for splice bolts to overlap ends of rail element.

BUTTON HEAD BOLT

L	THREAD LENGTH
1⅜"	FULL THREAD LENGTH
2"	FULL THREAD LENGTH
10"	4" Min THREAD LENGTH
18"	4" Min THREAD LENGTH
20"	4" Min THREAD LENGTH
22"	4" Min THREAD LENGTH
26"	4" Min THREAD LENGTH
36"	4" Min THREAD LENGTH
** 2¾"	2" Min THREAD LENGTH
** 19"	4" Min THREAD LENGTH

** For nested rail applications.

July 19, 2013
PLANS APPROVAL DATE
TO ACCOMPANY PLANS DATED ______

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

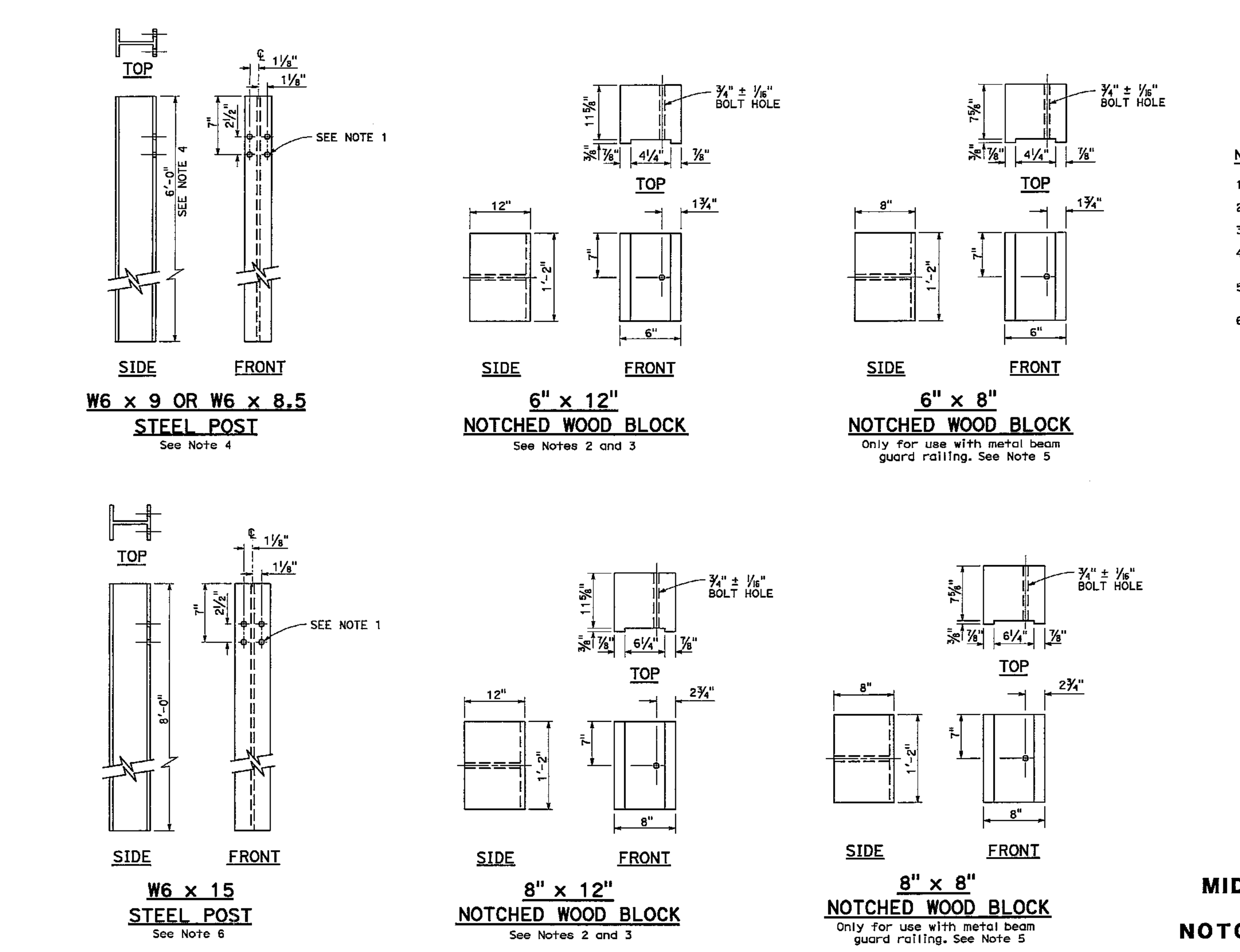
MIDWEST GUARDRAIL SYSTEM STANDARD HARDWARE

NO SCALE

RSP A77M1 DATED JULY 19, 2013 SUPPLEMENTS THE STANDARD PLANS BOOK DATED 2010.

REVISED STANDARD PLAN RSP A77M1

2010 REVISED STANDARD PLAN RSP A77M1



NOTES:

1. All holes in steel post shall be ⅞" Dia maximum.
2. Dimensions shown for wood block are nominal.
3. Notched face of block faces steel post.
4. 6'-0" length posts to be used for typical roadway installation. See Revised Standard Plan RSP A77N3.
5. See Revised Standard Plan RSP A77L3 for use of 6" x 8" and 8" x 8" notched wood blocks.
6. This post and 8" x 12" block combination to be used for line post sections of MGS on narrow roadways and where strengthened line post sections of MGS are warranted to shield fixed objects.

REGISTERED CIVIL ENGINEER
November 15, 2013
PLANS APPROVAL DATE
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.
TO ACCOMPANY PLANS DATED ______

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

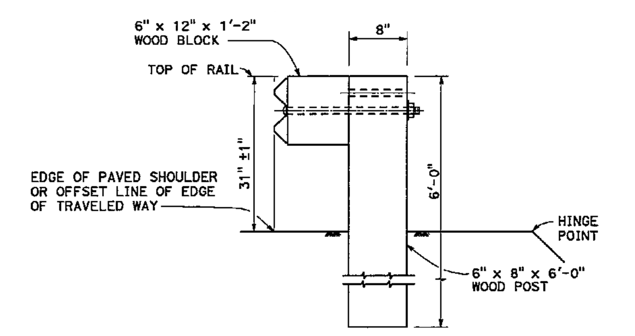
MIDWEST GUARDRAIL SYSTEM STEEL POST AND NOTCHED WOOD BLOCK DETAILS

NO SCALE

RSP A77N2 DATED NOVEMBER 15, 2013 SUPERSEDES RSP A77N2 DATED JULY 19, 2013 THAT SUPPLEMENTS THE STANDARD PLANS BOOK DATED 2010.

REVISED STANDARD PLAN RSP A77N2

2010 REVISED STANDARD PLAN RSP A77N2



DETAIL A
TYPICAL ROADWAY INSTALLATION
See Note 1

NOTE:
1. CONTRACTOR TO SPACE POSTS AS NECESSARY SO THAT THE POST IS NOT DRIVEN THROUGH THE CULVERT OR CULVERT BEDDING.

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEYPLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JCS	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JCS	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW
CLIENT PROJECT MGR. DEPARTMENT MGR.: DRE PROJECT MGR.: HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PANOCHE VALLEY SOLAR LLC

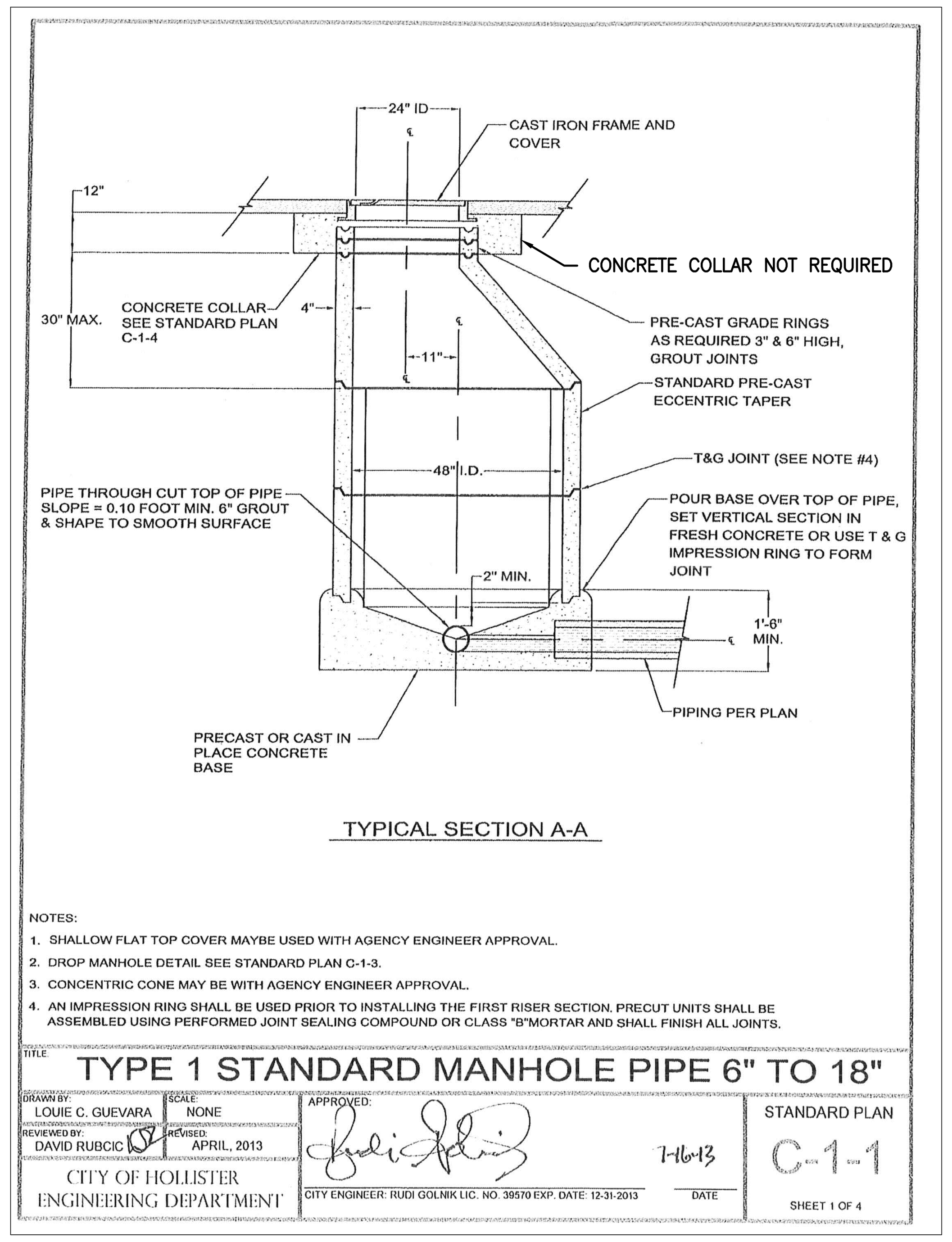
PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	JCS	07JAN15
SCALE: NTS	PACKAGE CODE	DRN	JCS	07JAN15
		CHK	MTG	12JAN15
		APP	LEC	12JAN15

SUBJECT: GENERAL DETAILS MISCELLANEOUS

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0087 REV. D



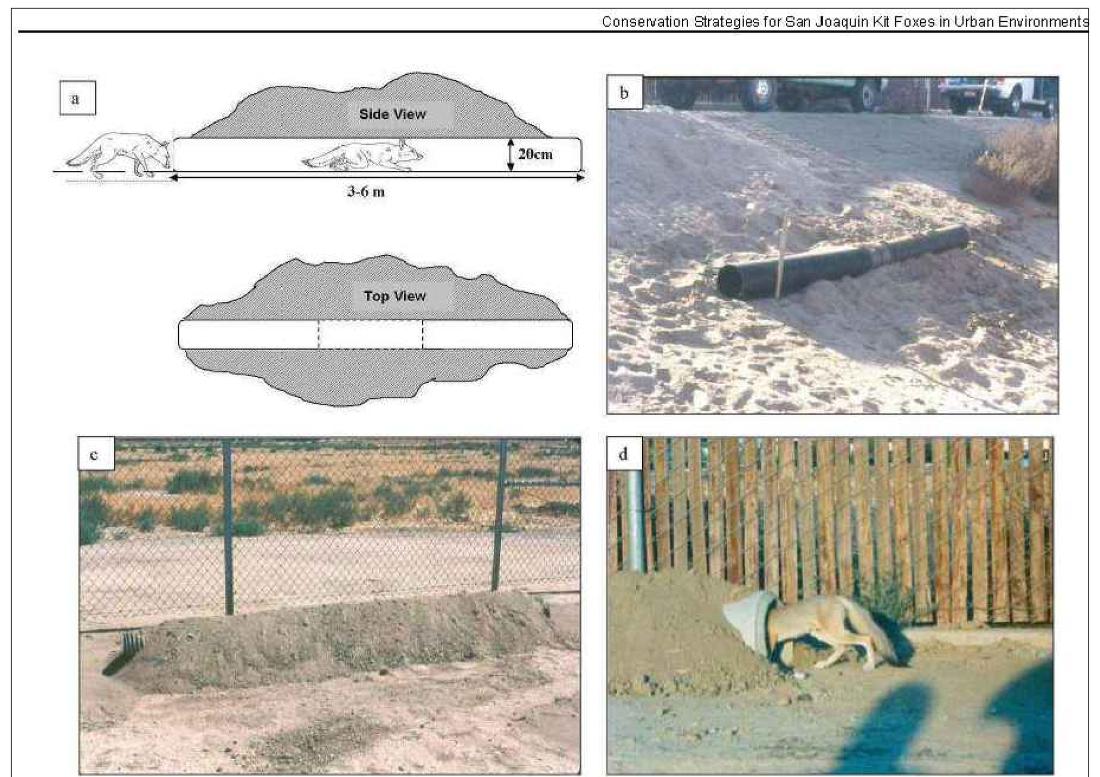
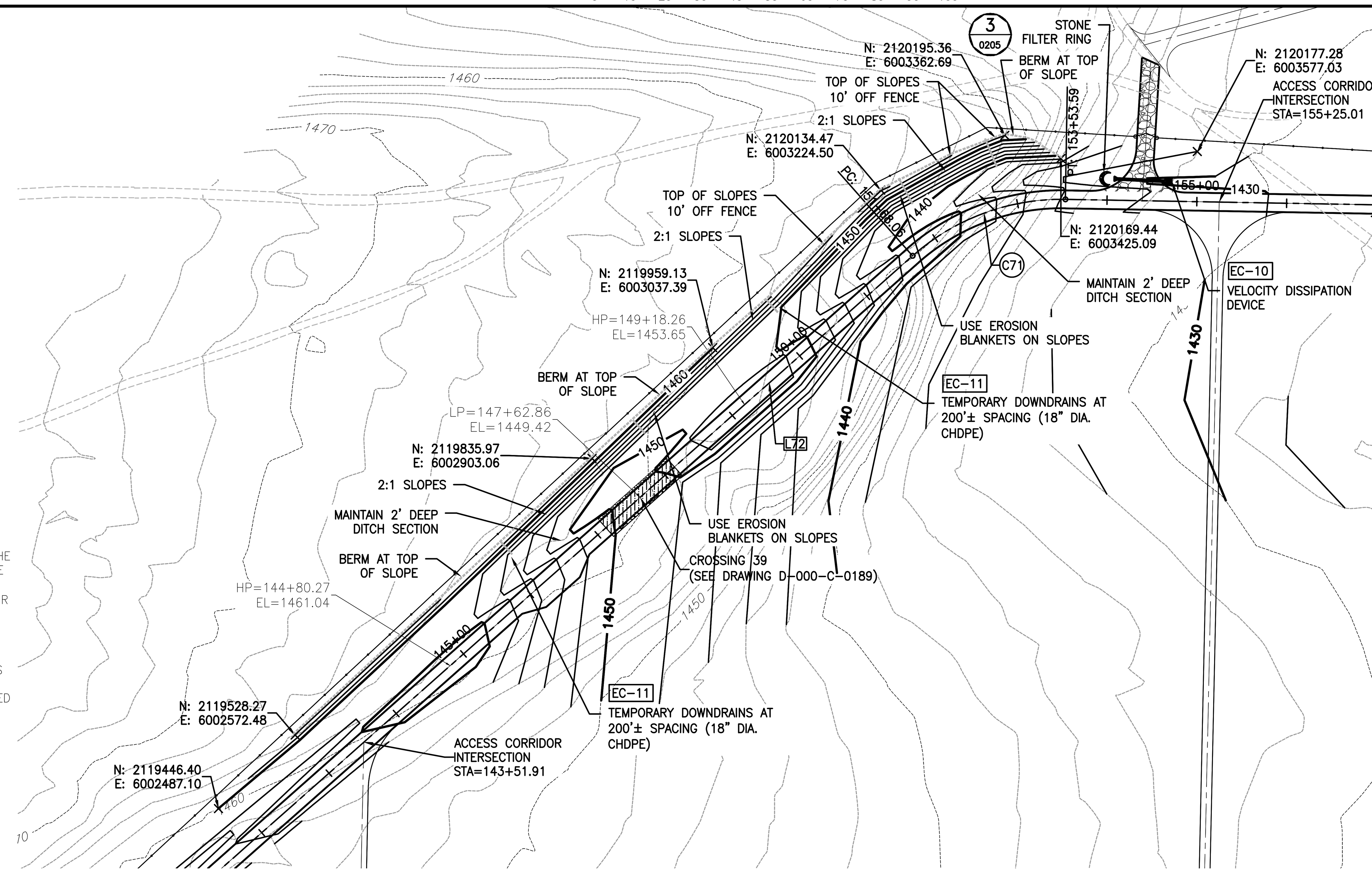


Plate 2. Artificial escape dens for San Joaquin kit fox at Bakersfield, CA. a) Escape den schematic. b) High-density polyethylene escape den under construction. c) Completed den. d) Kit fox entering escape den.

ESCAPE DENS

1. DENS WILL MEASURE 8 INCHES ACROSS, BE CONSTRUCTED OF PVC OR HDPE PIPE AND BE INSTALLED WITH REBAR TO RESTRICT THE OPENING TO 6 INCHES TO PREVENT USE BY BADGERS OR COYOTES. THE 8□INCH□DIAMETER PIPE SHOULD BE AT LEAST 25 FEET LONG, PLACED FLAT ON THE GROUND SURFACE AND COVERED WITH SOIL FOR THERMAL PROTECTION. ESCAPE DENS SHALL BE LOCATED EVERY ¼ QUARTER MILE ALONG THE LENGTH OF THE PERIMETER FENCE.ESIGNED TO PROVIDE ESCAPE COVER FOR KIT FOXES. TWO DIFFERENT LENGTHS WERE USED TO DETERMINE WHETHER KIT FOXES PREFERRED THE GREATER SECLUSION ASSOCIATED WITH A LONGER DEN.

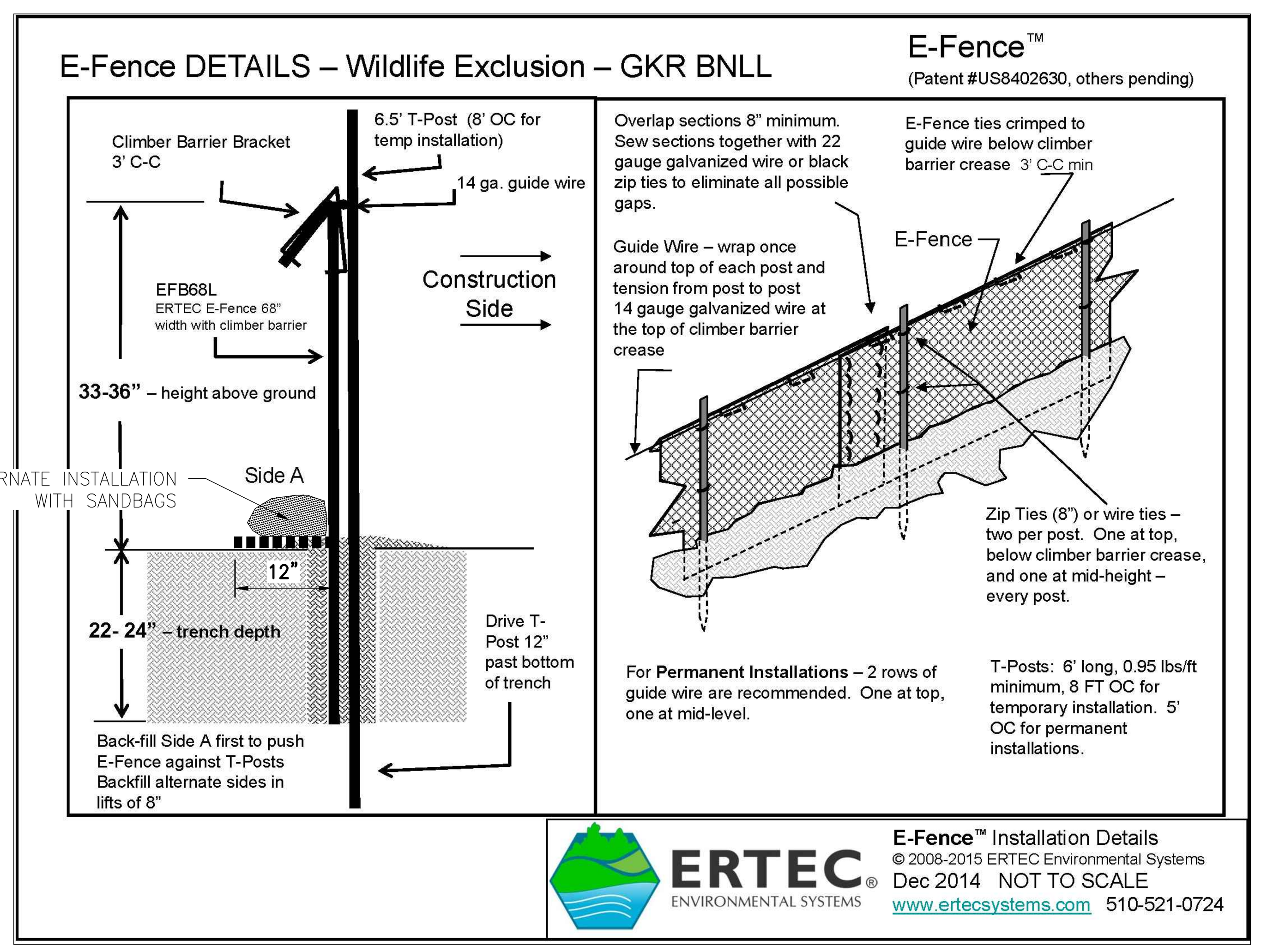
2. THESE SPECIFICATIONS HAVE BEEN REVIEWED BY THE BIOLOGY MANAGER AND COMPLY WITH PROJECT MITIGATION MEASURES ADOPTED AT THE TIME OF SUBMITTAL. THEY REFLECT STANDARD SPECIFICATIONS ACCEPTED BY THE REGULATORY AGENCIES FOR SENSITIVE SPECIES KNOWN TO OCCUR ON SITE. QUESTIONS REGARDING THESE DETAILS, SPECIFICATIONS, AND INSTALLATION THEREOF SHALL BE DIRECTED TO THE BIOLOGY MANAGER.

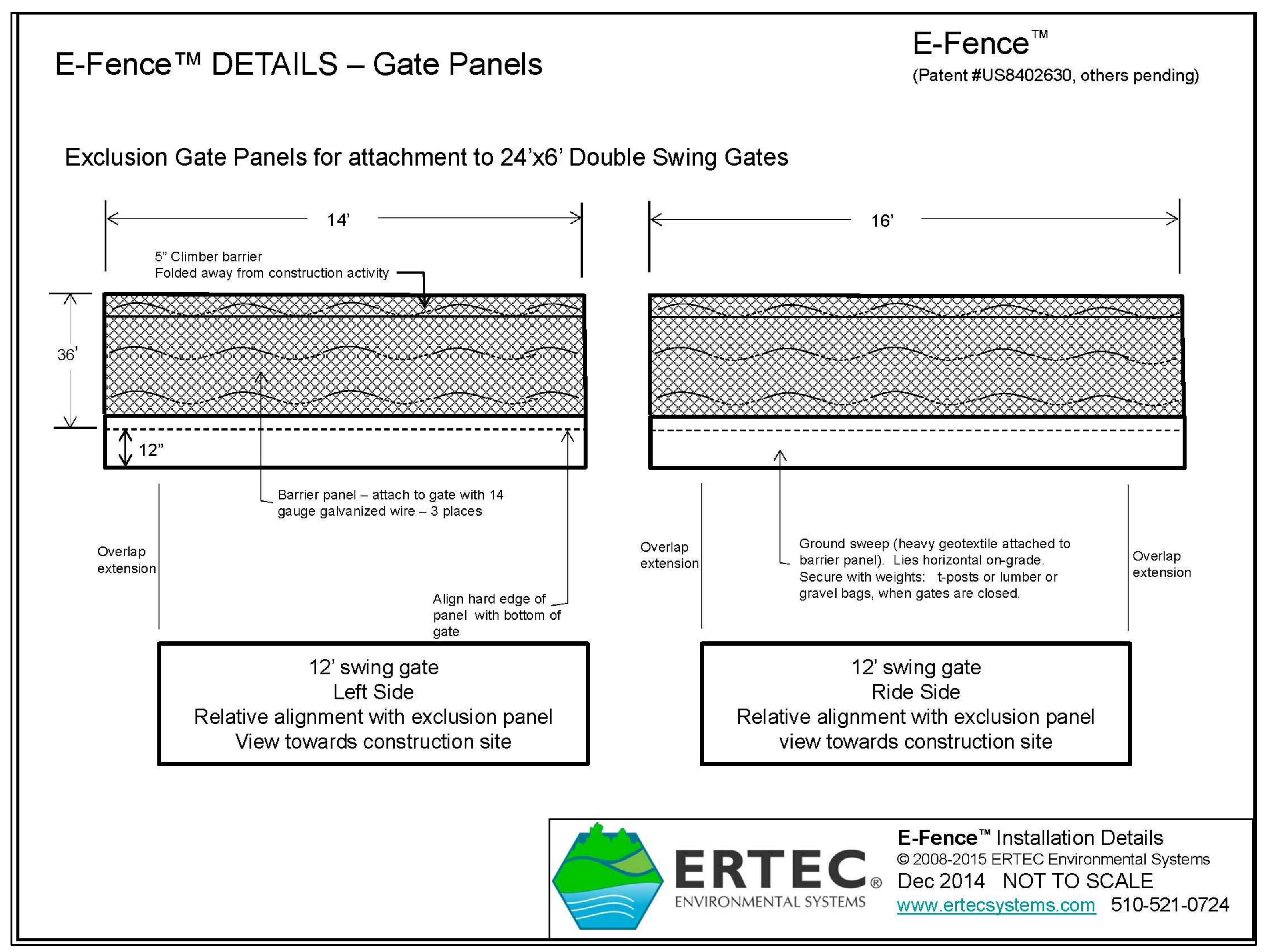


BORROW DETAIL ON WEST PERIMETER ROAD

1" = 100'

(SEE DRAWINGS D-000-C-0138 AND D-000-C-0139 FOR LOCATION)





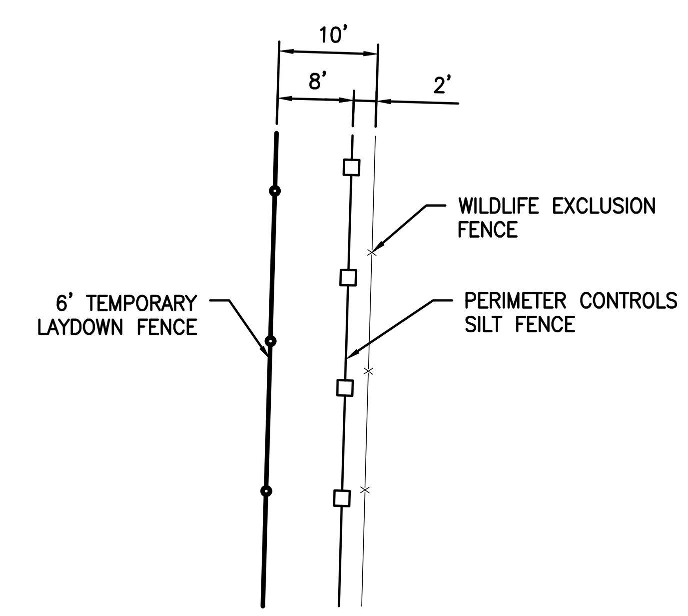
E-FENCE

1. CONTRACTOR SHALL CONSULT WITH ERTEC OR OTHER APPROVED VENDOR FOR E-FENCE AND ASSOCIATED APPURTANCES FOR SPECIFICAITONS AND INSTALLATION DETAILS.

2. THESE SPECIFICATIONS HAVE BEEN REVIEWED BY THE BIOLOGY MANAGER AND COMPLY WITH PROJECT MITIGATION MEASURES ADOPTED AT THE TIME OF SUBMITTAL. THEY REFLECT STANDARD SPECIFICATIONS ACCEPTED BY THE REGULATORY AGENCIES FOR SENSITIVE SPECIES KNOWN TO OCCUR ON SITE. QUESTIONS REGARDING THESE DETAILS, SPECIFICATIONS, AND INSTALLATION THEREOF SHALL BE DIRECTED TO THE BIOLOGY MANAGER.

ENVIRONMENTAL DETAILS

NTS



LAYDOWN AREA

NOTES:

1. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
2. SEE DWGS D-000-C-0011 THROUGH D-000-C-0026 FOR FENCE COORDINATES.

EXCLUSION FENCE DETAIL

NTS

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

NOTES

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3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	TOC	MTG	DRE	HRM	JCG	
D	08SEP15	ISSUED FOR INFORMATION	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JCS	MTG	LEC	HRM	JCG	

REFERENCES

REF	NUMBER	TITLE

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055 | ACTIVITY NO. | SCALE NTS | PACKAGE CODE

	BY	DDMMMYY
DES	JCS	08JAN15
DRN	JCS	08JAN15
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

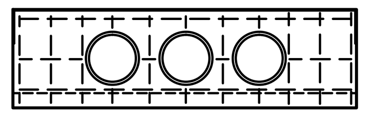
amec

SUBJECT: GENERAL DETAILS MISCELLANEOUS

AREA

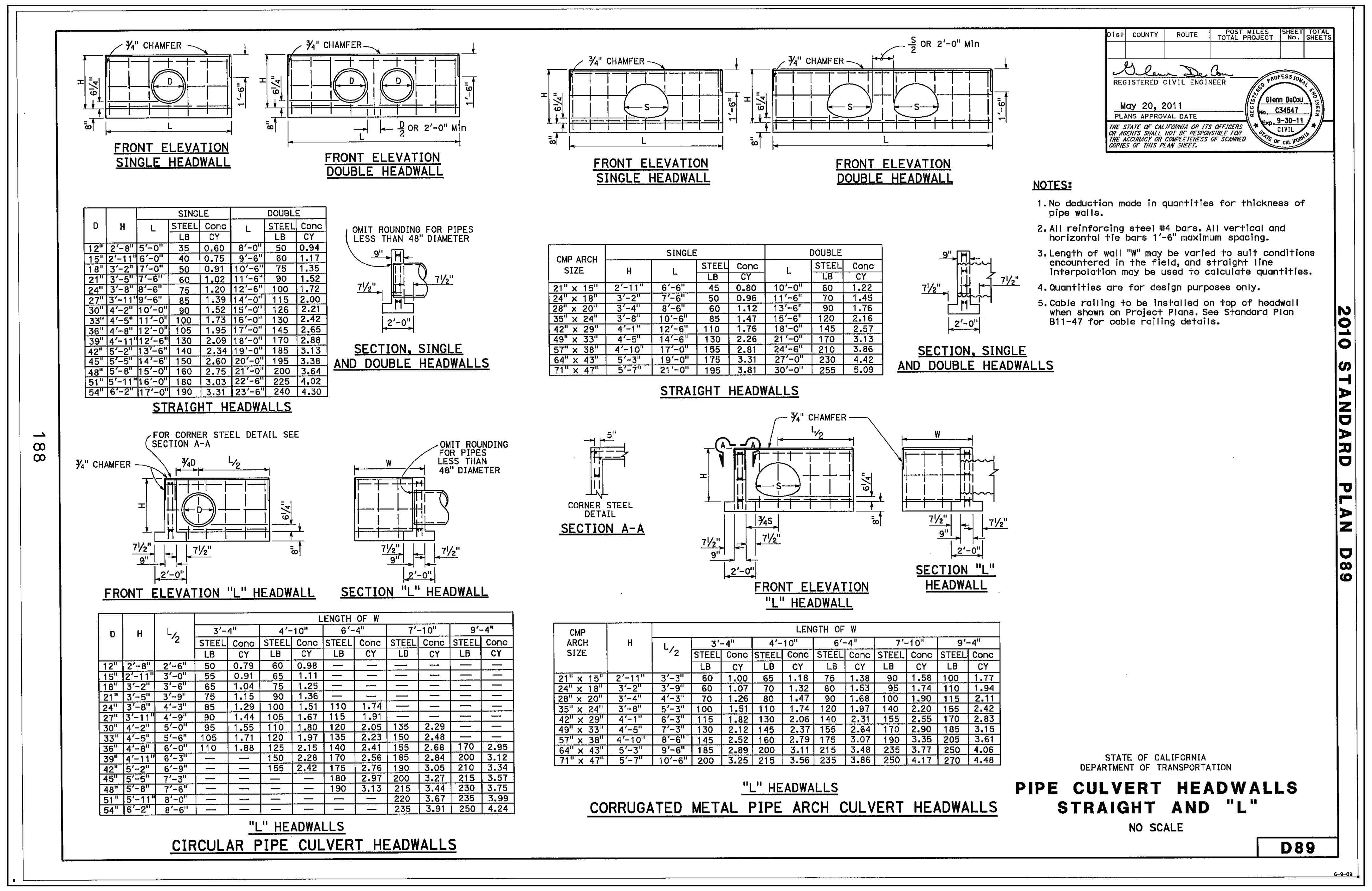
CLIENT DWG. NO.

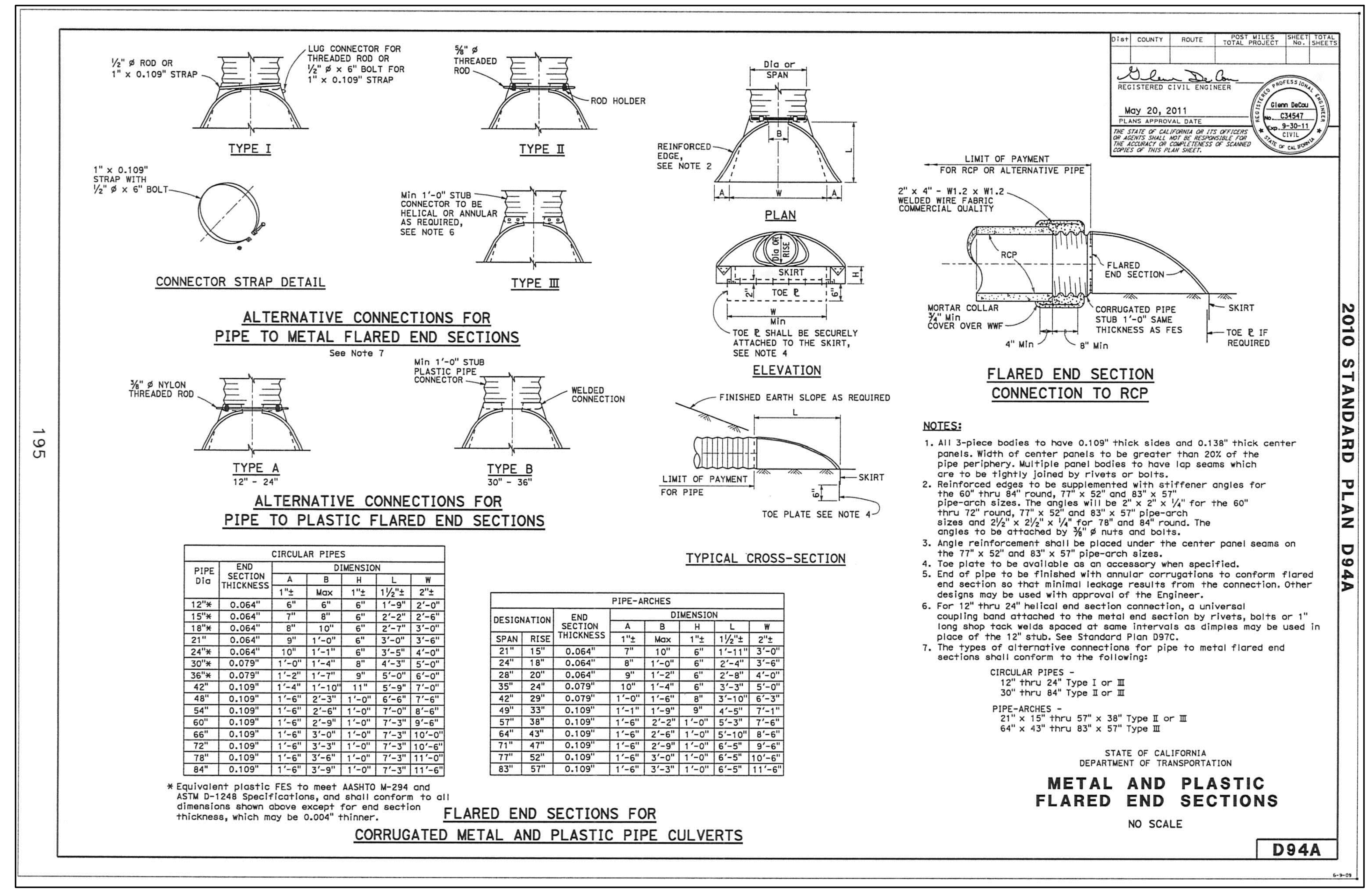
DRAWING NO. D-000-C-0088 REV. E

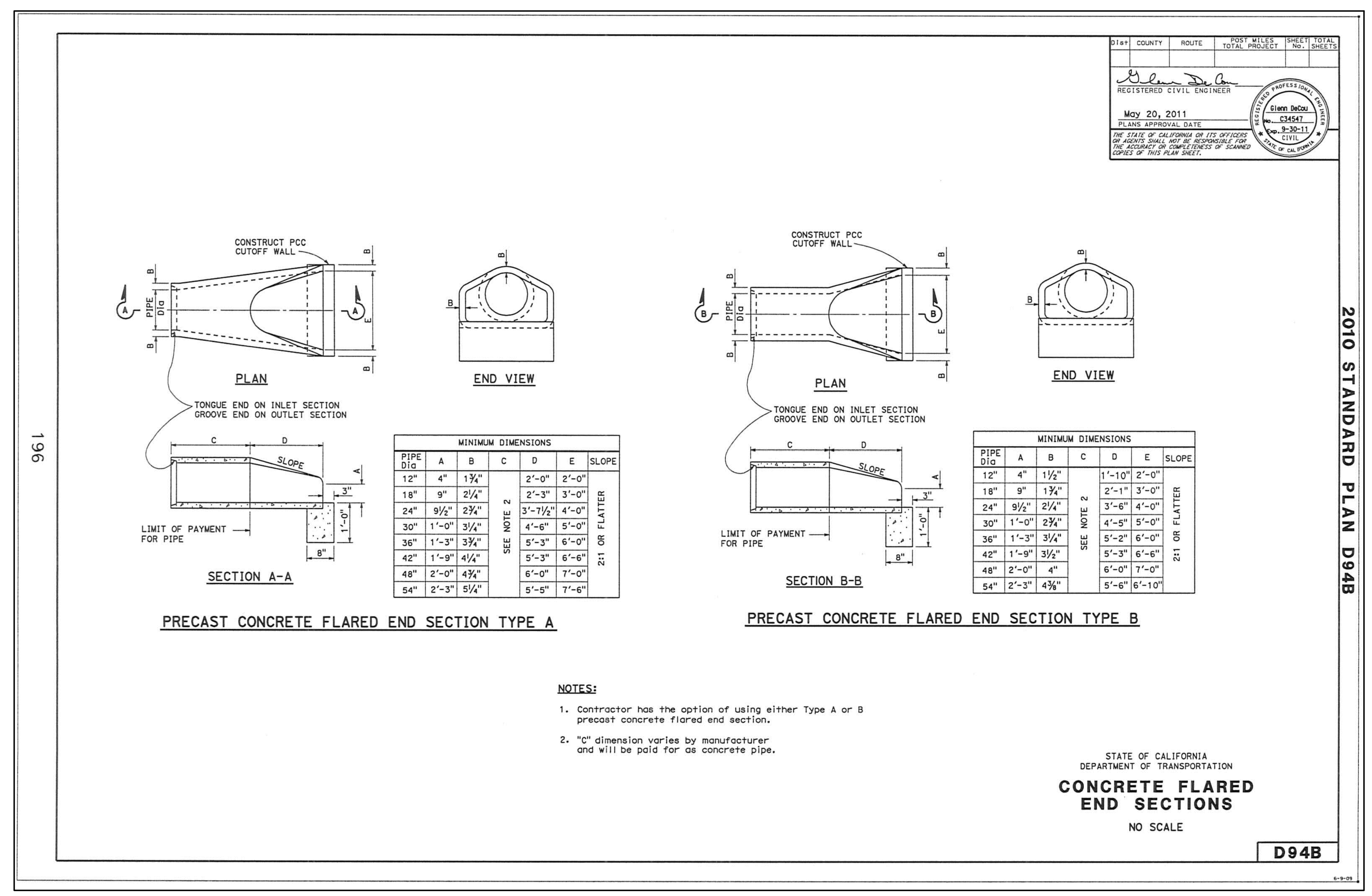


TRIPLE HEADWALL DIMENSIONS		
D	H	L
18"	3'-2"	14'-0"
30"	4'-2"	20'-0"

ALL OTHER DIMENSIONS NOT SHOWN IN TABLE ARE SAME AS IN TABLE BELOW







NOTES

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3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JCS	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	LEC	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JCS	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE NTS
PACKAGE CODE

	BY	DDMMMYY
DES	JCS	07JAN15
DRN	JCS	07JAN15
CHK	MTG	12JAN15
APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT
GENERAL DETAILS
MISCELLANEOUS

amec

AREA
CLIENT DWG. NO.
DRAWING NO. D-000-C-0089
REV. D

CAD FILE: P:\CAD\CIV\D-000-C-0089.DWG
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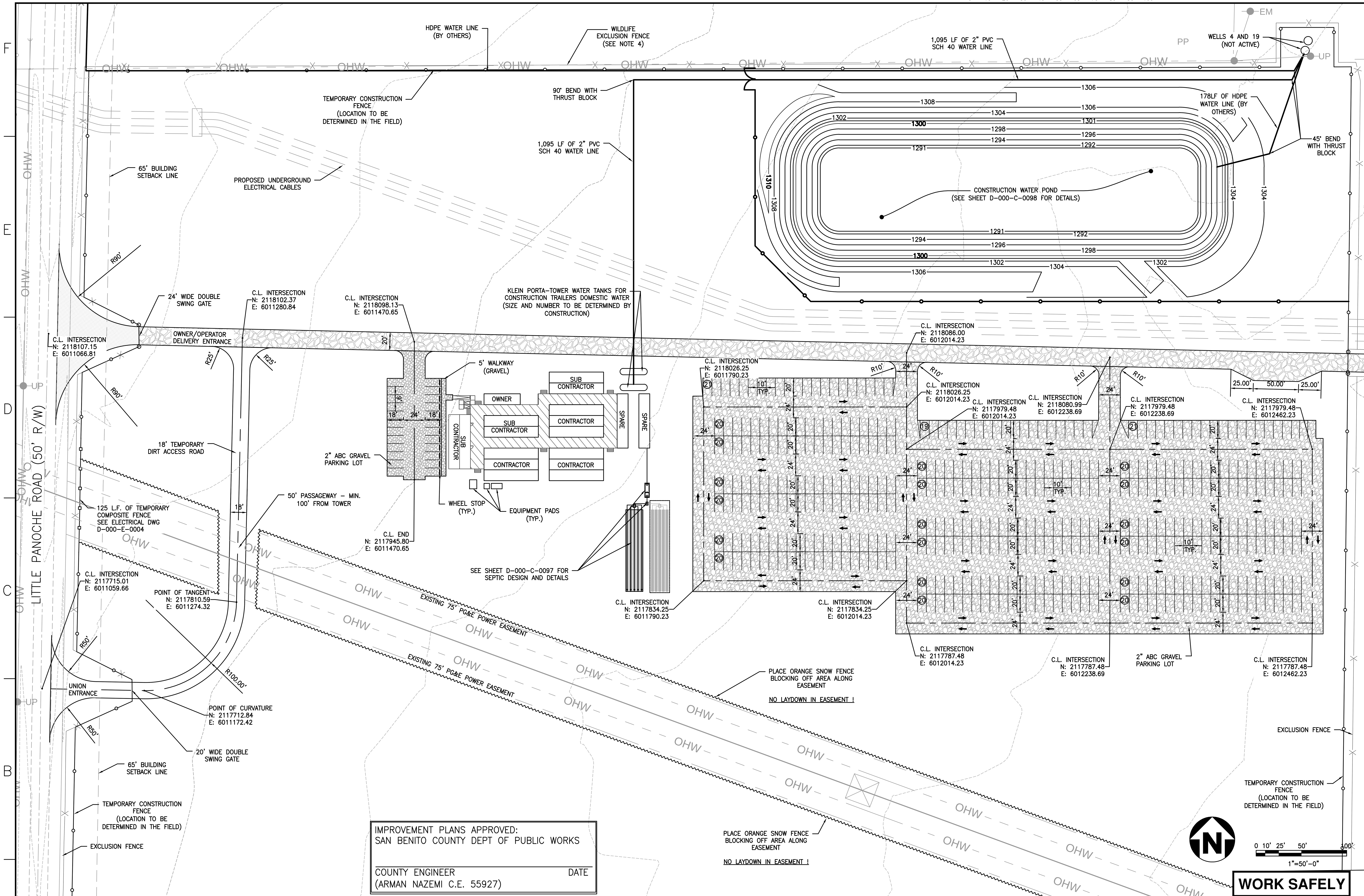

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
6. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
7. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
8. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
9. ALL EROSION CONTROL PRODUCTS SHALL BE NON-WOVEN SUCH AS NON-WOVEN SILT FENCE, GEOTEXTILES, ETC... CONTRACTOR SHALL AVOID USE OF PLASTIC MONOFILAMENT NETTING. TIGHTLY WOVEN FIBER NETTING OR SIMILAR MATERIAL SHALL NOT BE USED FOR EROSION CONTROL OR OTHER PURPOSES AT THE PROJECT SITE TO ENSURE THAT BLUNT NOSE LEOPARD LIZARDS DO NOT BECOME ENTANGLED OR TRAPPED.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JCS	MSN	LEC	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	MSN	LEC	HRM	JCG	
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REFERENCES

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NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	11MAR14
SCALE	PACKAGE CODE	DRN	JCS	04APR14
1" = 50'		CHK	MSN	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL CONSTRUCTION TRAILER AREA DETAILS

AREA

CLIENT DWG. NO.

DRAWING NO. D-000-C-0096 REV. D

SAVED: 10-Sep-15 12:52 PM PLOTTED: 15-Sep-15 7:05 PM USER: GILL, MATTHEW

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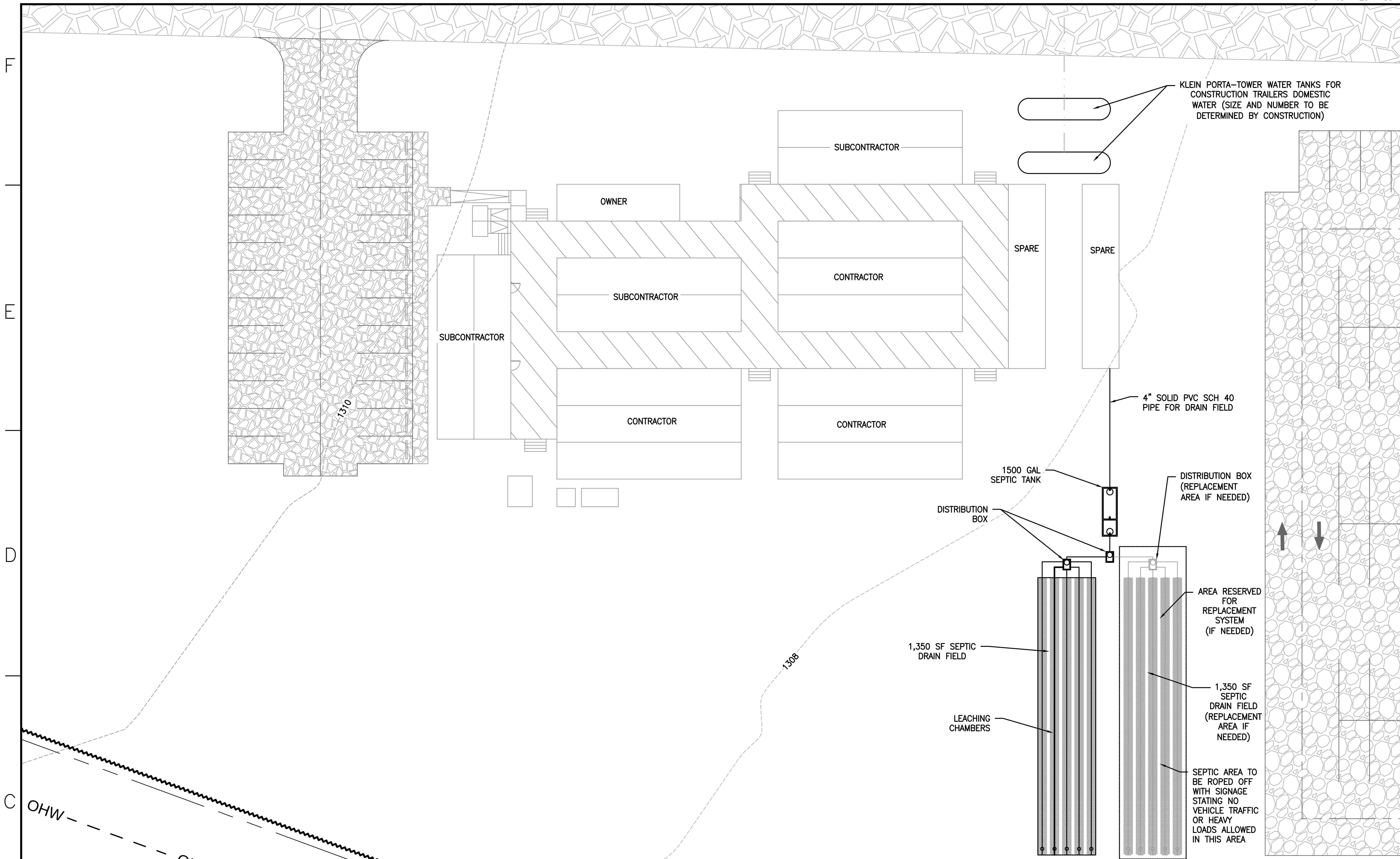
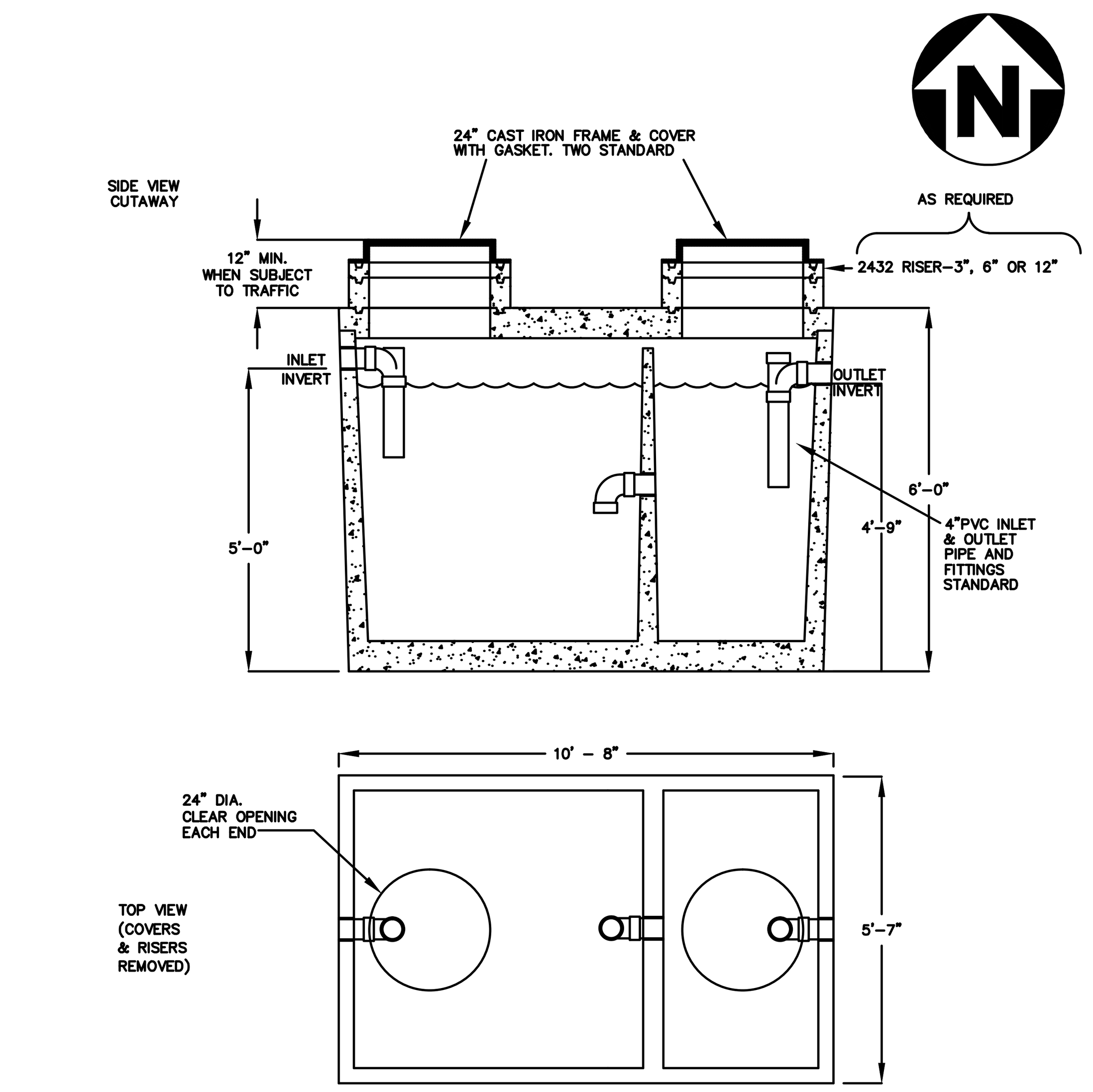




- LIQUID CAPACITY: 1500 GALLONS
- TANK DESIGNED FOR H-20 TRAFFIC WHEEL LOAD WITH DRY SOIL CONDITIONS (WATER TABLE BELOW TANK) EARTH COVER OVER TANK NOT TO EXCEED 6 FT.
- SUITABLE NATIVE OR SUB-BASE SHALL BE PREPARED TO HANDLE ANTICIPATED LOADS. THE EXCAVATION SHALL BE BEDDED WITH SUITABLE GRANULAR MATERIAL AND SHALL BE COMPACTED TO 90% MAXIMUM DRY DENSITY, OR TO REQUIREMENTS OF THE PROJECT GEOTECHNICAL ENGINEER.
- FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT JENSEN PRECAST.

10-01-03
1500ST_JP-W.dwg
© 2003 Jensen Precast

MINIMUM EXCAVATION SIZE:
6'-7" X 11'-8" X DEPTH REQ'D

THE DESIGN AND DETAIL OF THIS DRAWING ARE THE PROPERTY OF JENSEN PRECAST AND NOT TO BE USED EXCEPT IN CONNECTION WITH ITS OWN WORK. DESIGN AND INVENTION RIGHTS ARE RESERVED.

(JENSEN PRECAST JP-1500 GALLON COMMERCIAL SEPTIC TANK, OR APPROVED EQUAL. CONTRACTOR TO PROVIDE CALCULATIONS AND SHOP DRAWINGS TO ENGINEER)

NOTES:

1. SEPTIC TANK, ALONG WITH THEIR MANUFACTURERS, MUST BE APPROVED BY SAN BENITO COUNTY ENVIRONMENTAL HEALTH PRIOR TO INSTALLATION.
2. SEPTIC TANK SHALL BE COMPLIANT WITH ASTM C1227.
3. THE INLET COMPARTMENT OF ANY SEPTIC TANK SHALL NOT BE LESS THAN 2/3 OF THE TOTAL CAPACITY OF THE TANK.
4. SEPTIC TANK SHALL BE WATERTIGHT, INCLUDING ALL JOINTS AND CONNECTIONS.
5. TOP OF BOTH INLET AND OUTLET TEE SHALL BE GREATER THAN 2" FROM THE LID.
6. COMPARTMENT PARTITION SHALL BE AT 1/3 THE LIQUID DEPTH AND 8" CLEAR ABOVE THE LIQUID LEVEL.
7. ACCESS OPENINGS MUST BE WITHIN 12" OF FINISHED GRADE AND HAVE FINAL COVER THAT IS CROWNED OR SLOPED TO SHED SURFACE WATER.
8. THERE SHALL BE 2 ACCESS OPENINGS, GREATER THAN 18", OVER INLET AND OUTLET.
9. PRE-CAST CONCRETE TANK SHALL HAVE A MINIMUM WALL, FLOOR AND ROOF THICKNESS OF 3". THE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AND PRODUCED IN ACCORDANCE WITH THE PRACTICES OUTLINED IN ACI STANDARDS 301 AND 318. TYPE V SULFATE RESISTANT CEMENT SHALL BE USED IN ALL CONCRETE MIXES.

1,500 GALLON (LIQUID CAPACITY) SEPTIC TANK
DETAIL 01 / -
NTS

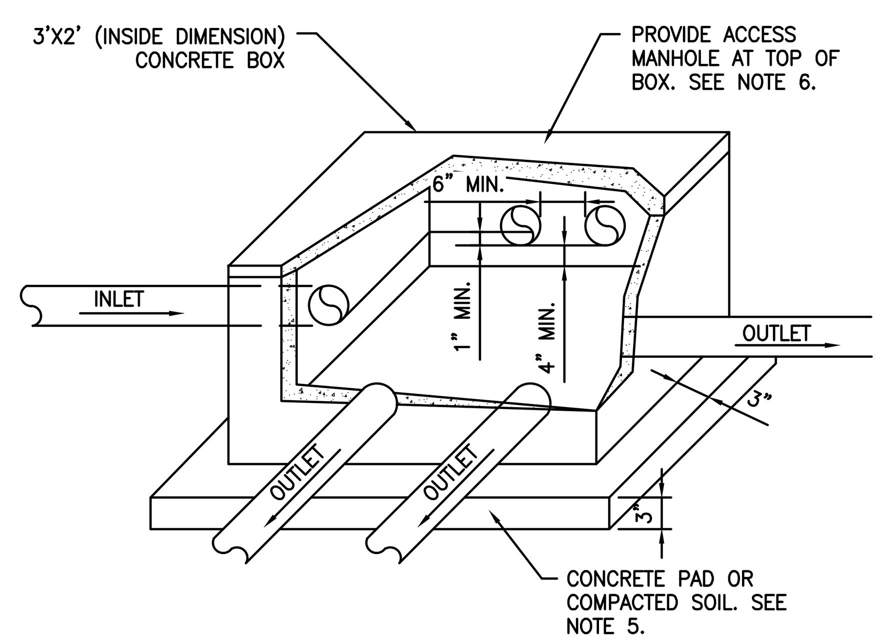
NOTES

1. FOR GENERAL NOTES SEE DWG D-000-C-002.
2. SEE DRAWING D-000-C-0096 FOR TEMPORARY FACILITIES INFORMATION.
3. ALL MATERIALS AND INSTALLATION SHALL BE IN ACCORDANCE WITH CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY STATE WATER RESOURCES CONTROL BOARD ONSITE WASTEWATER TREATMENT SYSTEMS (OWTS) POLICY REGULATIONS AND SPECIFICATIONS & SAN BENITO COUNTY REGULATIONS
4. REFER TO "REVISED GEOTECHNICAL EVALUATION PANOCHE VALLEY SOLAR PHOTOVOLTAIC GENERATION FACILITY" BY KLEINFELDER, DATED NOVEMBER 20 2014, FOR SOIL BORINGS.
5. A PERMIT IS REQUIRED FROM SAN BENITO COUNTY PRIOR TO CONSTRUCTION OF THE SEPTIC SYSTEM. APPLICANT SHALL NOTIFY THE ENVIRONMENTAL HEALTH DEPARTMENT OF SAN BENITO COUNTY PRIOR TO INSTALLATION OF SYSTEM AND PROVIDE THE NAME AND THE CONTRACTOR'S LICENSE NUMBER OF THE INSTALLER.

SEPTIC NOTES:

1. SEWAGE TREATMENT AND DISPOSAL WILL BE BY INDIVIDUAL SYSTEMS.
2. DISTANCE FROM THE FOLLOWING:
   - DWELLING – APPROXIMATELY 40' FROM TEMPORARY CONSTRUCTION FACILITIES
   - WELLS – APPROXIMATELY 750'
   - PROPERTY LINE – APPROXIMATELY 650' (LITTLE PANOCHE ROAD)
   - WATER COURSE – APPROXIMATELY 2000'
3. SLOPE OF PROPERTY @ SEPTIC FIELD: 1.0%
4. SIZING REQUIREMENTS:
   - TYPE OF OCCUPANCY = OFFICE
   - NO. OF EMPLOYEES = 50
   - SEWAGE FLOW RATE = 20 GPD/EMPLOYEE
   - TOTAL SEWAGE FLOW RATE = 1,000 GPD
   - MINIMUM SEPTIC TANK SIZE = 1,000 x 1.5 = 1,500 GALLONS
   - SEPTIC TANK PROVIDED (V)= 1,500 GALLONS
   - PERCOLATION TEST RESULT = 10 MIN/IN; THEREFORE SEWAGE APPLICATION RATE = 0.8 GAL/SF/DAY
   - SEWAGE APPLICATION RATE (Q)=0.80 GAL/SF/DAY
   - REQUIRED ABSORPTION AREA (FOR PIPE AND GRAVEL SYSTEM) (A = V/Q) A = 1500/0.8 = 1,875 SF
   - REQUIRED ABSORPTION AREA (FOR LEACHING CHAMBER SYSTEM) = 70% x V/Q)* A = 70% X 1500/0.8 = 1,313 SF
   - ABSORPTION AREA PROVIDED = 5 ROWS x 18 CHAMBERS x 15 SF/CHAMBER = 1,350 SF

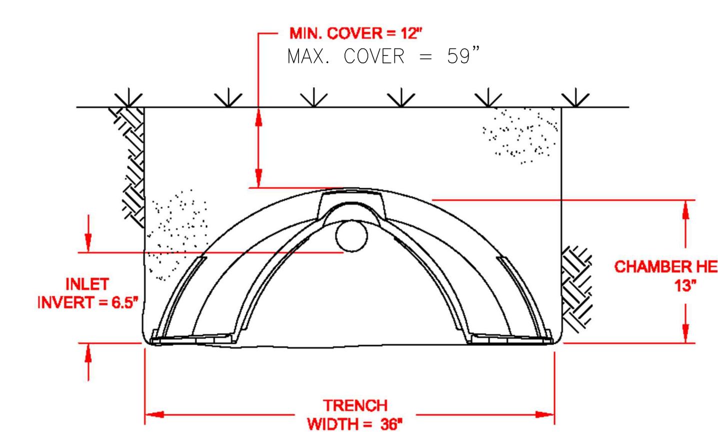
*APPENDIX H, 2013 CALIFORNIA PLUMBING CODE



NOTES:

1. ALL OUTLET INVERTS ARE TO BE LEVEL AND FROM 4" TO 6" ABOVE THE FLOOR OF THE BOX.
2. INLET INVERT HEIGHT IS TO BE 1" MIN. ABOVE OUTLET INVERTS.
3. EACH FIELD LATERAL IS TO BE CONNECTED INDIVIDUALLY TO THE DISTRIBUTION BOX AND IS NOT TO BE SUBDIVIDED.
4. THE BOX SHALL BE OF WATERTIGHT CONSTRUCTION.
5. THE BOX SHALL BE INSTALLED ON CAST-IN-PLACE OR ON A PRE-CAST CONCRETE PAD THAT EXTENDS 3" BEYOND ITS EDGE, OR ON COMPACTED SOIL. **THE DISTRIBUTION BOX MUST BE LEVEL AND STEADY.** PRECAUTIONS MUST BE TAKEN DURING BACKFILLING, AFTER INSPECTION AND APPROVAL FROM SAN BENITO COUNTY, TO PREVENT SHIFTING OF THE BOX.
6. ACCESS TO DISTRIBUTION BOX SHALL BE PROVIDED BY A MANHOLE AT THE TOP, WITH MINIMUM DIMENSION OF 20" SQUARE OR 20" DIAMETER. MANHOLES SHALL EXTEND TO WITHIN AT LEAST 12" OF GROUND SURFACE AND PROVIDED WITH SUBSTANTIAL CONCRETE, STEEL, STONE, FIBERGLASS OR CAST IRON COVERS.

DISTRIBUTION BOX
DETAIL 03 / -
NTS



NOTES:

1. INSTALL PER ADS INSTALLATION GUIDELINES.
2. EXCAVATE AND LEVEL INSTALLATION AREAS.
3. SCARIFY SURFACE TO REMOVE ANY SMEARING CAUSED DURING EXCAVATION.
4. INSTALL UNIVERSAL END CAP AND SECURE IN PLACE WITH BACKFILL.
5. INSTALL 4" PIPE TO EACH ROW OF ARC 36 CHAMBER USING KNOCKOUTS PROVIDED IN THE UNIVERSAL END CAPS.
6. FILL PERIMETER AND INTERIOR SIDEWALL AREAS TO TOP OF CHAMBERS AND WALK INTO PLACE.
7. USING A LIGHT TRACKED MACHINE, COVER ARC 36 LEACHING CHAMBERS TO A MINIMUM OF 12" AFTER CONSOLIDATION FOR H-10 APPLICATIONS. AVOID LARGE ROCKS OR DEBRIS IN COVER MATERIALS.

ADS ARC 36 TRENCH INSTALLATION
DETAIL 02 / -
NTS

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER (ARMAN NAZEMI C.E. 55927) DATE

WORK SAFELY

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	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

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176055		DES	JCS/MTG	11MAR14
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1" = 20'		CHK	MSN	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL
CONSTRUCTION TRAILER AREA
SEPTIC DETAILS

AREA

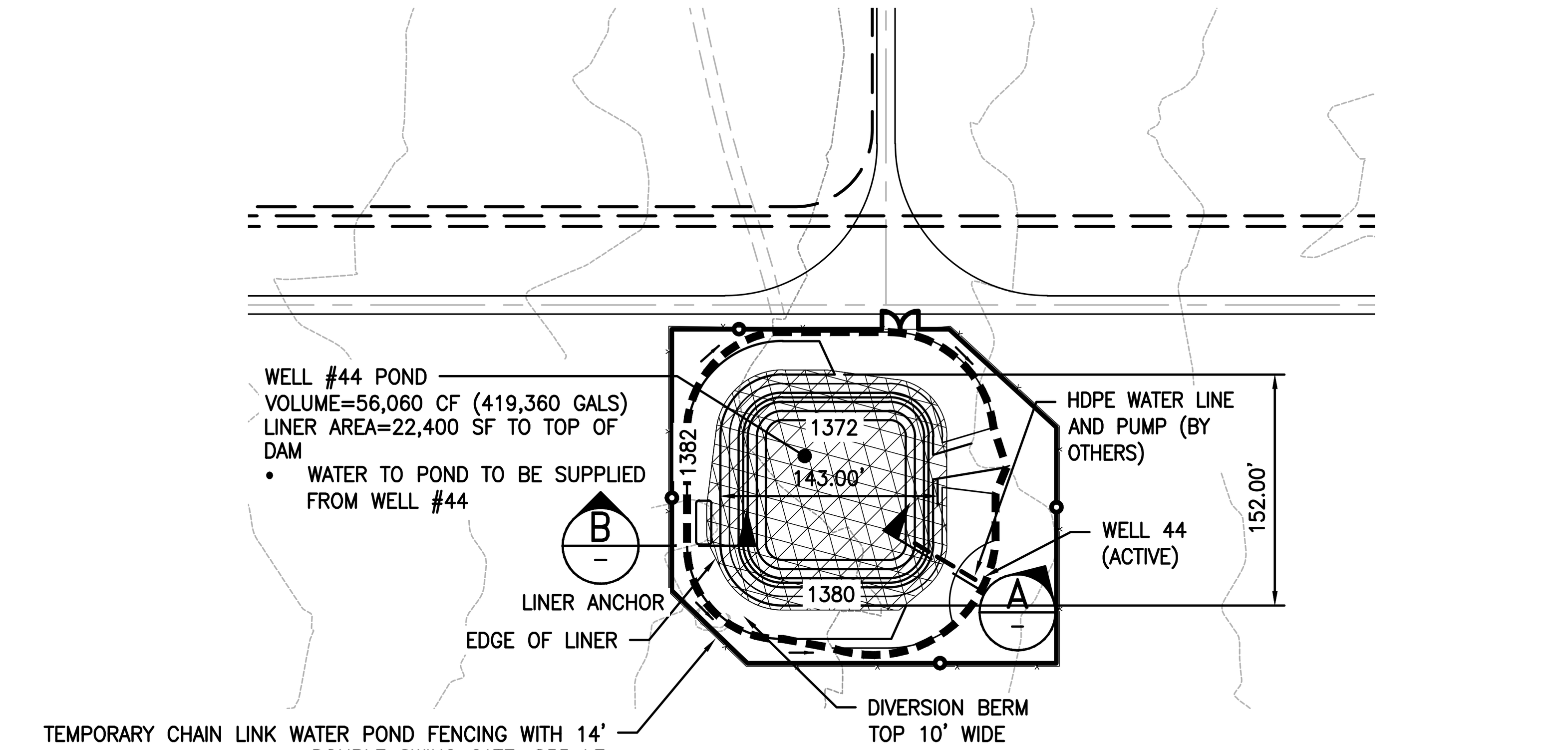
CLIENT DWG. NO.

DRAWING NO. D-000-C-0097 REV. D

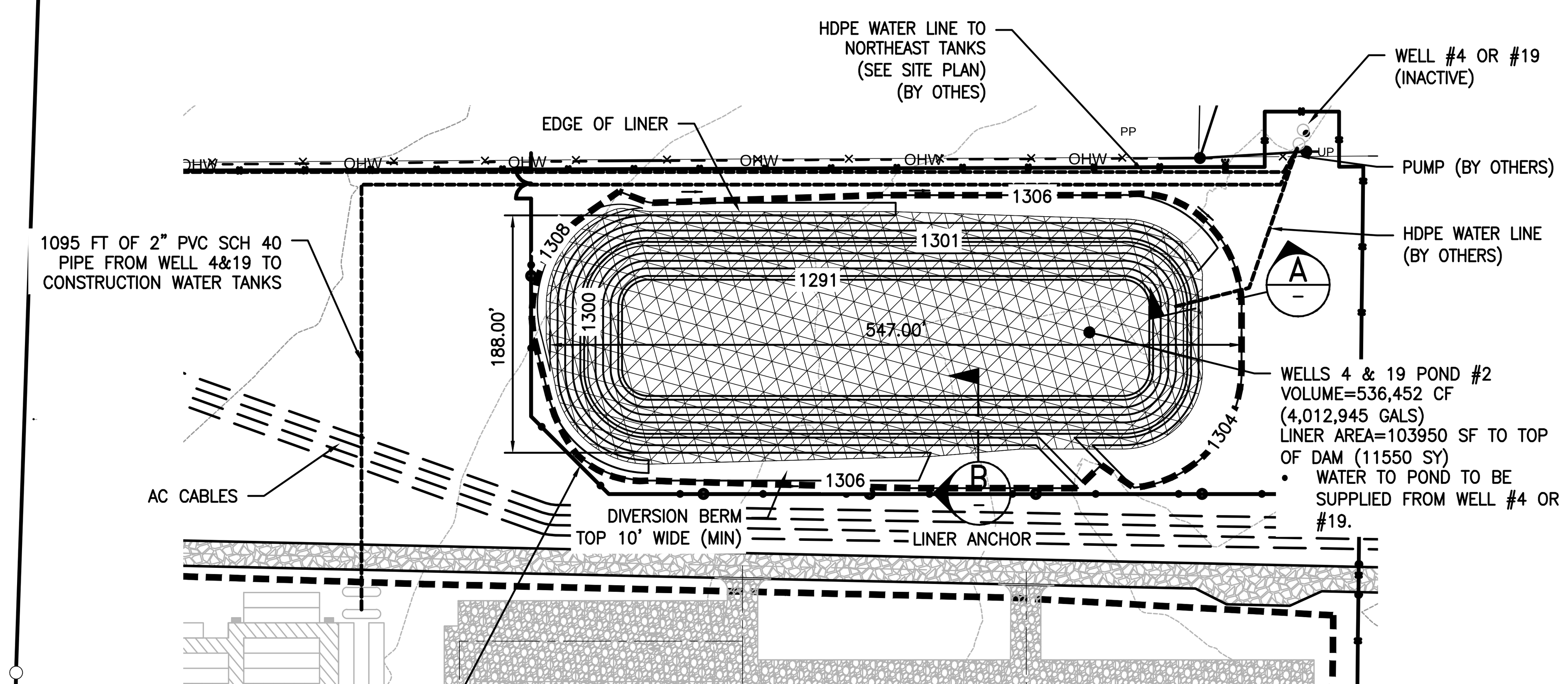
ARCH D-24x36

SAVED: 14-Sep-15 2:45 PM PLOTTED: 15-Sep-15 7:07 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIV\D-000-C-0097.DWG



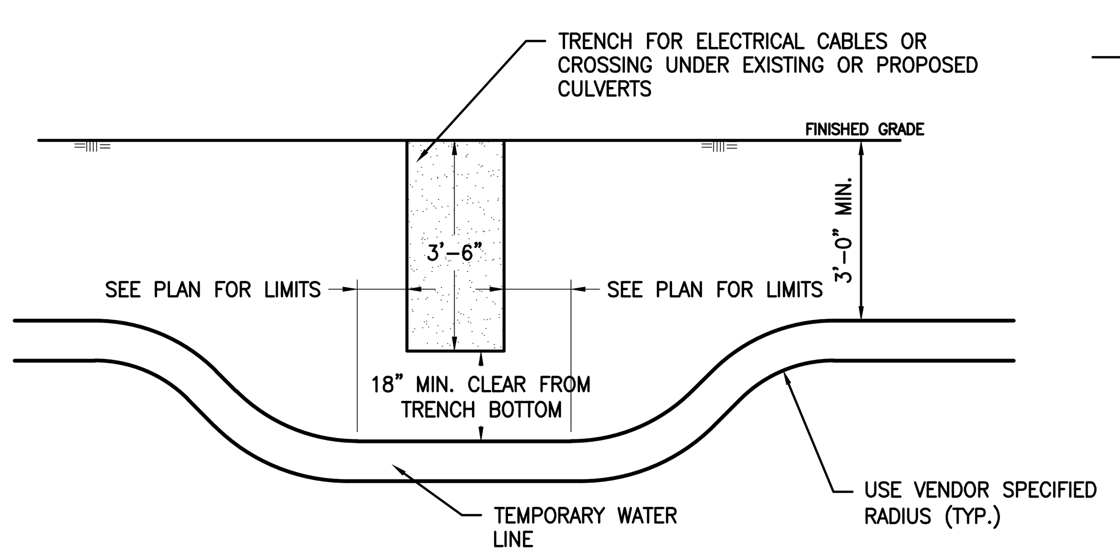
WELL #44 POND
SCALE: 1"=100'



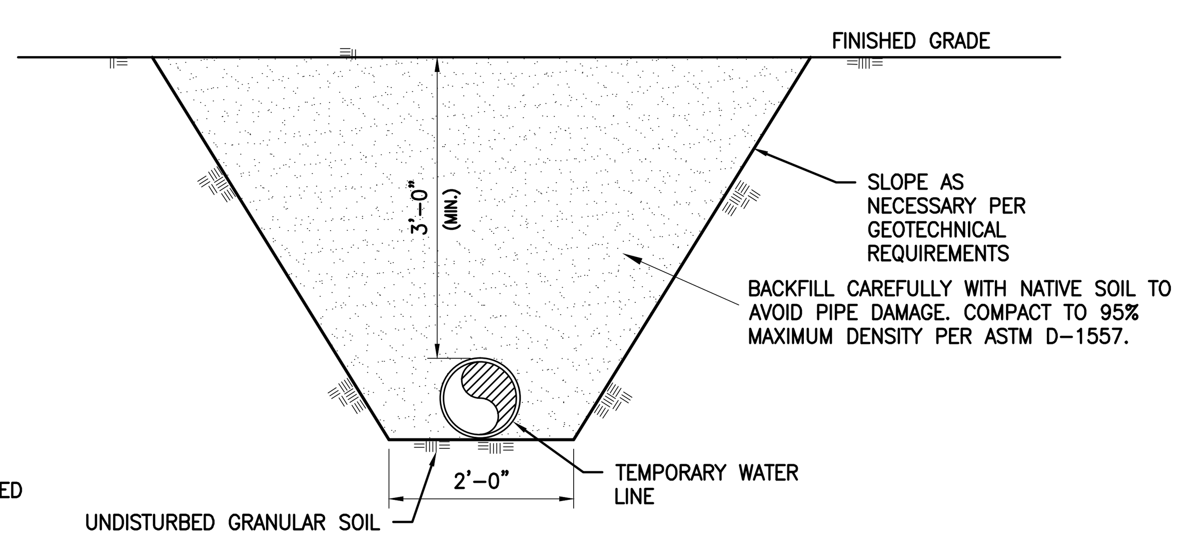
WELLS 4 & 19 POND
SCALE: 1"=100'

NOTES:

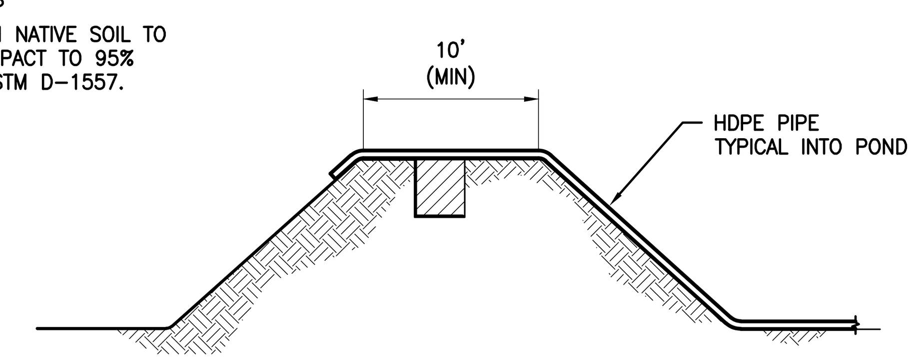
1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
9. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
10. ALL EROSION CONTROL PRODUCTS SHALL BE NON-WOVEN SUCH AS NON-WOVEN SILT FENCE, GEOTEXTILES, ETC... CONTRACTOR SHALL AVOID USE OF PLASTIC MONOFILAMENT NETTING. TIGHTLY WOVEN FIBER NETTING OR SIMILAR MATERIAL SHALL NOT BE USED FOR EROSION CONTROL OR OTHER PURPOSES AT THE PROJECT SITE TO ENSURE THAT BLUNT NOSE LEOPARD LIZARDS DO NOT BECOME ENTANGLED OR TRAPPED.
11. FOR PONDS 1, 2, AND 3 SEE DRAWINGS D-000-C-0203 THROUGH D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.



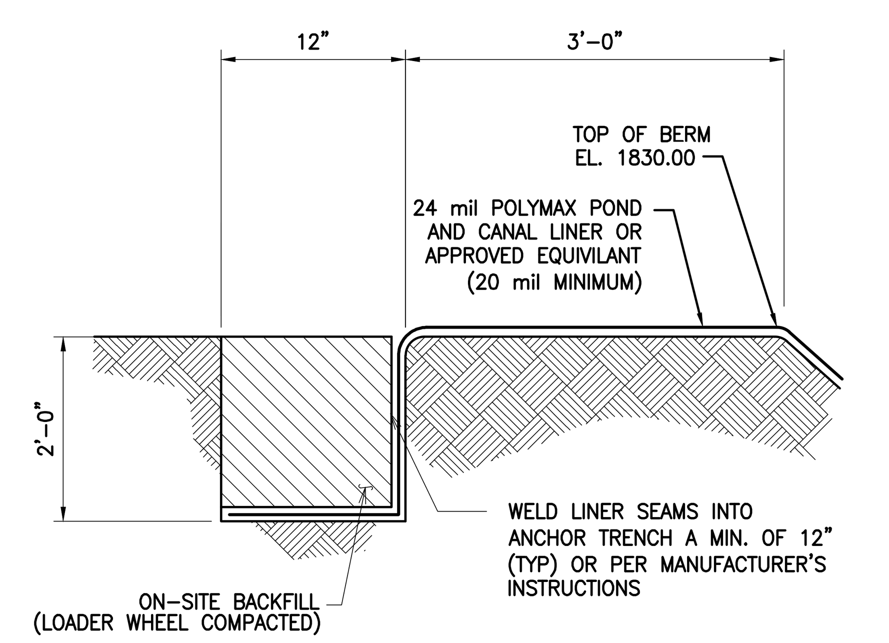
PIPE CROSSING DETAIL 01
NTS



PIPE TRENCH DETAIL 02
NTS



SECTION A
N.T.S.



LINER ANCHOR
SECTION B
N.T.S.

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
E	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
D	03MAR15	ISSUED FOR PERMIT REVIEW; ADDED CDFW JURISDICTIONAL WATERS	JTW	MTG	LEC	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JCS	MTG	LEC	HRM	JCG	
B	30JAN15	REVISED FOR BID	JCS	MTG	LEC	HRM	JCG	
A	12JAN15	ISSUED FOR BID	JCS	MTG	LEC	HRM	JCG	

REF	NUMBER	TITLE
	REFERENCES	

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR. DRE	PROJECT MGR. HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

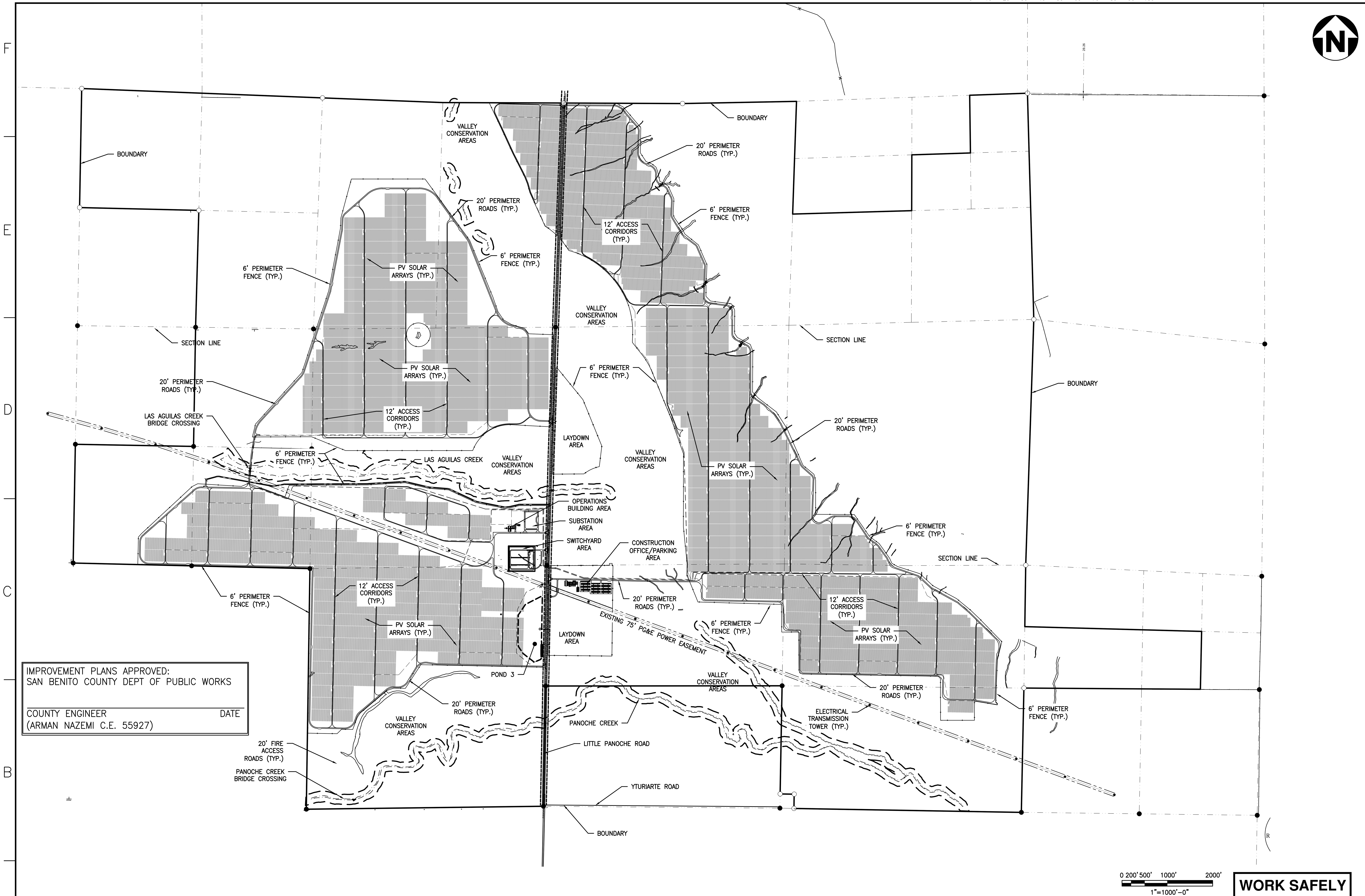
PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	MTG	11MAR14
SCALE	PACKAGE CODE	DRN	JCS	04APR14
AS SHOWN		CHK	MTG	12JAN15
		APP	LEC	12JAN15

PANOCHE VALLEY SOLAR LLC

SUBJECT
CIVIL
CONSTRUCTION WATER POND DETAILS
AND WELL LOCATIONS

amec

AREA
CLIENT DWG. NO.
DRAWING NO. D-000-C-0098 REV. E



IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES,SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
8. ALL DISTURBED AREAS NOT COVERED BY AGGREGATE OR PAVEMENT SHALL BE RE-VEGETATED, SEE RE-VEGETATION REPORT.
9. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
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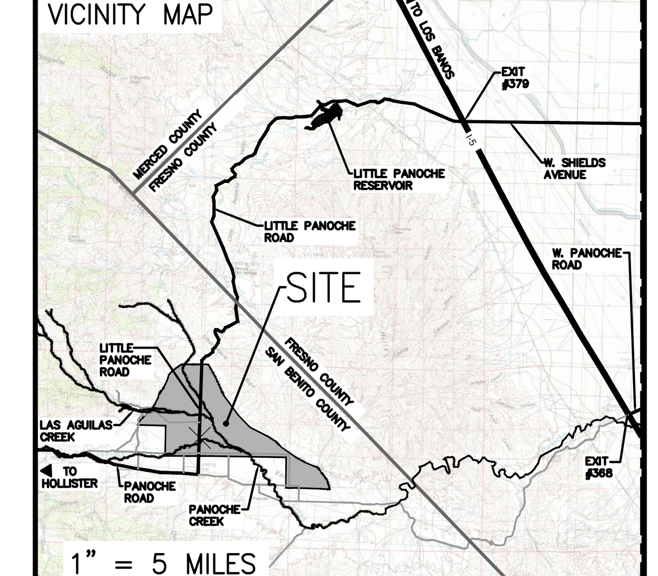
11. FOR POND 3 SEE DRAWING D-000-C-0205. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. DEVELOPER NAME: PANOCHE VALLEY SOLAR, LLC
13. ASSESSOR'S PARCEL NUMBER (APN) 027-260-004, 027-260-005, 027-260-011, 027-260-012, 027-270-001, 027-270-002, 027-270-007, 027-270-008, 027-270-009, 027-270-012, 027-290-001, 027-290-004.
14. BOUNDARY AND TOPOGRAPHIC INFORMATION TAKEN FROM A SURVEY BY PENFIELD & SMITH, 111 EAST VICTORIA STREET, SANTA BARBARA, CA 93101. BOUNDARY SURVEY DATED AUGUST 17, 2012, AND TOPOGRAPHIC SURVEY DATED SEPTEMBER 12, 2012.

VICINITY MAP



REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
H	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	LEC	HRM	JCG	
G	03MAR15	ISSUED FOR PERMIT REVIEW; ADDED CDFW JURISDICTIONAL WATERS	JTW	MTG	LEC	HRM	JCG	
F	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	MTG	LEC	HRM	JCG	
E	30JAN15	REVISED FOR BID	JTW	MTG	LEC	HRM	JCG	
D	12JAN15	ISSUED FOR BID	JTW	MTG	LEC	HRM	JCG	
C	13NOV14	ISSUED FOR INFORMATION	DRD	MTG	LEC	JCG		
B	27MAY14	ISSUED FOR INFORMATION	JCS		LEC			
A	02APR14	ISSUED FOR INFORMATION	JCS	LEC	HRM			

REF	NUMBER	TITLE

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE 1" = 1000'
PACKAGE CODE

	BY	DDMMMYY
DES	JCS/MTG	11MAR14
DRN	JCS	11MAR14
CHK	LEC	02APR14
APP	HRM	24FEB15

PANOCHE VALLEY SOLAR LLC

amec

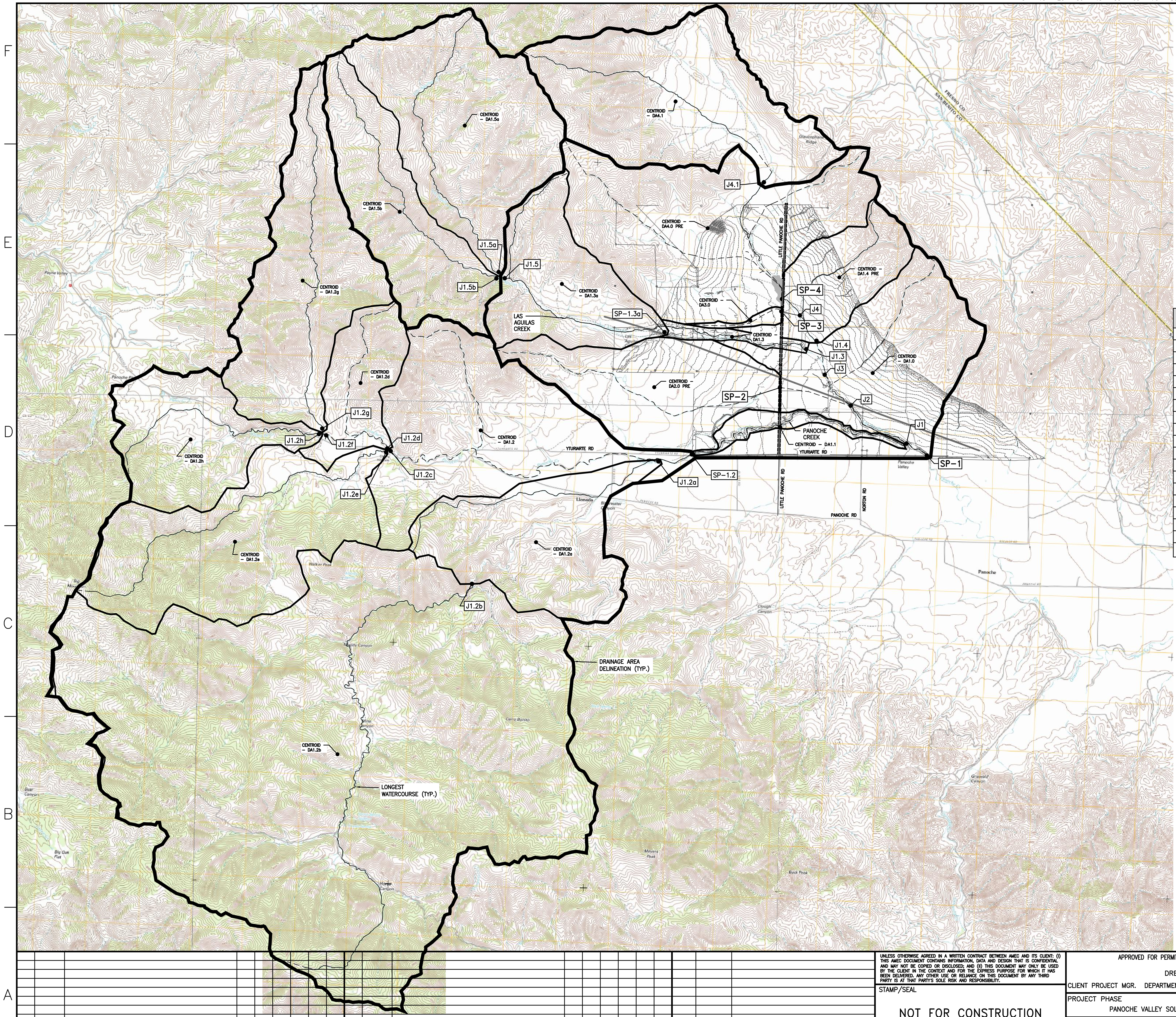
SUBJECT
CIVIL
OVERALL SITE LAYOUT

AREA
CLIENT DWG. NO.
DRAWING NO. D-000-C-0101
REV. H

SAVED: 31-Aug-15 1:47 PM PLOTTED: 15-Sep-15 6:46 PM USER: GILL, MATTHEW

CAD FILE: P:\CAD\CIV\D-000-C-0101.DWG

ARCH D-24x36



NOTES:

1. TOPOGRAPHIC INFORMATION FOR OFFSITE AREAS WAS OBTAINED USING USGS 7.5-MINUTE SERIES QUADRANGLES 24K. QUADRANGLES USED INCLUDE PANOCHE PASS, SAN BENITO, CERRO COLORADO, LLANADA, MERCEY HOT SPRINGS AND PANOCHE.
2. TOPOGRAPHIC INFORMATION FOR ONSITE AREAS WAS OBTAINED FROM A SURVEY BY PENFIELD & SMITH, DATED JULY 2014.

Pre- Drainage Basins	Area (ac)	Area (sq mi)	CN	TLAG (min)
DA 1.0 Pre	2,578	4.03	71.2	51
DA 1.1	249	0.39	73.3	39
DA 1.2	2,922	4.57	82.7	65
DA 1.2a	2,069	3.23	81.1	45
DA 1.2b	14,195	22.18	60.9	84
DA 1.2d	889	1.39	82.3	16
DA 1.2e	2,987	4.67	64.3	54
DA 1.2g	2,584	4.04	65.5	52
DA 1.2h	1,593	2.49	70.4	44
DA 1.3	160	0.25	70.1	15
DA 1.3a	1,537	2.40	87.0	42
DA 1.4	994	1.55	69.2	25
DA 1.5a	2,805	4.38	88.9	46
DA 1.5b	1,841	2.88	73.0	41
DA 2.0 Pre	1,837	2.87	78.0	48
DA 3.0	66	0.10	68.0	24
DA 4.0 Pre	3,265	5.10	76.8	37
DA 4.1	2,896	4.53	80.6	40
Total	**45,466**	**71.04**	**68.58**	

KEYPLAN

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

0 1,500 3,000 6,000
1" = 3,000'

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
C	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTC	DRE	HRM	JCG	
B	24FEB15	ISSUED FOR PERMIT REVIEW	VSE	MBE	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	VSE		MBE	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE 1" = 3000'
PACKAGE CODE

	BY	DDMMMYY
DES	VSE	18AUG14
DRN	VSE	18AUG14
CHK	MBE	22JAN15
APP	MBE	12JAN15

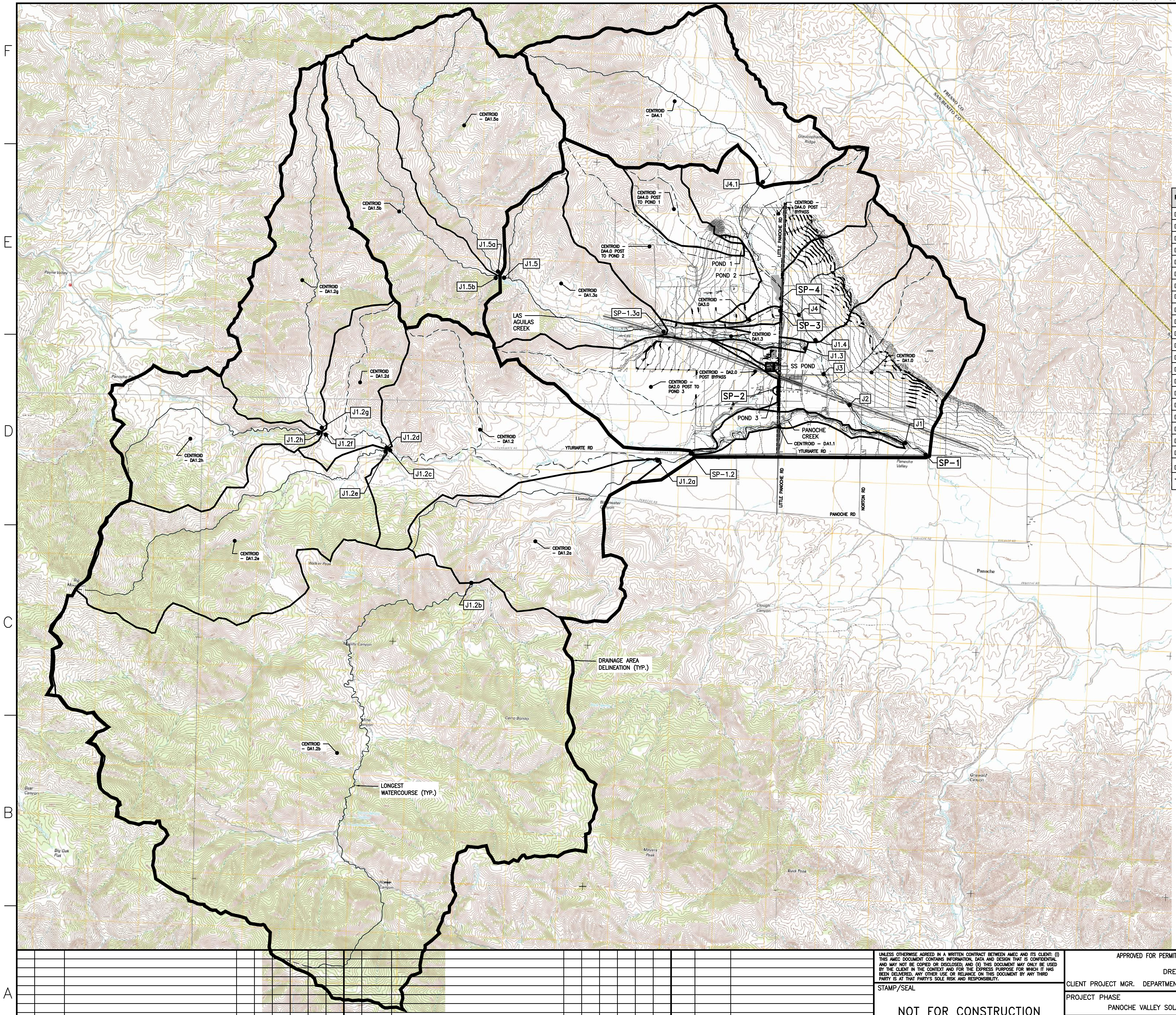
PANOCHE VALLEY SOLAR LLC

amec

SUBJECT
CIVIL
PRE-DEVELOPMENT
HYDROLOGY PLAN

AREA
CLIENT DWG. NO.
DRAWING NO. D-000-C-0201
REV. C

SAVED: 04-Sep-15 2:34 PM PLOTTED: 15-Sep-15 9:56 PM USER: GILL, MATTHEW
CAD FILE: P:\CAD\CIV\D-000-C-0201.DWG



NOTES:

1. TOPOGRAPHIC INFORMATION FOR OFFSITE AREAS WAS OBTAINED USING USGS 7.5–MINUTE SERIES QUADRANGLES 24K. QUADRANGLES USED INCLUDE PANOCHE PASS, SAN BENITO, CERRO COLORADO, LLANADA, MERCEY HOT SPRINGS AND PANOCHE.
2. TOPOGRAPHIC INFORMATION FOR ONSITE AREAS WAS OBTAINED FROM A SURVEY BY PENFIELD & SMITH, DATED JULY 2014.

Post- Drainage Basins	Area (ac)	Area (sq mi)	CN	TLAG (min)
DA 1.0 Post	2,573	4.02	71.9	51
DA 1.1	249	0.39	73.3	39
DA 1.2	2,922	4.57	82.7	65
DA 1.2a	2,069	3.23	81.1	45
DA 1.2b	14,195	22.18	60.9	84
DA 1.2d	889	1.39	82.3	16
DA 1.2e	2,987	4.67	64.3	54
DA 1.2g	2,584	4.04	65.5	52
DA 1.2h	1,593	2.49	70.4	44
DA 1.3	160	0.25	70.1	15
DA 1.3a	1,537	2.40	87.0	42
DA 1.4 Post	994	1.55	70.0	25
DA 1.5a	2,805	4.38	88.9	46
DA 1.5b	1,841	2.88	73.0	41
DA 2.0 TO POND 3	1,794	2.80	79.0	47
DA 2.0 BYPASS	40	0.06	71.8	22
DA 2.0 SS	6	0.01	98.2	3
DA 3.0 Post	66	0.10	69.2	24
DA 4.0 TO POND 2	1,458	2.28	80.7	34
DA 4.0 TO POND 1	441	0.69	81.5	28
DA 4.0 BYPASS	1,367	2.14	72.9	40
DA 4.1	2,896	4.53	80.6	40
Total	**45,466**	**71.04**	**68.71**	

KEYPLAN

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

0 1,500 3,000 6,000
1" = 3,000'

WORK SAFELY

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
C	16SEP15	ISSUED FOR PERMIT REVIEW	AFK	MTG	DRE	HRM	JCG	
B	24FEB15	ISSUED FOR PERMIT REVIEW	VSE	MBE	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	VSE		MBE	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE
PANOCHE VALLEY SOLAR PROJECT

PROJECT NO. 176055
ACTIVITY NO.
SCALE 1" = 3000'
PACKAGE CODE

	BY	DDMMMYY
DES	VSE	18AUG14
DRN	VSE	18AUG14
CHK	MBE	22JAN15
APP	MBE	12JAN15

PANOCHE VALLEY SOLAR LLC

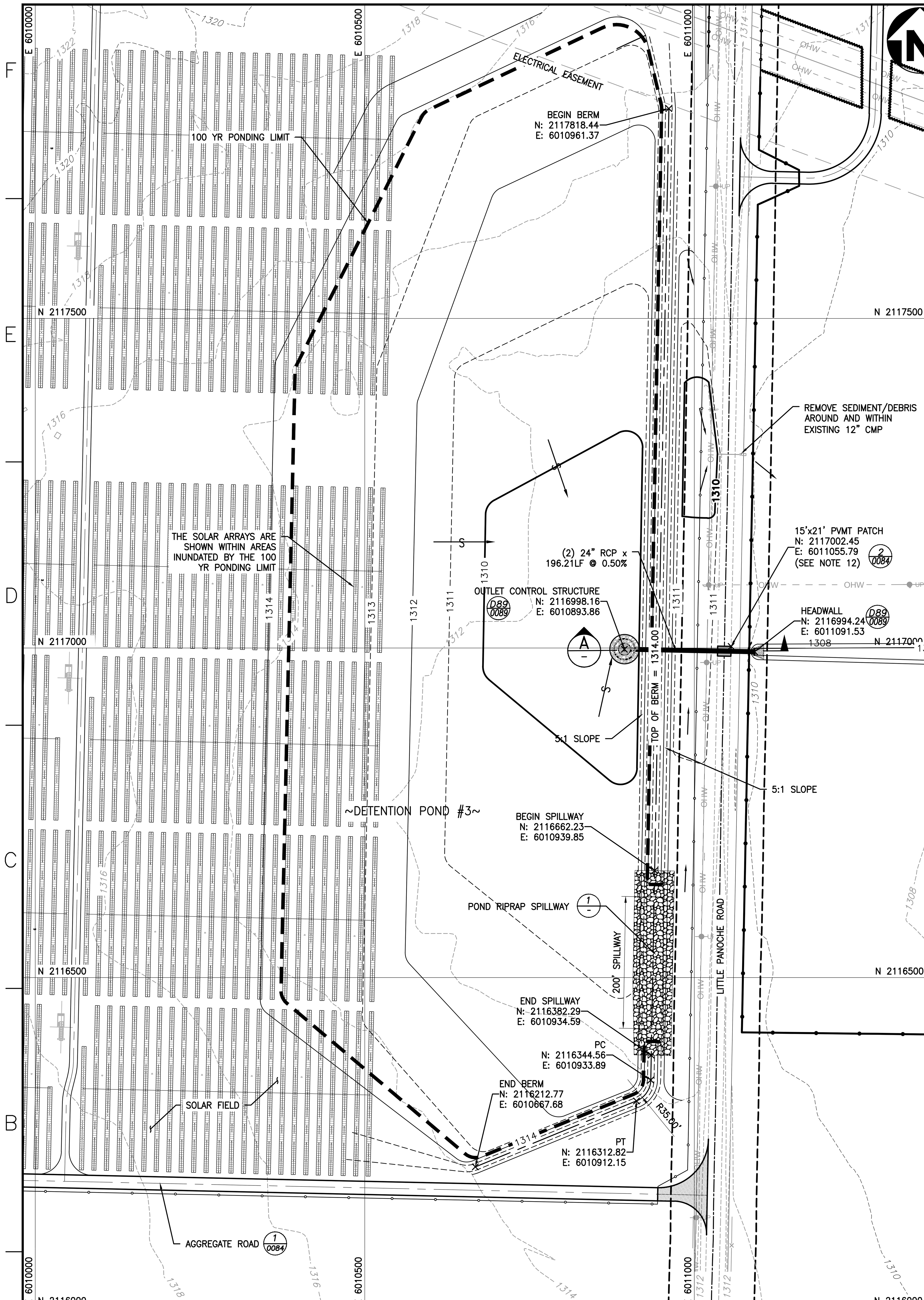
SUBJECT
CIVIL
POST–DEVELOPMENT
HYDROLOGY PLAN

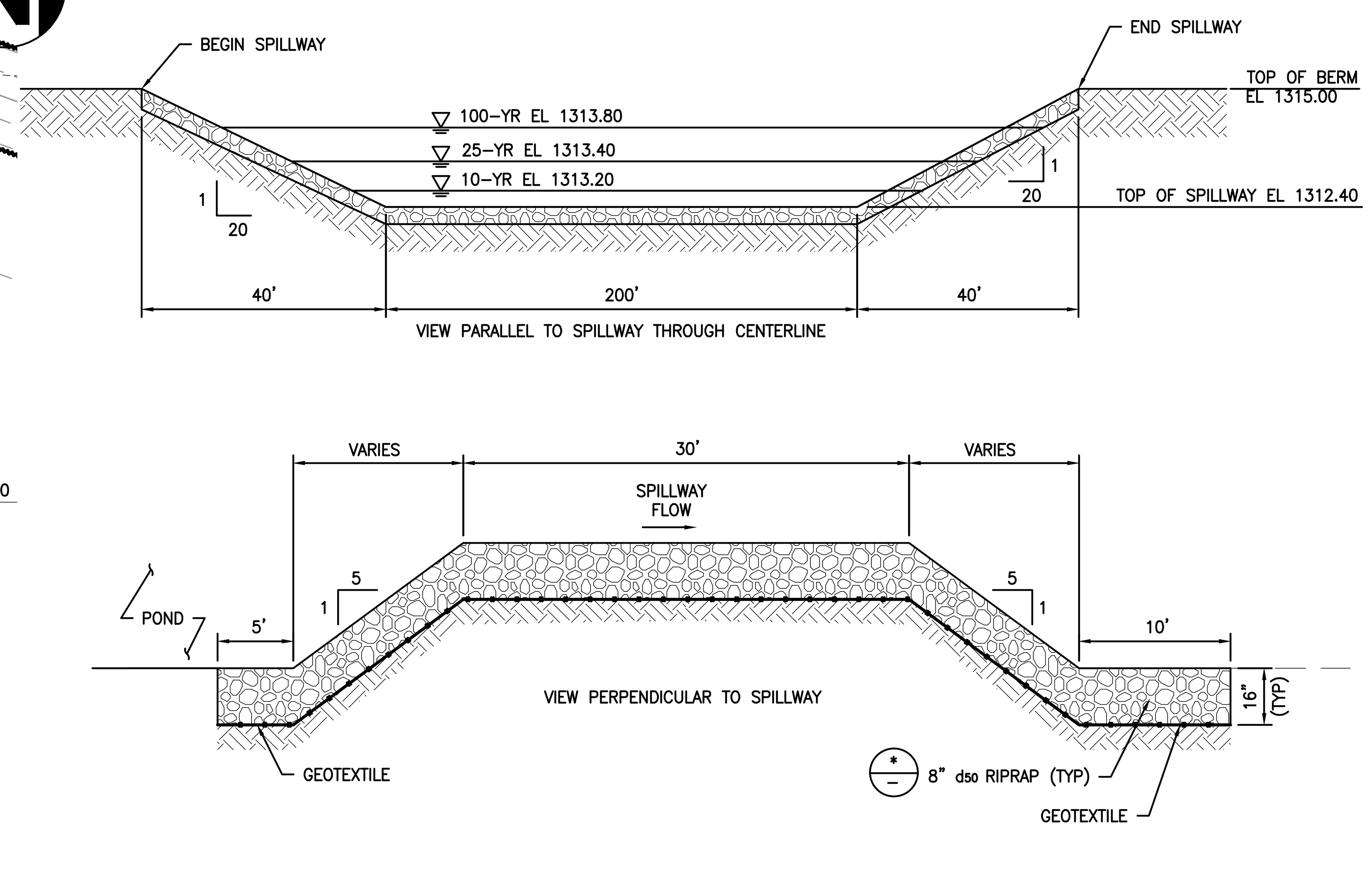
amec

AREA
CLIENT DWG. NO.
DRAWING NO. D–000–C–0202
REV. C

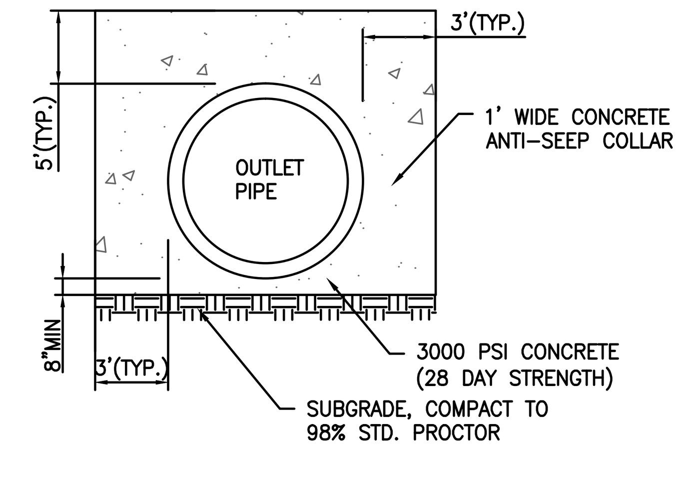
CAD FILE: P:\CAD\CIV\D-000-C-0202.DWG

SAVED: 10–Sep–15 5:30 PM PLOTTED: 15–Sep–15 9:58 PM USER: GILL, MATTHEW

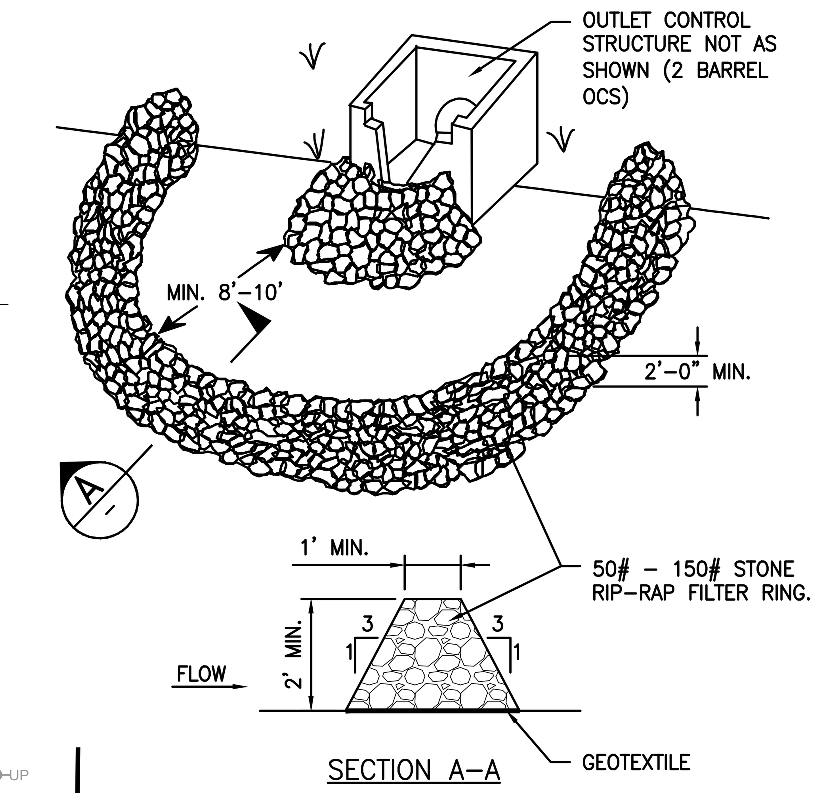




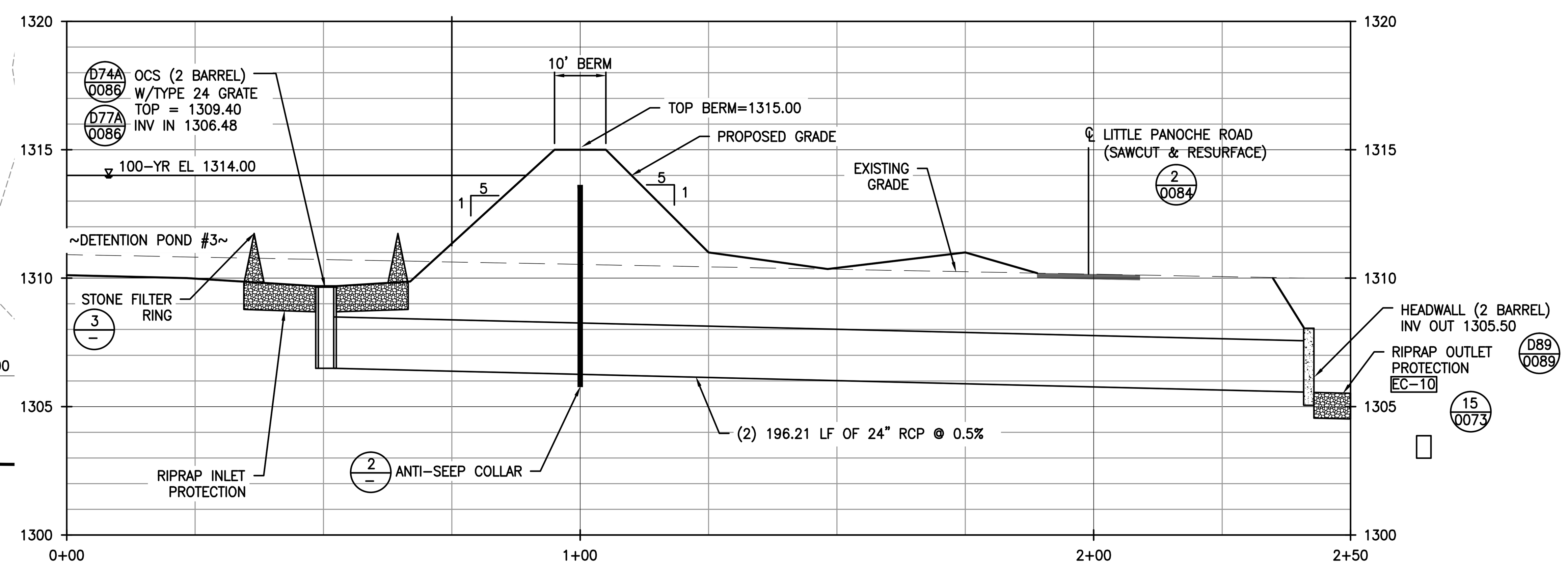
1 DETENTION POND #3 RIPRAP SPILLWAY DETAIL
NTS



2 ANTI-SEEP COLLAR
NTS



3 STONE FILTER RING
NTS



A SECTION
SCALE: 1" = 20' HORIZ
1" = 4' VERT

0 20' 50' 100' 200'
1"=100'-0"

IMPROVEMENT PLANS APPROVED:
SAN BENITO COUNTY DEPT OF PUBLIC WORKS

COUNTY ENGINEER DATE
(ARMAN NAZEMI C.E. 55927)

WORK SAFELY

NOTES

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DRAWINGS D-000-C-0002 AND D-000-C-0003.
2. FOR SEDIMENT AND EROSION CONTROL NOTES AND DETAILS, SEE DRAWINGS D-000-C-0071 THROUGH D-000-C-0074. FOR FURTHER INFORMATION REFERENCE SWPPP REPORT, C-RPT-000-001.
3. FOR DUST CONTROL PLAN AND NOTES, SEE REPORT C-RPT-000-003.
4. FOR GENERAL DETAILS, SEE DRAWINGS D-000-C-0081 THROUGH D-000-C-0089.
5. FOR JURISDICTIONAL WATERS, OPEN CHANNELS, AND LOW WATER CROSSING DETAILS AND INFORMATION SEE DRAWINGS D-000-C-0151 THROUGH D-000-C-0190.
6. FOR PERIMETER ROAD PLAN AND PROFILES AND NEW VASQUEZ CREEK ROAD SEE DRAWINGS D-000-C-0121 THROUGH D-000-C-0146.
7. FOR ADDITIONAL SEDIMENT AND EROSION CONTROL DETAILS AND SPECIFICATIONS REFERENCE SEE CASQA CONSTRUCTION BMP HANDBOOK.
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9. IF RE-VEGETATION OF OPEN CHANNELS AND DISTURBED AREAS HAVE NOT DEVELOPED PRIOR TO THE RAINY SEASON CONTRACTOR SHALL BE REQUIRED TO INSTALL ADDITIONAL MEASURES SUCH AS EROSION CONTROL BLANKETS, ROCK CHECK DAMS (IN OPEN CHANNELS ONLY), ROCK MULCH, RIP RAP, OR ANY OTHER APPROVED METHOD AS LISTED IN THE CASQA CONSTRUCTION BMP HANDBOOK.
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11. FOR FURTHER INFORMATION PLEASE REFERENCE THE HYDROLOGY AND HYDRAULICS REPORTS, C-RPT-000-002 AND C-RPT-100-004.
12. SAWCUT EXISTING PAVEMENT TO STRAIGHT LINE BOTH SIDES PRIOR TO PIPE INSTALLATION. INSTALL PIPES AND PROVIDE PAVEMENT PATCH WITH TRANSITION TO EXISTING LITTLE PANOCHE ROAD.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
D	16SEP15	ISSUED FOR PERMIT REVIEW	TOC	MTG	DRE	HRM	JCG	
C	24FEB15	ISSUED FOR PERMIT REVIEW	JTW	LEC	DRE	HRM	JCG	
B	30JAN15	REVISED FOR BID	DRD	MBE	DRE	HRM	JCG	
A	12JAN15	ISSUED FOR BID	DRD		MBE	HRM	JCG	

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

NOT FOR CONSTRUCTION

APPROVED FOR PERMIT REVIEW

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
	DRE	HRM

PROJECT PHASE: PANOCHE VALLEY SOLAR PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMMYY
176055		DES	VSE	11JUL14
SCALE	PACKAGE CODE	DRN	DRD	06NOV14
AS NOTED		CHK	MBE	23JAN15
		APP	MBE	12JAN15

PANOCHE VALLEY SOLAR LLC

amec

SUBJECT: CIVIL
DETENTION POND #3

AREA

CLIENT DWG. NO.

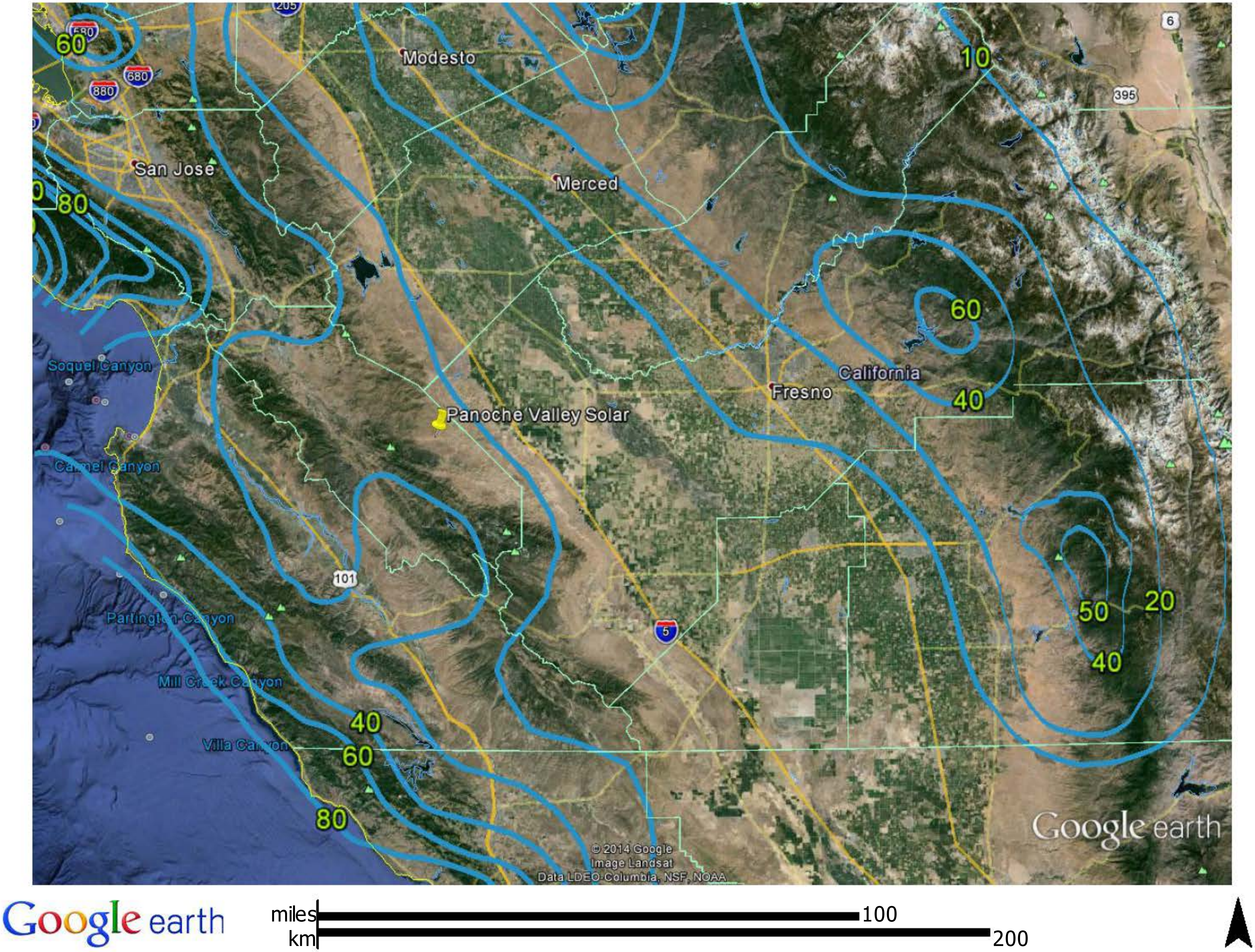
DRAWING NO. D-000-C-0205 REV. D

SAVED: 15-Sep-15 7:30 PM PLOTTED: 16-Sep-15 12:56 AM USER: GILL, MATTHEW

Appendix C: Permit Registration Documents

Permit Registration Documents included in this Appendix

Y/N	Permit Registration Document
Y	Notice of Intent
Y	Risk Assessment
Y	Certification
Y	Post Construction Water Balance
Y	Copy of Annual Fee Receipt
N	ATS Design Documents
Y	Site Map, see Appendix B
N	Waste Discharge Identification (WDID) confirmation


Modesto
San Jose
Merced
Fresno
California
Panoche Valley Solar
Soquel Canyon
Carmel Canyon
Partington Canyon
Mill Creek Canyon
Villa Canyon
60
80
10
60
40
50
20
40
40
60
80
© 2014 Google
Image Landsat
Data LDEO-Columbia, NSF, NOAA
Google earth
miles
100
km
200

EPA United States Environmental Protection Agency

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » Stormwater » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

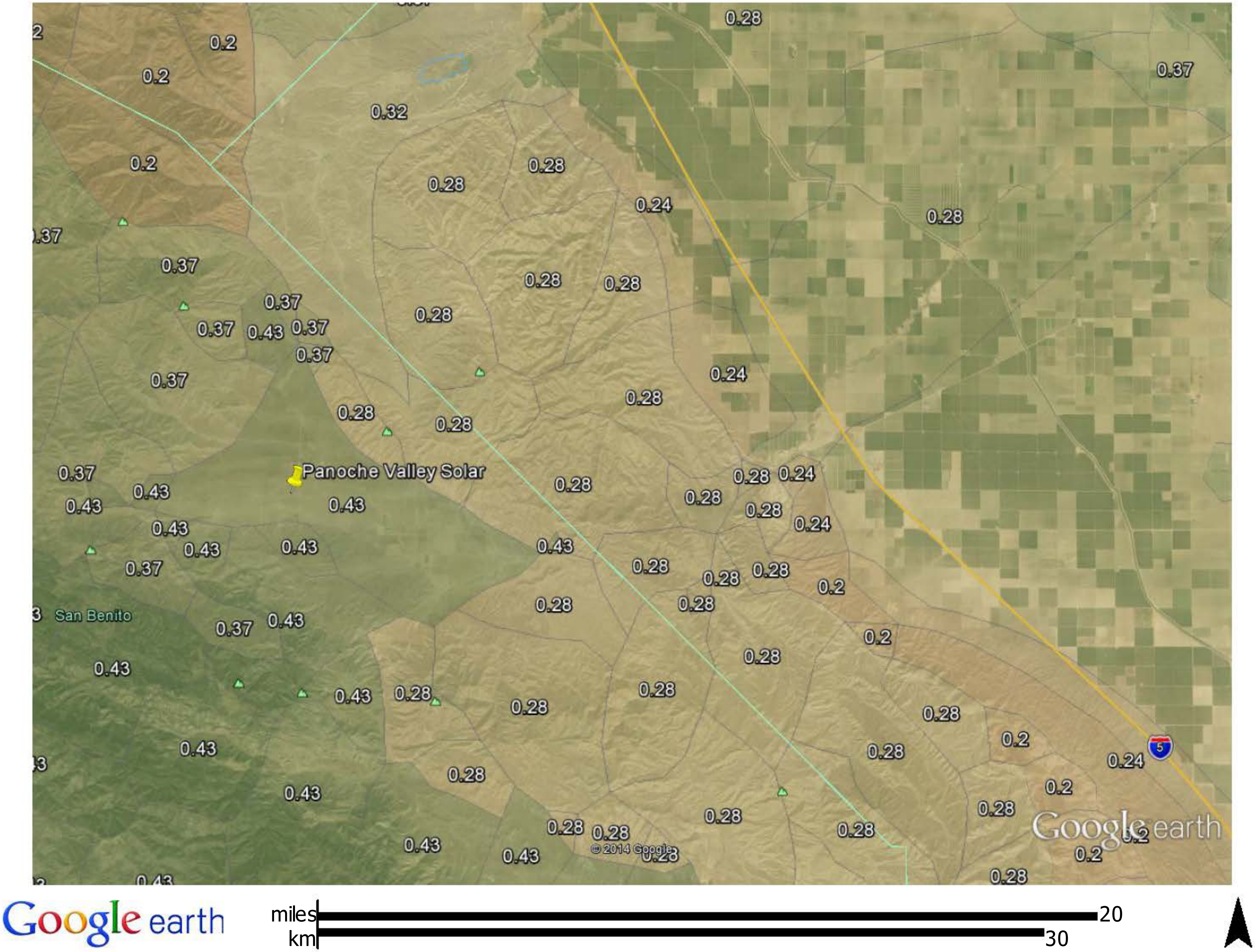
Start Date:	10/14/2015
End Date:	02/01/2017
Latitude:	36.6322
Longitude:	-120.8716

Erosivity Index Calculator Results

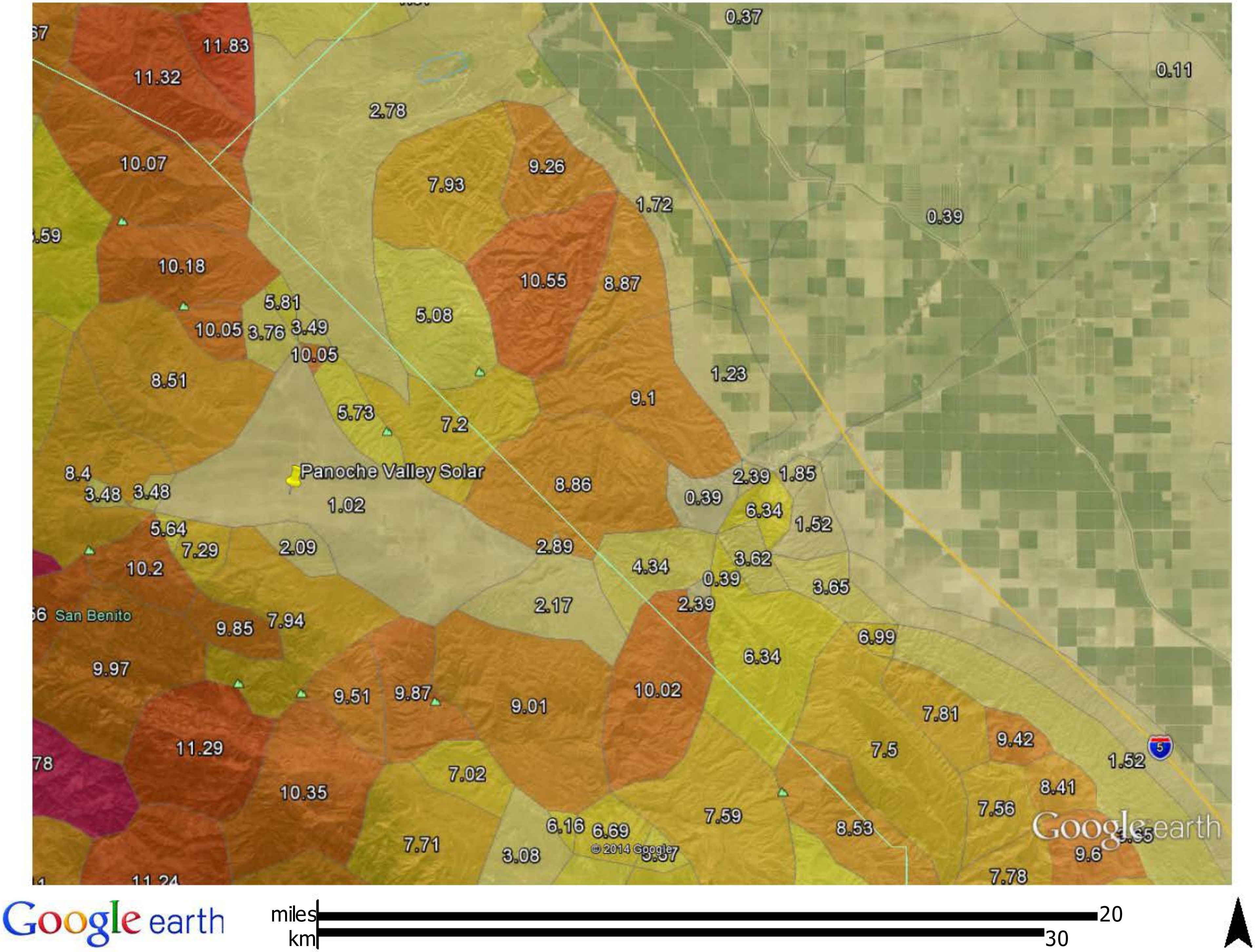
AN EROSIVITY INDEX VALUE OF 33.77 HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **10/14/2015** - **02/01/2017**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

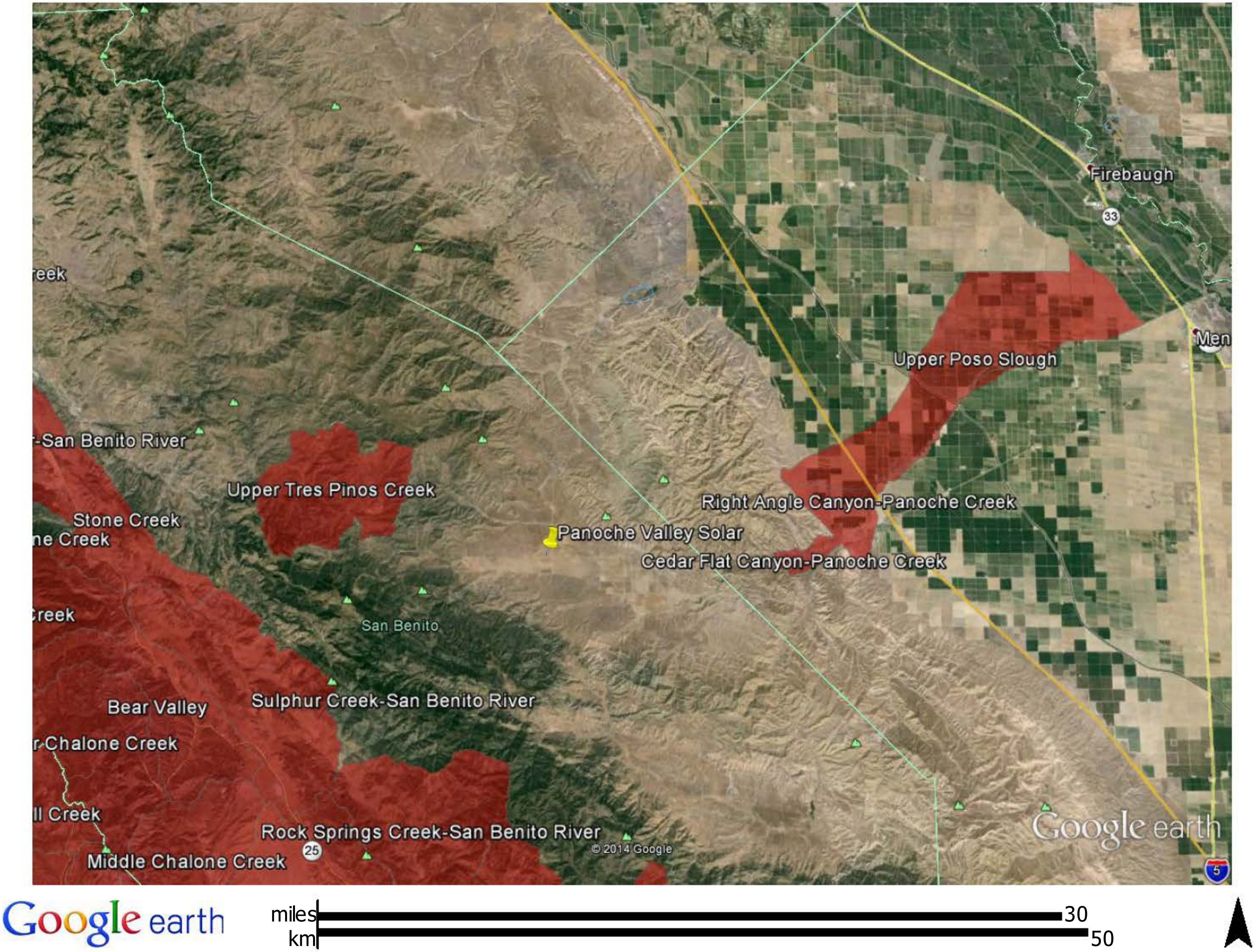


Panoche Valley Solar
San Benito
0.2
0.32
0.28
0.24
0.37
0.43
© 2014 Google
Google earth
miles
20
km
30



0.37
11.83
11.32
0.11
2.78
10.07
9.26
7.93
1.72
0.39
10.18
10.55
8.87
5.81
10.05
3.76
3.49
5.08
10.05
8.51
1.23
9.1
5.73
7.2
Panoche Valley Solar
8.4
3.48
3.48
1.02
8.86
2.39
1.85
0.39
6.34
1.52
5.64
7.29
2.09
2.89
10.2
4.34
3.62
0.39
3.65
2.17
2.39
San Benito
9.85
7.94
6.99
9.97
6.34
9.51
9.87
9.01
10.02
7.81
11.29
9.42
7.5
1.52
7.02
10.35
8.41
7.59
7.56
6.16
6.69
8.53
7.71
3.08
9.6
7.78
11.24
© 2014 Google
Google earth
miles
20
km
30

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		33.77
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	http://www.waterboards.ca.gov/waterboards_map.shtml		
9	**K Factor Value**		0.43
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		1.02
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	14.811522	
16	**Site Sediment Risk Factor**	**Low**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			



Firebaugh
33
reek
Men
Upper Poso Slough
-San Benito River
Upper Tres Pinos Creek
Right Angle Canyon-Panoche Creek
Stone Creek
ne Creek
Panoche Valley Solar
Cedar Flat Canyon-Panoche Creek
reek
San Benito
Bear Valley
Sulphur Creek-San Benito River
-Chalone Creek
ll Creek
Rock Springs Creek-San Benito River
25
Middle Chalone Creek
© 2014 Google
Google earth
5
Google earth
miles
30
km
50

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml	no	Low
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan		

Combined Risk Level Matrix

Sediment Risk

	Low	Medium	High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk:	Low
Project RW Risk:	Low
Project Combined Risk:	Level 1

Appendix D: SWPPP Amendment Certifications

SWPPP Amendment No.________________

Project Name:	
Project No:	

Qualified SWPPP Developer's Certification of the
Stormwater Pollution Prevention Plan Amendment

"This Stormwater Pollution Prevention Plan and attachments were prepared under my direction to meet the requirements of the California Construction General Permit (SWRCB Order No. 2009-009-DWQ as amended by 2010-0014-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

QSD's Signature	Date
QSD Name	QSD Certificate Number
Title and Affiliation	Telephone
Address	Email

Appendix E: Submitted Changes to PRDs

Log of Updated PRDs

The General Permit allows for the reduction or increase of the total acreage covered under the General Permit when a portion of the project is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the project is purchased by a different entity; or when new acreage is added to the project.

Modified PRDs will be filed electronically within 30 days of a reduction or increase in total disturbed area if a change in permit covered acreage is to be sought. The SWPPP will be modified appropriately, with revisions and amendments recorded in Appendix C. Updated PRDs submitted electronically via SMARTS can be found in this Appendix.

This appendix includes all of the following updated PRDs (check all that apply):

☐ Revised Notice of Intent (NOI);

☐ Revised Site Map;

☐ Revised Risk Assessment;

☐ New landowner's information (name, address, phone number, email address); and

☐ New signed certification statement.

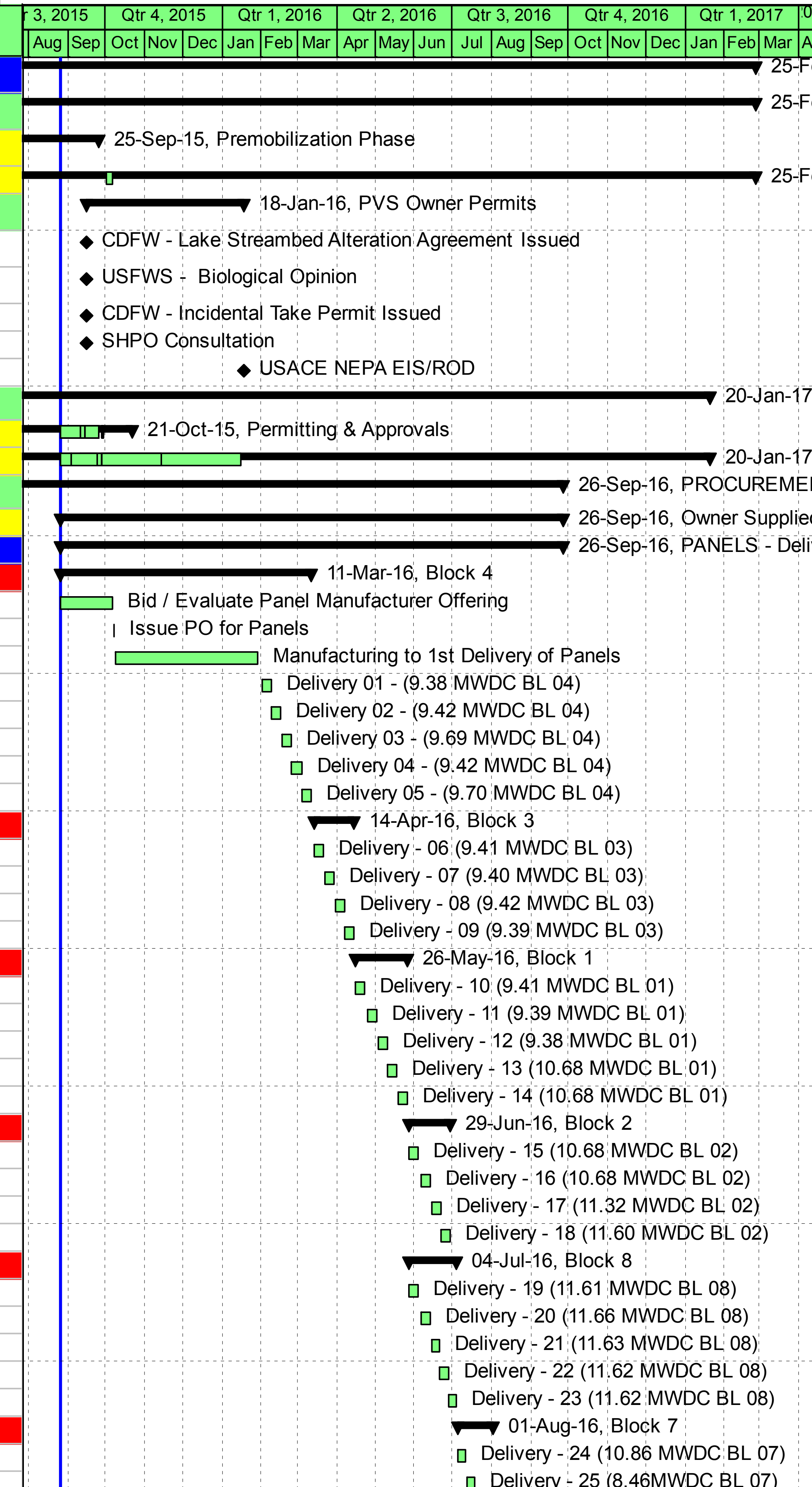
Mark Noyes

Legally Responsible Person

Signature of Legally Responsible Person or Approved Signatory	Date
Mark Noyes	(914) 419-6701
Name of Legally Responsible Person or Approved Signatory	Telephone Number

Appendix F: Construction Schedule

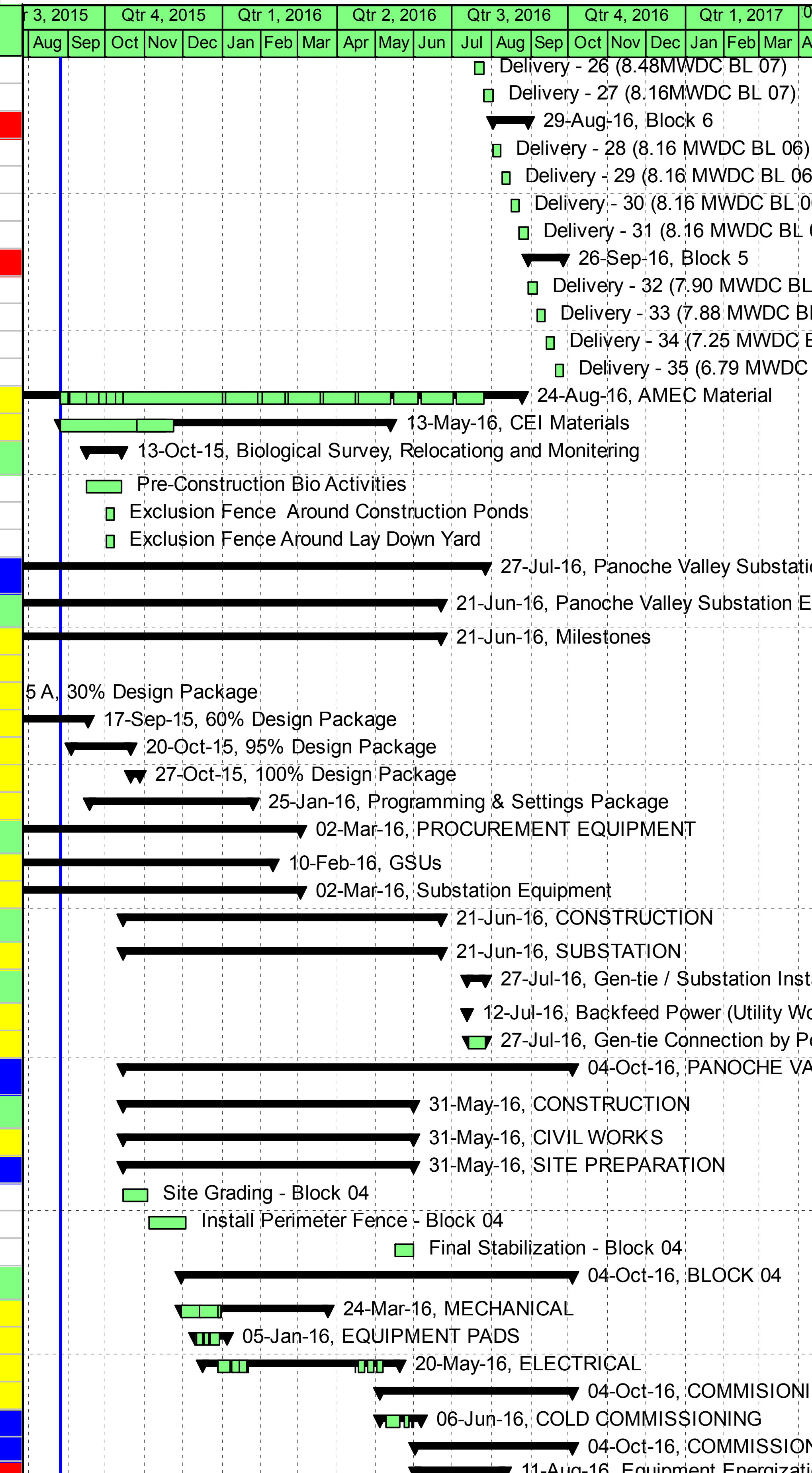
Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
PANOCHE VALLEY SOLAR - EPPS (AMEC)		756	384	03-Apr-14 A	25-Feb-17
MILESTONES		756	384	03-Apr-14 A	25-Feb-17
Premobilization Phase		394	22	03-Apr-14 A	25-Sep-15
General Construction Milestones		556	384	09-Dec-14 A	25-Feb-17
PVS Owner Permits		81	81	15-Sep-15	18-Jan-16
A1122	CDFW - Lake Streambed Alteration Agreement Issued	0	0		15-Sep-15*
A1142	USFWS - Biological Opinion	0	0		15-Sep-15*
A5810	CDFW - Incidental Take Permit Issued	0	0		15-Sep-15*
A1152	SHPO Consultation	0	0		15-Sep-15*
A1132	USACE NEPA EIS/ROD	0	0		18-Jan-16*
AMEC Engineering		697	359	21-Apr-14 A	20-Jan-17
Permitting & Approvals		377	39	13-Jun-14 A	21-Oct-15
PV Site Engineering		697	359	21-Apr-14 A	20-Jan-17
PROCUREMENT EQUIPMENT		618	275	10-Apr-14 A	26-Sep-16
Owner Supplied Equipment		284	284	26-Aug-15	26-Sep-16
PANELS - Delivery		284	284	26-Aug-15	26-Sep-16
Block 4		143	143	26-Aug-15	11-Mar-16
185	Bid / Evaluate Panel Manufacturer Offering	30	30	26-Aug-15	06-Oct-15
186	Issue PO for Panels	1	1	07-Oct-15	07-Oct-15
191	Manufacturing to 1st Delivery of Panels	82	82	08-Oct-15	29-Jan-16
196	Delivery 01 - (9.38 MWDC BL 04)	6	6	01-Feb-16	08-Feb-16
236	Delivery 02 - (9.42 MWDC BL 04)	6	6	09-Feb-16	16-Feb-16
276	Delivery 03 - (9.69 MWDC BL 04)	6	6	17-Feb-16	24-Feb-16
286	Delivery 04 - (9.42 MWDC BL 04)	6	6	25-Feb-16	03-Mar-16
296	Delivery 05 - (9.70 MWDC BL 04)	6	6	04-Mar-16	11-Mar-16
Block 3		24	24	14-Mar-16	14-Apr-16
201	Delivery - 06 (9.41 MWDC BL 03)	6	6	14-Mar-16	21-Mar-16
251	Delivery - 07 (9.40 MWDC BL 03)	6	6	22-Mar-16	29-Mar-16
241	Delivery - 08 (9.42 MWDC BL 03)	6	6	30-Mar-16	06-Apr-16
231	Delivery - 09 (9.39 MWDC BL 03)	6	6	07-Apr-16	14-Apr-16
Block 1		30	30	15-Apr-16	26-May-16
206	Delivery - 10 (9.41 MWDC BL 01)	6	6	15-Apr-16	22-Apr-16
336	Delivery - 11 (9.39 MWDC BL 01)	6	6	25-Apr-16	02-May-16
326	Delivery - 12 (9.38 MWDC BL 01)	6	6	03-May-16	10-May-16
316	Delivery - 13 (10.68 MWDC BL 01)	6	6	11-May-16	18-May-16
306	Delivery - 14 (10.68 MWDC BL 01)	6	6	19-May-16	26-May-16
Block 2		24	24	27-May-16	29-Jun-16
226	Delivery - 15 (10.68 MWDC BL 02)	6	6	27-May-16	03-Jun-16
366	Delivery - 16 (10.68 MWDC BL 02)	6	6	06-Jun-16	13-Jun-16
356	Delivery - 17 (11.32 MWDC BL 02)	6	6	14-Jun-16	21-Jun-16
346	Delivery - 18 (11.60 MWDC BL 02)	6	6	22-Jun-16	29-Jun-16
Block 8		27	27	27-May-16	04-Jul-16
211	Delivery - 19 (11.61 MWDC BL 08)	6	6	27-May-16	03-Jun-16
301	Delivery - 20 (11.66 MWDC BL 08)	6	6	06-Jun-16	13-Jun-16
291	Delivery - 21 (11.63 MWDC BL 08)	5	5	14-Jun-16	20-Jun-16
281	Delivery - 22 (11.62 MWDC BL 08)	5	5	21-Jun-16	27-Jun-16
271	Delivery - 23 (11.62 MWDC BL 08)	5	5	28-Jun-16	04-Jul-16
Block 7		20	20	05-Jul-16	01-Aug-16
216	Delivery - 24 (10.86 MWDC BL 07)	5	5	05-Jul-16	11-Jul-16
406	Delivery - 25 (8.46MWDC BL 07)	5	5	12-Jul-16	18-Jul-16



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

TASK filter: All Activities

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
396	Delivery - 26 (8.48MWDC BL 07)	5	5	19-Jul-16	25-Jul-16
376	Delivery - 27 (8.16MWDC BL 07)	5	5	26-Jul-16	01-Aug-16
Block 6		20	20	02-Aug-16	29-Aug-16
266	Delivery - 28 (8.16 MWDC BL 06)	5	5	02-Aug-16	08-Aug-16
436	Delivery - 29 (8.16 MWDC BL 06)	5	5	09-Aug-16	15-Aug-16
426	Delivery - 30 (8.16 MWDC BL 06)	5	5	16-Aug-16	22-Aug-16
416	Delivery - 31 (8.16 MWDC BL 06)	5	5	23-Aug-16	29-Aug-16
Block 5		20	20	30-Aug-16	26-Sep-16
221	Delivery - 32 (7.90 MWDC BL 05)	5	5	30-Aug-16	05-Sep-16
341	Delivery - 33 (7.88 MWDC BL 05)	5	5	06-Sep-16	12-Sep-16
331	Delivery - 34 (7.25 MWDC BL 05)	5	5	13-Sep-16	19-Sep-16
311	Delivery - 35 (6.79 MWDC BL 05)	5	5	20-Sep-16	26-Sep-16
AMEC Material		595	252	10-Apr-14 A	24-Aug-16
CEI Materials		179	179	26-Aug-15	13-May-16
Biological Survey, Relocationg and Monitering		20	20	16-Sep-15	13-Oct-15
A7420	Pre-Construction Bio Activities	20	20	16-Sep-15	13-Oct-15*
A7360	Exclusion Fence Around Construction Ponds	5	5	01-Oct-15	07-Oct-15*
A7370	Exclusion Fence Around Lay Down Yard	5	5	01-Oct-15	07-Oct-15*
Panoche Valley Substation		496	232	05-Aug-14 A	27-Jul-16
Panoche Valley Substation Engineering		387	215	11-Aug-14 A	21-Jun-16
Milestones		367	215	15-Sep-14 A	21-Jun-16
10% Design Package		30	0	11-Aug-14 A	03-Oct-14 A
30% Design Package		177	0	06-Oct-14 A	14-May-15 A
60% Design Package		17	10	15-May-15 A	17-Sep-15
95% Design Package		33	33	04-Sep-15	20-Oct-15
100% Design Package		5	5	21-Oct-15	27-Oct-15
Programming & Settings Package		92	92	18-Sep-15	25-Jan-16
PROCUREMENT EQUIPMENT		393	127	05-Aug-14 A	02-Mar-16
GSUs		393	111	05-Aug-14 A	10-Feb-16
Substation Equipment		299	127	04-Nov-14 A	02-Mar-16
CONSTRUCTION		180	180	14-Oct-15	21-Jun-16
SUBSTATION		180	180	14-Oct-15	21-Jun-16
Gen-tie / Substation Installation		12	12	12-Jul-16	27-Jul-16
Backfeed Power (Utility Workscope)		1	1	12-Jul-16	12-Jul-16
Gen-tie Connection by Power Company (Utility Workscope)		11	11	13-Jul-16	27-Jul-16
PANOCHE VALLEY SOLAR - Block 04		245	245	14-Oct-15	04-Oct-16
CONSTRUCTION		157	157	14-Oct-15	31-May-16
CIVIL WORKS		157	157	14-Oct-15	31-May-16
SITE PREPARATION		157	157	14-Oct-15	31-May-16
S1000	Site Grading - Block 04	15	15	14-Oct-15	03-Nov-15
S1010	Install Perimeter Fence - Block 04	20	20	04-Nov-15	03-Dec-15
S1020	Final Stabilization - Block 04	10	10	16-May-16	31-May-16
BLOCK 04		214	214	30-Nov-15	04-Oct-16
MECHANICAL		79	79	30-Nov-15	24-Mar-16
EQUIPMENT PADS		16	16	10-Dec-15	05-Jan-16
ELECTRICAL		108	108	16-Dec-15	20-May-16
COMMISIONING		107	107	04-May-16	04-Oct-16
COLD COMMISSIONING		23	23	04-May-16	06-Jun-16
COMMISSIONING AFTER ENERGIZE		88	88	01-Jun-16	04-Oct-16
Equipment Energization		51	51	01-Jun-16	11-Aug-16

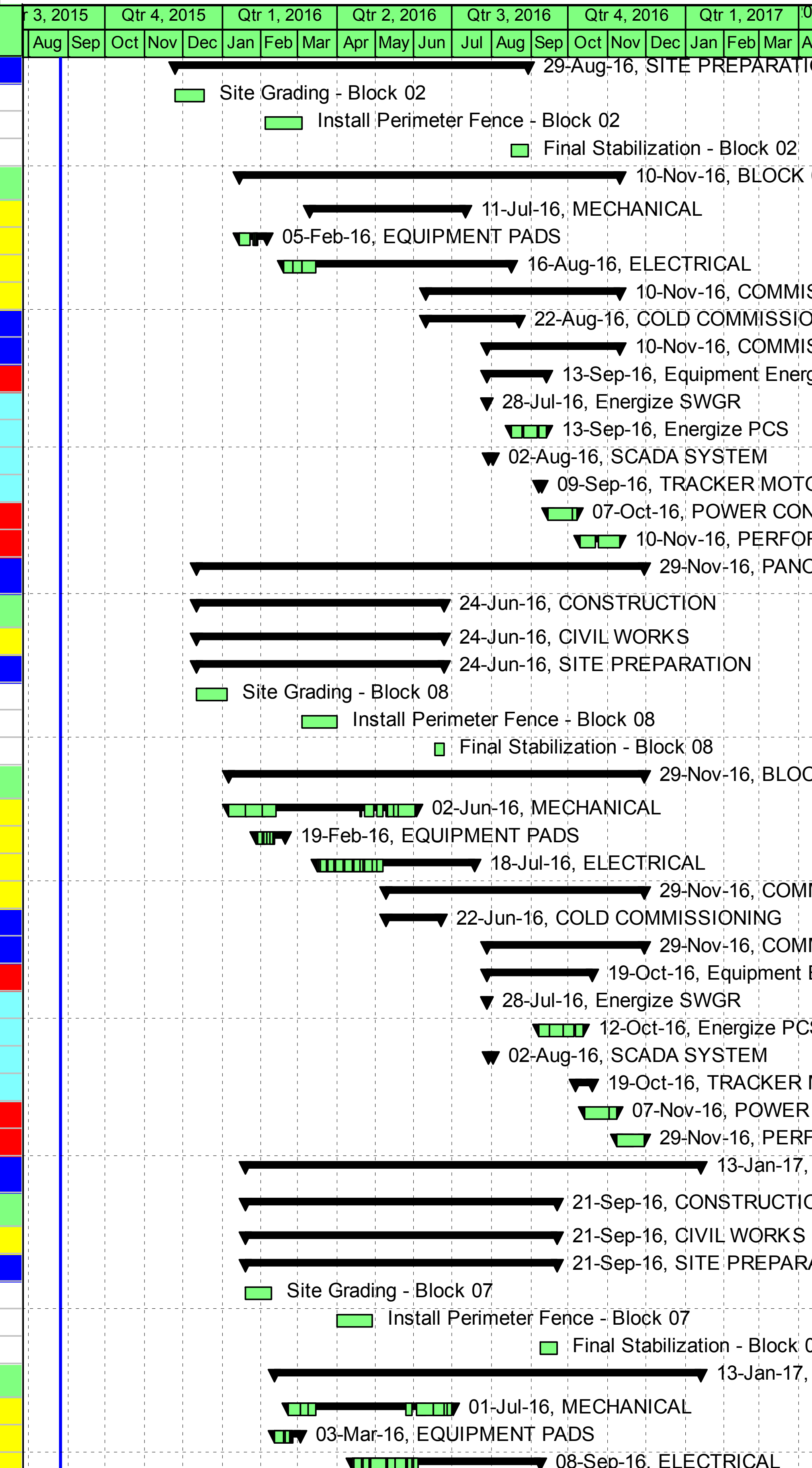


Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
Energize SWGR		1	1	28-Jul-16	28-Jul-16
Energize PCS		46	46	01-Jun-16	04-Aug-16
TRACKER MOTOR SYSTEM		10	10	29-Jul-16	11-Aug-16
SCADA SYSTEM		3	3	29-Jul-16	02-Aug-16
POWER CONDITIONING		18	18	05-Aug-16	30-Aug-16
PERFORMANCE TESTING		24	24	31-Aug-16	04-Oct-16
PANOCHE VALLEY SOLAR - Block 03		238	238	28-Oct-15	07-Oct-16
CONSTRUCTION		163	163	28-Oct-15	22-Jun-16
CIVIL WORKS		163	163	28-Oct-15	22-Jun-16
SITE PREPARATION		163	163	28-Oct-15	22-Jun-16
S1000	Site Grading - Block 03	15	15	28-Oct-15*	17-Nov-15
S1010	Install Perimeter Fence - Block 03	20	20	04-Dec-15	05-Jan-16
S1020	Final Stabilization - Block 03	10	10	09-Jun-16	22-Jun-16
BLOCK 03		217	217	30-Nov-15	07-Oct-16
MECHANICAL		78	78	11-Jan-16	29-Apr-16
EQUIPMENT PADS		13	13	30-Nov-15	16-Dec-15
ELECTRICAL		128	128	07-Dec-15	09-Jun-16
COMMISIONING		103	103	13-May-16	07-Oct-16
COLD COMMISSIONING		23	23	13-May-16	15-Jun-16
COMMISSIONING AFTER ENERGIZE		70	70	30-Jun-16	07-Oct-16
Equipment Energization		28	28	30-Jun-16	09-Aug-16
Energize SWGR		1	1	29-Jul-16	29-Jul-16
Energize PCS		28	28	30-Jun-16	09-Aug-16
SCADA SYSTEM		3	3	01-Aug-16	03-Aug-16
TRACKER MOTOR SYSTEM		3	3	01-Aug-16	03-Aug-16
POWER CONDITIONING		18	18	10-Aug-16	02-Sep-16
PERFORMANCE TESTING		24	24	06-Sep-16	07-Oct-16
PANOCHE VALLEY SOLAR - Block 01		238	238	11-Nov-15	21-Oct-16
CONSTRUCTION		177	177	11-Nov-15	27-Jul-16
CIVIL WORKS		177	177	11-Nov-15	27-Jul-16
SITE PREPARATION		177	177	11-Nov-15	27-Jul-16
S1000	Site Grading - Block 01	15	15	11-Nov-15*	03-Dec-15
S1010	Install Perimeter Fence - Block 01	20	20	06-Jan-16	03-Feb-16
S1020	Final Stabilization - Block 01	10	10	14-Jul-16	27-Jul-16
BLOCK 01		207	207	30-Dec-15	21-Oct-16
MECHANICAL		83	83	09-Feb-16	06-Jun-16
EQUIPMENT PADS		16	16	30-Dec-15	22-Jan-16
ELECTRICAL		122	122	22-Jan-16	14-Jul-16
COMMISIONING		104	104	27-May-16	21-Oct-16
COLD COMMISSIONING		35	35	27-May-16	15-Jul-16
COMMISSIONING AFTER ENERGIZE		66	66	21-Jul-16	21-Oct-16
Equipment Energization		29	29	21-Jul-16	30-Aug-16
Energize SWGR		1	1	01-Aug-16	01-Aug-16
Energize PCS		24	24	21-Jul-16	23-Aug-16
SCADA SYSTEM		3	3	02-Aug-16	04-Aug-16
TRACKER MOTOR SYSTEM		10	10	17-Aug-16	30-Aug-16
POWER CONDITIONING		18	18	24-Aug-16	19-Sep-16
PERFORMANCE TESTING		24	24	20-Sep-16	21-Oct-16
PANOCHE VALLEY SOLAR - Block 02		242	242	25-Nov-15	10-Nov-16
CONSTRUCTION		190	190	25-Nov-15	29-Aug-16
CIVIL WORKS		190	190	25-Nov-15	29-Aug-16

Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

TASK filter: All Activities

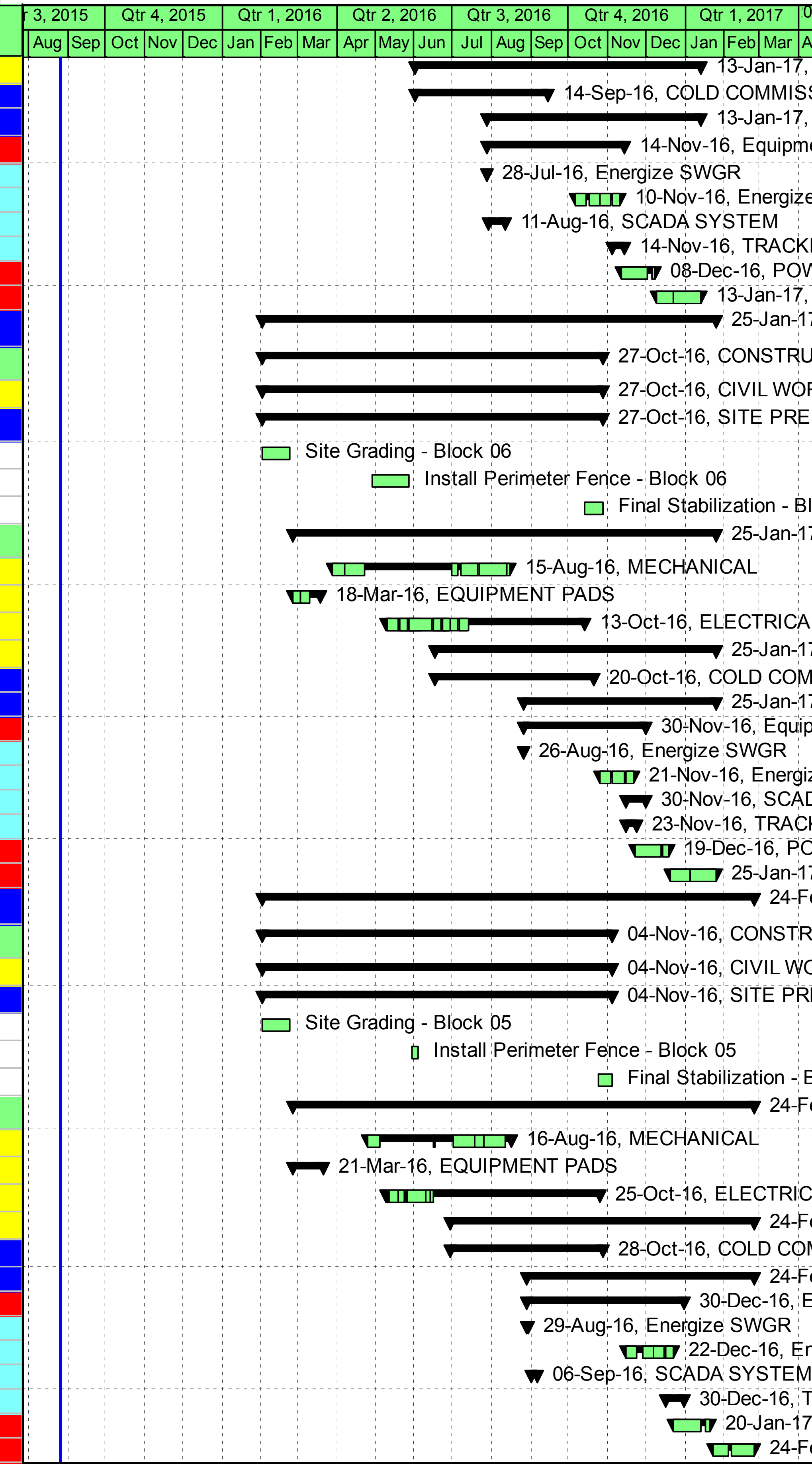
Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
SITE PREPARATION		190	190	25-Nov-15	29-Aug-16
S1000	Site Grading - Block 02	15	15	25-Nov-15*	17-Dec-15
S1010	Install Perimeter Fence - Block 02	20	20	04-Feb-16	03-Mar-16
S1020	Final Stabilization - Block 02	10	10	16-Aug-16	29-Aug-16
BLOCK 02		211	211	14-Jan-16	10-Nov-16
MECHANICAL		86	86	10-Mar-16	11-Jul-16
EQUIPMENT PADS		15	15	14-Jan-16	05-Feb-16
ELECTRICAL		127	127	18-Feb-16	16-Aug-16
COMMISIONING		108	108	10-Jun-16	10-Nov-16
COLD COMMISSIONING		51	51	10-Jun-16	22-Aug-16
COMMISSIONING AFTER ENERGIZE		75	75	28-Jul-16	10-Nov-16
Equipment Energization		33	33	28-Jul-16	13-Sep-16
Energize SWGR		1	1	28-Jul-16	28-Jul-16
Energize PCS		19	19	17-Aug-16	13-Sep-16
SCADA SYSTEM		3	3	29-Jul-16	02-Aug-16
TRACKER MOTOR SYSTEM		3	3	07-Sep-16	09-Sep-16
POWER CONDITIONING		18	18	14-Sep-16	07-Oct-16
PERFORMANCE TESTING		24	24	10-Oct-16	10-Nov-16
PANOCHE VALLEY SOLAR - Block 08		243	243	11-Dec-15	29-Nov-16
CONSTRUCTION		135	135	11-Dec-15	24-Jun-16
CIVIL WORKS		135	135	11-Dec-15	24-Jun-16
SITE PREPARATION		135	135	11-Dec-15	24-Jun-16
S1000	Site Grading - Block 08	15	15	11-Dec-15	05-Jan-16
S1010	Install Perimeter Fence - Block 08	20	20	04-Mar-16	31-Mar-16
S1020	Final Stabilization - Block 08	5	5	17-Jun-16	24-Jun-16
BLOCK 08		228	228	06-Jan-16	29-Nov-16
MECHANICAL		104	104	06-Jan-16	02-Jun-16
EQUIPMENT PADS		15	15	28-Jan-16	19-Feb-16
ELECTRICAL		87	87	16-Mar-16	18-Jul-16
COMMISIONING		142	142	09-May-16	29-Nov-16
COLD COMMISSIONING		32	32	09-May-16	22-Jun-16
COMMISSIONING AFTER ENERGIZE		86	86	28-Jul-16	29-Nov-16
Equipment Energization		59	59	28-Jul-16	19-Oct-16
Energize SWGR		1	1	28-Jul-16	28-Jul-16
Energize PCS		26	26	07-Sep-16	12-Oct-16
SCADA SYSTEM		3	3	29-Jul-16	02-Aug-16
TRACKER MOTOR SYSTEM		10	10	06-Oct-16	19-Oct-16
POWER CONDITIONING		18	18	13-Oct-16	07-Nov-16
PERFORMANCE TESTING		14	14	08-Nov-16	29-Nov-16
PANOCHE VALLEY SOLAR - Block 07		251	251	19-Jan-16	13-Jan-17
CONSTRUCTION		173	173	19-Jan-16	21-Sep-16
CIVIL WORKS		173	173	19-Jan-16	21-Sep-16
SITE PREPARATION		173	173	19-Jan-16	21-Sep-16
S1000	Site Grading - Block 07	15	15	19-Jan-16*	08-Feb-16
S1010	Install Perimeter Fence - Block 07	20	20	01-Apr-16	28-Apr-16
S1020	Final Stabilization - Block 07	10	10	08-Sep-16	21-Sep-16
BLOCK 07		234	234	11-Feb-16	13-Jan-17
MECHANICAL		94	94	22-Feb-16	01-Jul-16
EQUIPMENT PADS		14	14	11-Feb-16	03-Mar-16
ELECTRICAL		104	104	13-Apr-16	08-Sep-16



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

TASK filter: All Activities

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
COMMISIONING		157	157	01-Jun-16	13-Jan-17
COLD COMMISSIONING		74	74	01-Jun-16	14-Sep-16
COMMISSIONING AFTER ENERGIZE		117	117	28-Jul-16	13-Jan-17
Equipment Energization		77	77	28-Jul-16	14-Nov-16
Energize SWGR		1	1	28-Jul-16	28-Jul-16
Energize PCS		26	26	06-Oct-16	10-Nov-16
SCADA SYSTEM		10	10	29-Jul-16	11-Aug-16
TRACKER MOTOR SYSTEM		7	7	04-Nov-16	14-Nov-16
POWER CONDITIONING		18	18	11-Nov-16	08-Dec-16
PERFORMANCE TESTING		24	24	09-Dec-16	13-Jan-17
PANOCHE VALLEY SOLAR - Block 06		248	248	02-Feb-16	25-Jan-17
CONSTRUCTION		189	189	02-Feb-16	27-Oct-16
CIVIL WORKS		189	189	02-Feb-16	27-Oct-16
SITE PREPARATION		189	189	02-Feb-16	27-Oct-16
S1000	Site Grading - Block 06	15	15	02-Feb-16	23-Feb-16
S1010	Install Perimeter Fence - Block 06	20	20	29-Apr-16	27-May-16
S1020	Final Stabilization - Block 06	10	10	14-Oct-16	27-Oct-16
BLOCK 06		232	232	25-Feb-16	25-Jan-17
MECHANICAL		99	99	28-Mar-16	15-Aug-16
EQUIPMENT PADS		16	16	25-Feb-16	18-Mar-16
ELECTRICAL		111	111	09-May-16	13-Oct-16
COMMISIONING		152	152	17-Jun-16	25-Jan-17
COLD COMMISSIONING		88	88	17-Jun-16	20-Oct-16
COMMISSIONING AFTER ENERGIZE		103	103	26-Aug-16	25-Jan-17
Equipment Energization		66	66	26-Aug-16	30-Nov-16
Energize SWGR		1	1	26-Aug-16	26-Aug-16
Energize PCS		19	19	26-Oct-16	21-Nov-16
SCADA SYSTEM		10	10	15-Nov-16	30-Nov-16
TRACKER MOTOR SYSTEM		7	7	15-Nov-16	23-Nov-16
POWER CONDITIONING		18	18	22-Nov-16	19-Dec-16
PERFORMANCE TESTING		24	24	20-Dec-16	25-Jan-17
PANOCHE VALLEY SOLAR - Block 05		269	269	02-Feb-16	24-Feb-17
CONSTRUCTION		195	195	02-Feb-16	04-Nov-16
CIVIL WORKS		195	195	02-Feb-16	04-Nov-16
SITE PREPARATION		195	195	02-Feb-16	04-Nov-16
S1000	Site Grading - Block 05	15	15	02-Feb-16	23-Feb-16
S1010	Install Perimeter Fence - Block 05	5	5	30-May-16	03-Jun-16
S1020	Final Stabilization - Block 05	10	10	24-Oct-16	04-Nov-16
BLOCK 05		253	253	25-Feb-16	24-Feb-17
MECHANICAL		80	80	25-Apr-16	16-Aug-16
EQUIPMENT PADS		18	18	25-Feb-16	21-Mar-16
ELECTRICAL		119	119	09-May-16	25-Oct-16
COMMISIONING		165	165	29-Jun-16	24-Feb-17
COLD COMMISSIONING		86	86	29-Jun-16	28-Oct-16
COMMISSIONING AFTER ENERGIZE		123	123	29-Aug-16	24-Feb-17
Equipment Energization		86	86	29-Aug-16	30-Dec-16
Energize SWGR		1	1	29-Aug-16	29-Aug-16
Energize PCS		26	26	15-Nov-16	22-Dec-16
SCADA SYSTEM		3	3	01-Sep-16	06-Sep-16
TRACKER MOTOR SYSTEM		10	10	16-Dec-16	30-Dec-16
POWER CONDITIONING		18	18	23-Dec-16	20-Jan-17
PERFORMANCE TESTING		24	24	23-Jan-17	24-Feb-17



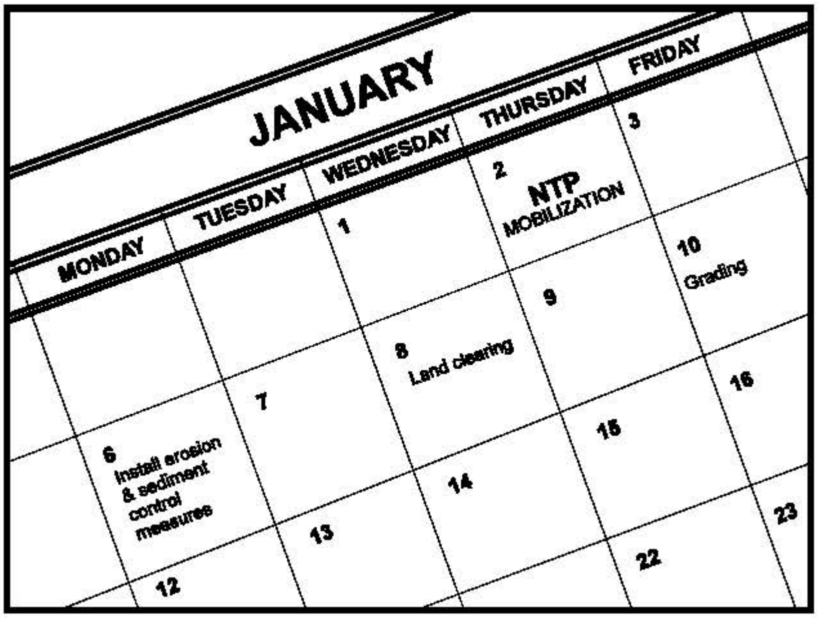
Appendix G: Construction Activities, Materials Used, and Associated Pollutants

Table G.1 Construction Activities and Associated Pollutants

Phase	Activity	Associated Materials or Pollutants	Pollutant Category[1]
Grading and Land Development	Clearing and Grubbing		Sediment
	Earthwork		Sediment
	Underground Electrical Installation		Sediment
	Vehicle & Equipment Use	• Equipment operation • Equipment maintenance • Equipment washing • Equipment fueling	Oil & Grease
Streets and Utilities Phase	Asphalt paving/curbs	• Hot mix asphalt	Oil and Grease
Vertical Construction Phase	Sanitary Wastes	• Portable toilets	Nutrients
	Concrete Work	• Concrete curing compounds	Metals, Synthetic Organics
	Solid waste	• Litter, trash and debris • Vegetation	Gross Pollutants
Landscaping and Site Stabilization Phase	Soil preparation/amendments	• Use of soil additives/amendments	Nutrients
Building Construction	Drywall	• Saw-cutting drywall	Metals
	Framing/Carpentry	• Sawdust, particle board dust, and treated woods • Saw cut slurries	Metals, Synthetic Organics
	Heating, Ventilation, Air Conditioning	• Demolition or construction of air condition and heating systems	Metals, Synthetic Organics
	Insulation	• Demolition or construction involving insulation, venting systems	Metals, Synthetic Organics
	Liquid waste	• Wash waters • Irrigation line testing/flushing	Metals, Synthetic Organics
	Painting	• Paint thinners, acetone, methyl ethyl ketone, stripper paints, lacquers, varnish, enamels, turpentine, gum spirit, solvents, dyes, stripping, pigments and sanding	Metals, Synthetic Organics
	Roofing	• Flashing • Shingle scrap and debris	Metals, Oil and Grease, Synthetic Organics

(1) Categories per CASQA BMP Handbook (i.e., Sediment, Nutrients, Bacteria and Viruses, Oil and Grease, Metals, Synthetic Organics, Pesticides, Gross Pollutants, and Vector Production)

Appendix H: CASQA Stormwater BMP Handbook Portal: Construction Fact Sheets



Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	☒
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.

- Plan the project and develop a schedule showing each phase

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of construction. Clearly show how the rainy season relates to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
  - Erosion control BMPs
  - Sediment control BMPs
  - Tracking control BMPs
  - Wind erosion control BMPs
  - Non-stormwater BMPs
  - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
  - Sequence trenching activities so that most open portions are closed before new trenching begins.
  - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
  - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Inspection and Maintenance

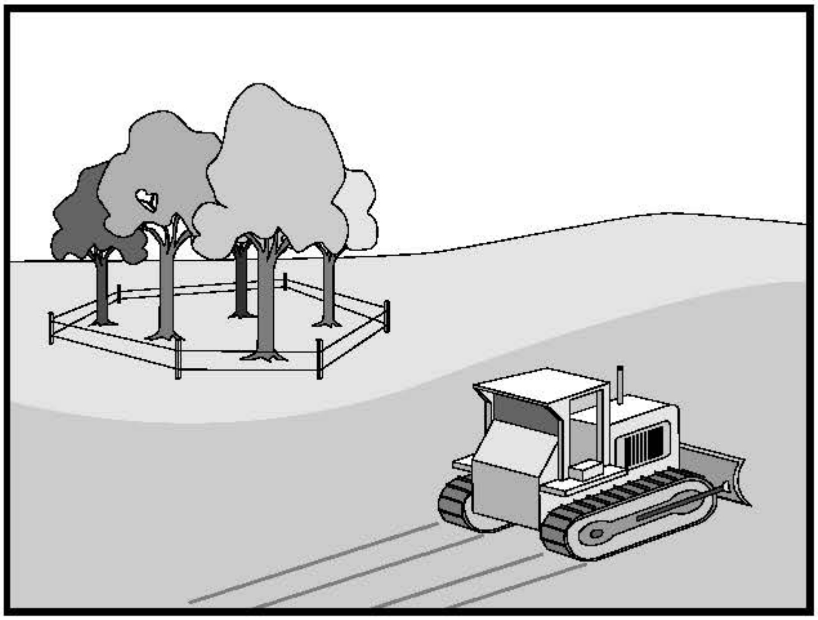
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Preservation Of Existing Vegetation EC-2



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.

- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.

- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.

  – Orange colored plastic mesh fencing works well.

  – Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.

- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.

- Consider the impact of grade changes to existing vegetation and the root zone.

- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.

- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of $10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar, and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.
- Fertilization
  - Fertilize stressed or damaged broadleaf trees to aid recovery.
  - Fertilize trees in the late fall or early spring.

- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.

- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

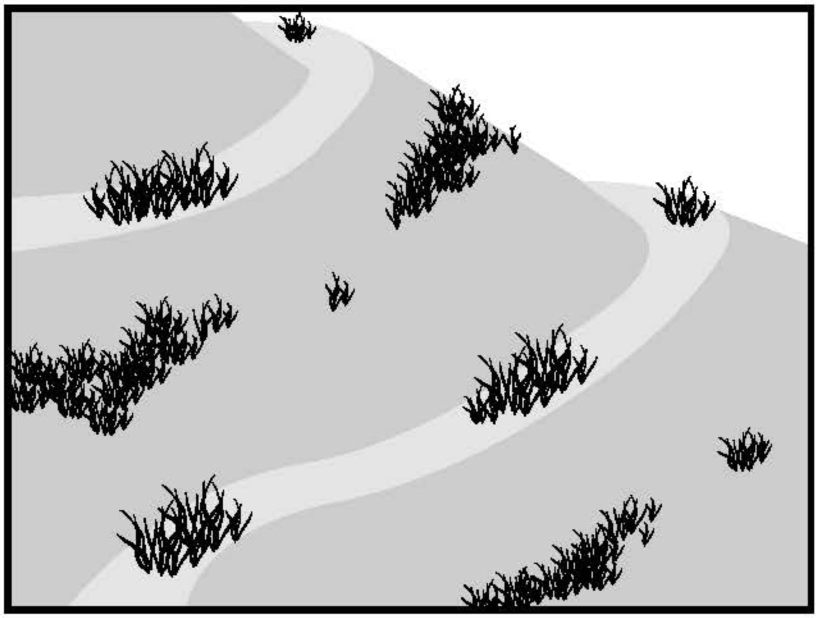
References

County of Sacramento Tree Preservation Ordinance, September 1981.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

EC-14 Compost Blanket

EC-16 Non-Vegetative Stabilization

Description and Purpose

Hydroseeding typically consists of applying a mixture of a hydraulic mulch, seed, fertilizer, and stabilizing emulsion with a hydraulic mulcher, to temporarily protect exposed soils from erosion by water and wind. Hydraulic seeding, or hydroseeding, is simply the method by which temporary or permanent seed is applied to the soil surface.

Suitable Applications

Hydroseeding is suitable for disturbed areas requiring temporary protection until permanent stabilization is established, for disturbed areas that will be re-disturbed following an extended period of inactivity, or to apply permanent stabilization measures. Hydroseeding without mulch or other cover (e.g. EC-7, Erosion Control Blanket) is not a stand-alone erosion control BMP and should be combined with additional measures until vegetation establishment.

Typical applications for hydroseeding include:

- Disturbed soil/graded areas where permanent stabilization or continued earthwork is not anticipated prior to seed germination.
- Cleared and graded areas exposed to seasonal rains or temporary irrigation.
- Areas not subject to heavy wear by construction equipment or high traffic.

Limitations

- Availability of hydroseeding equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Hydraulic seed should be applied with hydraulic mulch or a stand-alone hydroseed application should be followed by one of the following:
  - Straw mulch (see Straw Mulch EC-6)
  - Rolled erosion control products (see Geotextiles and Mats EC-7)
  - Application of Compost Blanket (see Compost Blanket EC-14)

  Hydraulic seed may be used alone only on small flat surfaces when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control.
- Hydraulic seed without mulch does not provide immediate erosion control.
- Temporary seeding may not be appropriate for steep slopes (i.e., slopes readily prone to rill erosion or without sufficient topsoil).
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation may not be appropriate for short term inactivity (i.e. less than 3-6 months).

Implementation

In order to select appropriate hydraulic seed mixtures, an evaluation of site conditions should be performed with respect to:

- Soil conditions
- Site topography and exposure (sun/wind)
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is an excellent source of information on appropriate seed mixes.

The following steps should be followed for implementation:

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying (See EC-15, Soil Preparation) the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.

- Avoid use of hydraulic seed in areas where the BMP would be incompatible with future earthwork activities.
- Hydraulic seed can be applied using a multiple step or one step process.
  - In a multiple step process, hydraulic seed is applied first, followed by mulch or a Rolled Erosion Control Product (RECP).
  - In the one step process, hydraulic seed is applied with hydraulic mulch in a hydraulic matrix. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate should be increased to compensate for all seeds not having direct contact with the soil.
- All hydraulically seeded areas should have mulch, or alternate erosion control cover to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds should be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag should be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container should be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed should be pellet inoculated. Inoculant sources should be species specific and should be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer should conform to the requirements of the California Food and Agricultural Code, which can be found at http://www.leginfo.ca.gov/.html/fac_table_of_contents.html. Fertilizer should be pelleted or granular form.
- Follow up applications should be made as needed to cover areas of poor coverage or germination/vegetation establishment and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Costs

Average cost for installation and maintenance may vary from as low as $1,900 per acre for flat slopes and stable soils, to $4,000 per acre for moderate to steep slopes and/or erosive soils. Cost of seed mixtures vary based on types of required vegetation.

BMP	Installed Cost per Acre
Hydraulic Seed	$1,900-$4,000

Source: Caltrans Soil Stabilization BMP Research for Erosion and Sediment Controls, July 2007

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.

- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.

- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

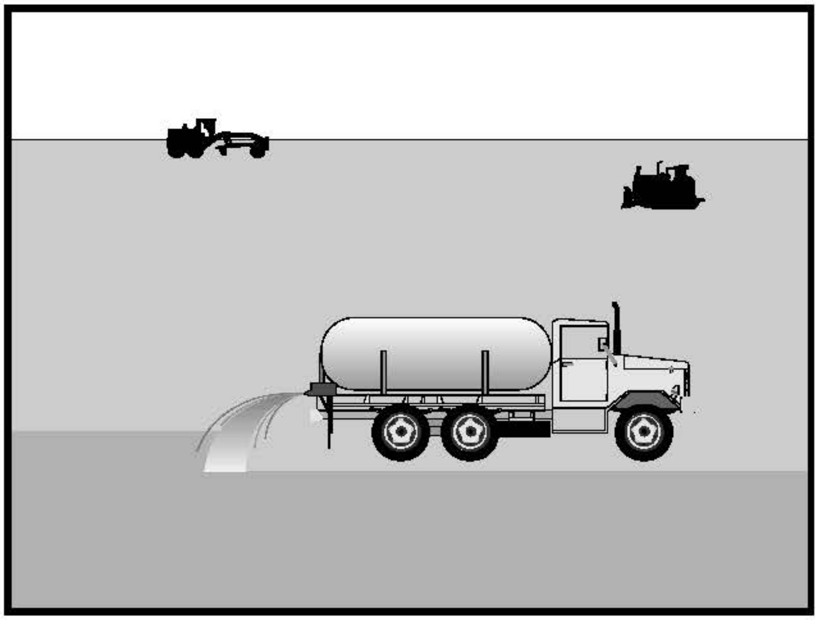
References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Soil Binders EC-5



Categories		
EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

Description and Purpose

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring temporary protection. Because soil binders, when used as a stand-alone practice, can often be incorporated into the soil, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are commonly used in the following areas:

- Rough graded soils that will be inactive for a short period of time
- Soil stockpiles
- Temporary haul roads prior to placement of crushed rock
- Compacted soil road base
- Construction staging, materials storage, and layout areas

Limitations

- Soil binders are temporary in nature and may need reapplication.

- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time may be 24 hours or longer. Soil binders may need reapplication after a storm event.

- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.

- Plant-material-based soil binders do not generally hold up to pedestrian or vehicular traffic across treated areas as well as polymeric emulsion blends or cementitious-based binders.

- Soil binders may not sufficiently penetrate compacted soils.

- Some soil binders are soil texture specific in terms of their effectiveness. For example, polyacrylamides (PAMs) work very well on silt and clayey soils but their performance decreases dramatically in sandy soils.

- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.

- Soil binders may not cure if low temperatures occur within 24 hours of application.

- The water quality impacts of some chemical soil binders are relatively unknown and some may have water quality impacts due to their chemical makeup.

Implementation

General Considerations

- Soil binders should conform to local municipality specifications and requirements.

- Site soil types will dictate appropriate soil binders to be used.

- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater when cured. Obtain a Material Safety Data Sheet (MSDS) from the manufacturer to ensure non-toxicity.

- Stormwater runoff from PAM treated soils should pass through one of the following sediment control BMP prior to discharging to surface waters.

  - When the total drainage area is greater than or equal to 5 acres, PAM treated areas should drain to a sediment basin.

  - Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a series of check dams. The total number of check dams used should be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam should be spaced evenly in the drainage channel through which stormwater flows are discharged off site.

- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.

- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this Fact Sheet. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application - The frequency of application is related to the functional longevity of the binder, which can be affected by subgrade conditions, surface type, climate, and maintenance schedule.
- Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean up.

Plant-Material-Based (Short Lived, <6 months) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	40	45	50	60	70

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together, but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

Plant-Material-Based (Long Lived, 6-12 months) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and should be applied as follows:

- For clayey soil: 5 parts water to 1 part emulsion
- For sandy soil: 10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound typically requires 12 to 24 hours drying time. Liquid copolymer should be diluted at a rate of 10 parts water to 1 part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with the manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:1 to 1:1	10.0 – 20.0

Poly-Acrylamide (PAM) and Copolymer of Acrylamide: Linear copolymer polyacrylamide for use as a soil binder is packaged as a dry flowable solid, as a liquid. Refer to the manufacturer's recommendation for dilution and application rates as they vary based on liquid or dry form, site conditions and climate.

- Limitations specific to PAM are as follows:

- Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.

- The specific PAM copolymer formulation must be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications.

- PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked".

- PAM should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

Gypsum: This is a formulated gypsum based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps should be followed:

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.

- Prior to application, roughen embankment and fill areas.

- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.

- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.

- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 40°F during the curing period.

- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.

- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.

- For liquid agents:
  - Crown or slope ground to avoid ponding.
  - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd² or according to manufacturer's recommendations.
  - Apply solution under pressure. Overlap solution 6 to 12 in.
  - Allow treated area to cure for the time recommended by the manufacturer; typically at least 24 hours.
  - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
  - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd².

Costs
Costs vary according to the soil stabilizer selected for implementation. The following are approximate installed costs:

Soil Binder	Cost per Acre (2000)[1]	Estimated Cost per Acre (2009)[2]
Plant-Material-Based (Short Lived) Binders	$700-$900	$770-$990
Plant-Material-Based (Long Lived) Binders	$1,200-$1,500	$1,320-$1,650
Polymeric Emulsion Blend Binders	$700 -$1,500	$770-$1,650
Cementitious-Based Binders	$800-$1,200	$880-$1,350

1. Source: Erosion Control Pilot Study Report, Caltrans, June 2000.

2. 2009 costs reflect a 10% escalation over year 2000 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Reapply the selected soil binder as needed to maintain effectiveness.

Table 1 Properties of Soil Binders for Erosion Control				
Evaluation Criteria	**Binder Type**			
	Plant Material Based (Short Lived)	**Plant Material Based (Long Lived)**	**Polymeric Emulsion Blends**	**Cementitious-Based Binders**
Relative Cost	Low	Moderate to High	Low to High	Low to Moderate
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies (1)	Varies (1)	Varies (1)	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

References

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

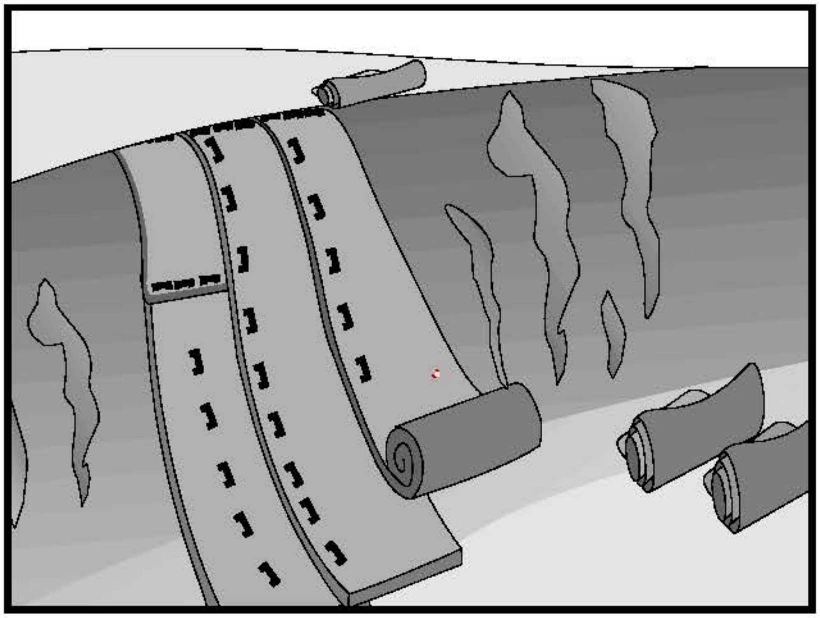
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Categories		
EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

Description and Purpose

Mattings, or Rolled Erosion Control Products (RECPs), can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high and vegetation will be slow to establish. Mattings are also used on stream banks, swales and other drainage channels where moving water at velocities between 3 ft/s and 6 ft/s are likely to cause scour and wash out new vegetation, and in areas where the soil surface is disturbed and where existing vegetation has been removed. RECPs may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). RECPs should be considered when the soils are fine grained and potentially erosive. RECPs should be considered in the following situations.

- Steep slopes, generally steeper than 3:1 (H:V)
- Slopes where the erosion potential is high
- Slopes and disturbed soils where mulch must be anchored
- Disturbed areas where plants are slow to develop

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- Channels with flows exceeding 3.3 ft/s
- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies

Limitations

- RECP installed costs are generally higher than other erosion control BMPs, limiting their use to areas where other BMPs are ineffective (e.g. channels, steep slopes).
- RECPs may delay seed germination, due to reduction in soil temperature.
- RECPs are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers). If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- The use of plastic should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until more environmentally friendly measures, such as seeding and mulching, may be installed.
  - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
  - Plastic sheeting results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting.
- RECPs may have limitations in extremely windy climates. However, when RECPs are properly trenched at the top and bottom and stapled in accordance with the manufacturer's recommendations, problems with wind can be minimized.

Implementation

Material Selection

- Natural RECPs have been found to be effective where re-vegetation will be provided by re-seeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

- The following natural and synthetic RECPs are commonly used:

Geotextiles

- Material can be a woven or a non-woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Geotextiles may be reused if they are suitable for the use intended.

Plastic Covers

- Generally plastic sheeting should only be used as stockpile covering or for very small graded areas for short periods of time (such as through one imminent storm event). If plastic sheeting must be used, choose a plastic that will withstand photo degradation.

- Plastic sheeting should have a minimum thickness of 6 mils, and must be keyed in at the top of slope (when used as a temporary slope protection) and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil (when used as a temporary slope protection).

- All sheeting must be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures must be repaired immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats

- Biodegradable RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable. See typical installation details at the end of this fact sheet.

- **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd^2, ±10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd^2. Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5 lb/yd^2. Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd^2. Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

■ Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.

- **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than ¼ in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Bonded synthetic fibers** consist of a three dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90 percent open area, which facilitates root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil Roughening is not recommended in areas where RECPs will be installed.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

Seeding/Planting

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all areas disturbed during blanket installation must be re-seeded. Where soil filling is specified for turf reinforcement mats (TRMs), seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Check Slots

Check slots shall be installed as required by the manufacturer.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the seedbed should be friable, made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations.
- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft (or greater, per manufacturer's specifications).
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd^2. Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 ½ staples/yd^2. Check manufacturer's specifications to determine if a higher density staple pattern is required.

Installation in Channels

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.
- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.

- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.
- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.
- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement mat (TRM))

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake ½-3/4 inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling just exposing top netting of mat.

Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Installed costs can be relatively high compared to other BMPs. Approximate costs for installed materials are shown below:

Rolled Erosion Control Products		Installed Cost per Acre (2000)[1]	Estimated Cost per Acre (2009)[2]
Biodegradable	Jute Mesh	$6,000-$7,000	$6,600-$7,700
	Curled Wood Fiber	$8,000-$10,500	$8,800-$11,050
	Straw	$8,000-$10,500	$8,800-$11,050
	Wood Fiber	$8,000-$10,500	$8,800-$11,050
	Coconut Fiber	$13,000-$14,000	$14,300-$15,400
	Coconut Fiber Mesh	$30,000-$33,000	$33,000-$36,300
	Straw Coconut Fiber	$10,000-$12,000	$11,000-$13,200
Non-Biodegradable	Plastic Netting	$2,000-$2,200	$2,200-$2,220
	Plastic Mesh	$3,000-$3,500	$3,300-$3,850
	Synthetic Fiber with Netting	$34,000-$40,000	$37,400-$44,000
	Bonded Synthetic Fibers	$45,000-$55,000	$49,500-$60,500
	Combination with Biodegradable	$30,000-$36,000	$33,000-$39,600

1. Source: Erosion Control Pilot Study Report, Caltrans, June 2000.
2. 2009 costs reflect a 10% escalation over year 2000 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance

- RECPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.

References

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

Guides for Erosion and Sediment Controls in California, USDA Soils Conservation Service, January 1991.

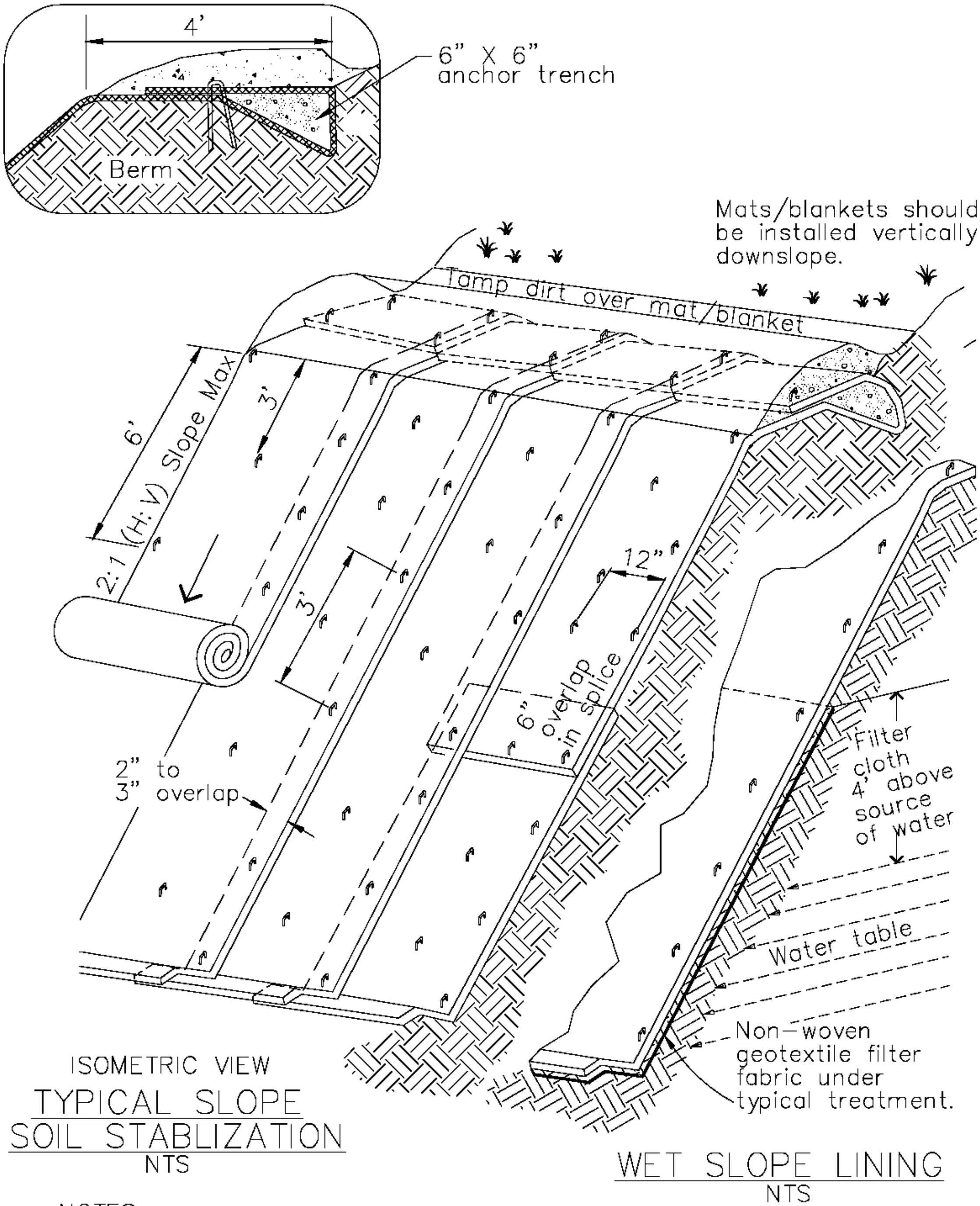
National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

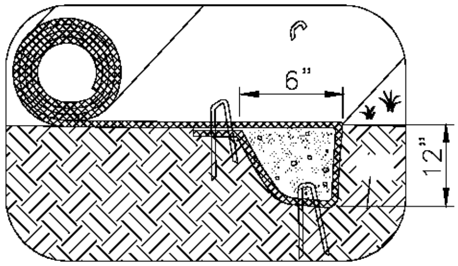
Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



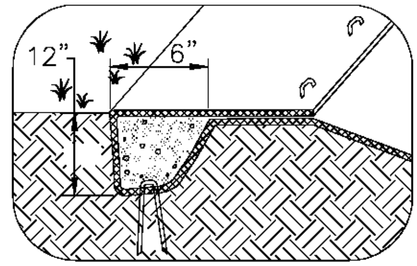
NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

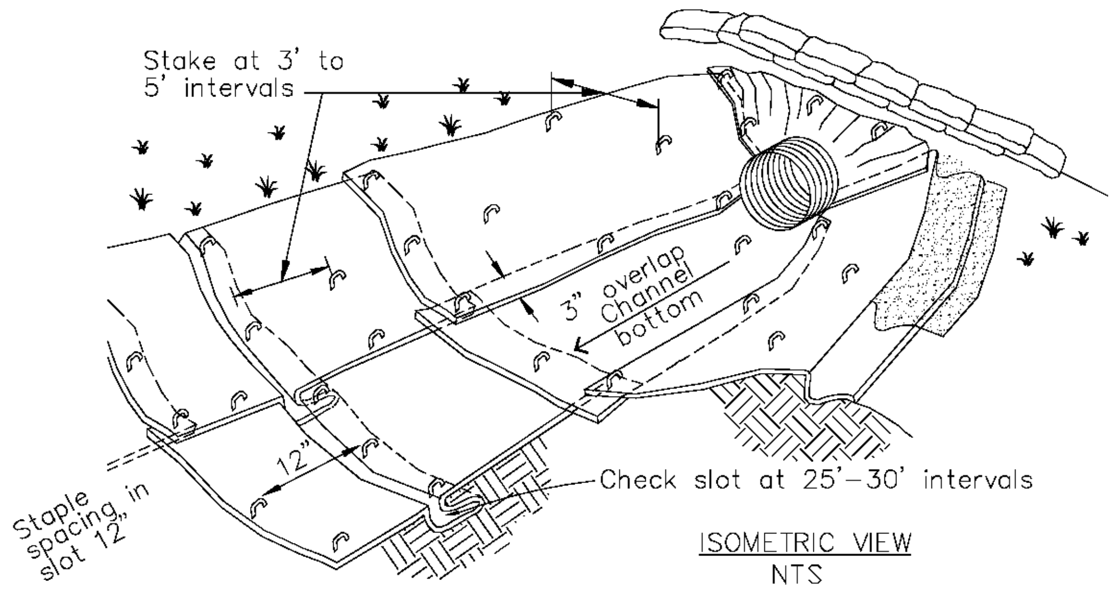
TYPICAL INSTALLATION DETAIL



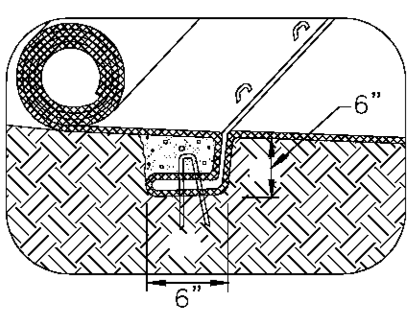
INITIAL CHANNEL ANCHOR TRENCH
NTS



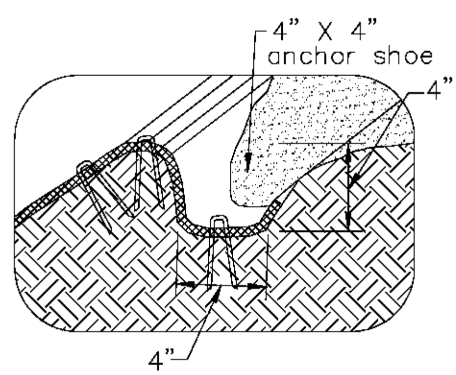
TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH
NTS



ISOMETRIC VIEW
NTS



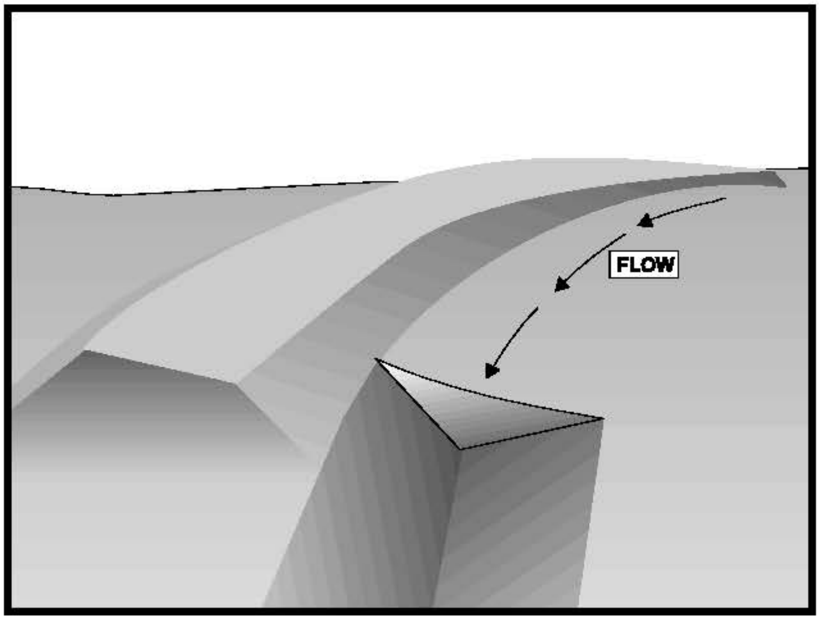
INTERMITTENT CHECK SLOT
NTS



LONGITUDINAL ANCHOR TRENCH
NTS

NOTES:
1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
  - To convey surface runoff down sloping land
  - To intercept and divert runoff to avoid sheet flow over sloped surfaces
  - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
  - To intercept runoff from paved surfaces
  - Below steep grades where runoff begins to concentrate
  - Along roadways and facility improvements subject to flood drainage

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- At the top of slopes to divert runon from adjacent or undisturbed slopes

- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows

- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations, and should not be used in areas with slopes steeper than 10%.

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin

(SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.

- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 percent, but not more than 15 percent.
- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.

- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 percent, and use rip-rap or sod for swales with a slope between 5 and 15 percent. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from $15 to $55 per ft for both earthwork and stabilization and depends on availability of material, site location, and access.
- Small dikes: $2.50 - $6.50/linear ft; Large dikes: $2.50/yd^3.
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

References

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursetynsky, P.E., McGraw Hill Book Company, 1986.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

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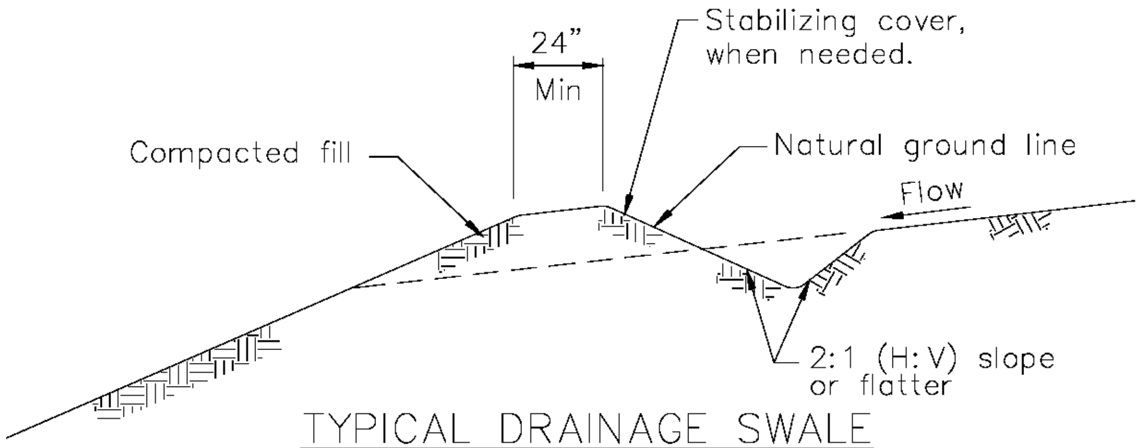
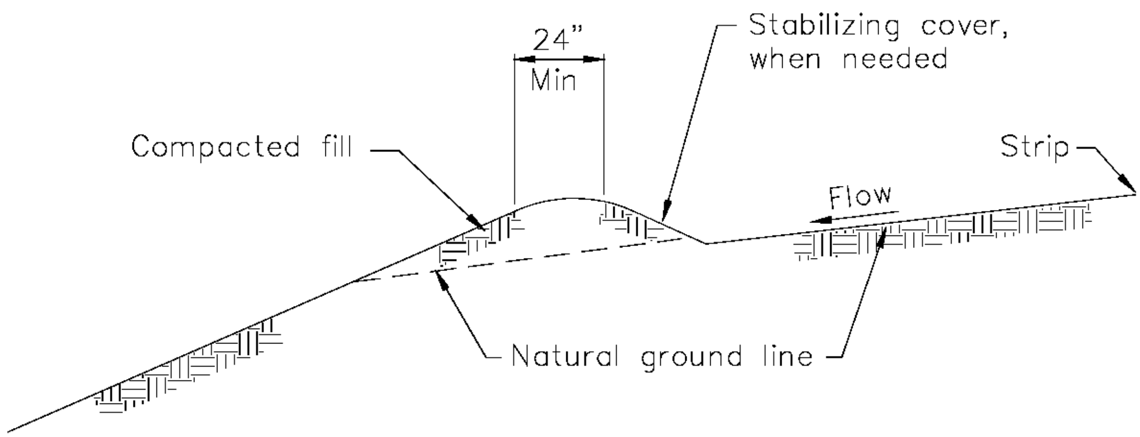


TYPICAL DRAINAGE SWALE

NOT TO SCALE

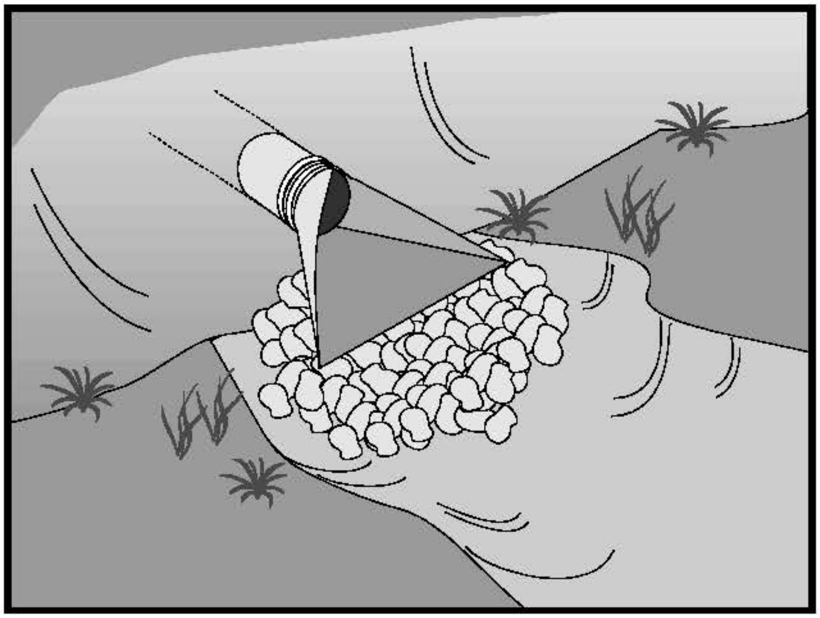
NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



TYPICAL EARTH DIKE

NOT TO SCALE



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble, which is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Suitable Applications

Whenever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This includes temporary diversion structures to divert runon during construction.

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances

Limitations

- Large storms or high flows can wash away the rock outlet protection and leave the area susceptible to erosion.

- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in velocity dissipation devices.

Implementation

General

Outlet protection is needed where discharge velocities and energies at the outlets of culverts, conduits or channels are sufficient to erode the immediate downstream reach. This practice protects the outlet from developing small eroded pools (plange pools), and protects against gully erosion resulting from scouring at a culvert mouth.

Design and Layout

As with most channel design projects, depth of flow, roughness, gradient, side slopes, discharge rate, and velocity should be considered in the outlet design. Compliance to local and state regulations should also be considered while working in environmentally sensitive streambeds. General recommendations for rock size and length of outlet protection mat are shown in the rock outlet protection figure in this BMP and should be considered minimums. The apron length and rock size gradation are determined using a combination of the discharge pipe diameter and estimate discharge rate: Select the longest apron length and largest rock size suggested by the pipe size and discharge rate. Where flows are conveyed in open channels such as ditches and swales, use the estimated discharge rate for selecting the apron length and rock size. Flows should be same as the culvert or channel design flow but never the less than the peak 5 year flow for temporary structures planned for one rainy season, or the 10 year peak flow for temporary structures planned for two or three rainy seasons.

- There are many types of energy dissipaters, with rock being the one that is represented in the attached figure.
- Best results are obtained when sound, durable, and angular rock is used.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction. Grouted or wired tied rock riprap can minimize maintenance requirements.
- Rock outlet protection is usually less expensive and easier to install than concrete aprons or energy dissipaters. It also serves to trap sediment and reduce flow velocities.
- Carefully place riprap to avoid damaging the filter fabric.

- Stone 4 in. to 6 in. may be carefully dumped onto filter fabric from a height not to exceed 12 in.

- Stone 8 in. to 12 in. must be hand placed onto filter fabric, or the filter fabric may be covered with 4 in. of gravel and the 8 in. to 12 in. rock may be dumped from a height not to exceed 16 in.

- Stone greater than 12 in. shall only be dumped onto filter fabric protected with a layer of gravel with a thickness equal to one half the D_{50} rock size, and the dump height limited to twice the depth of the gravel protection layer thickness.

- For proper operation of apron: Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.

- Outlets on slopes steeper than 10 percent should have additional protection.

Costs

Costs are low if material is readily available. If material is imported, costs will be higher. Average installed cost is $150 per device.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.

- Inspect apron for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. If riprap continues to wash away, consider using larger material.

- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.

- Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

References

County of Sacramento Improvement Standards, Sacramento County, May 1989.

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursztynsky, P.E., McGraw Hill Book Company, 1986.

Handbook of Steel Drainage & Highway Construction, American Iron and Steel Institute, 1983.

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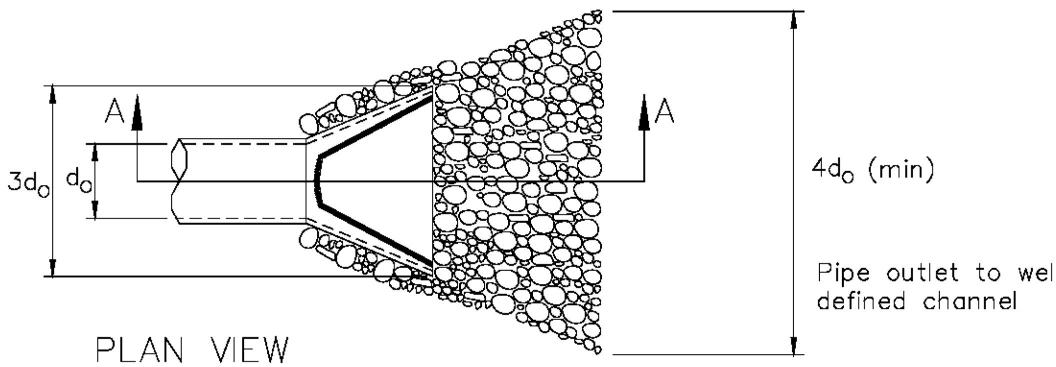
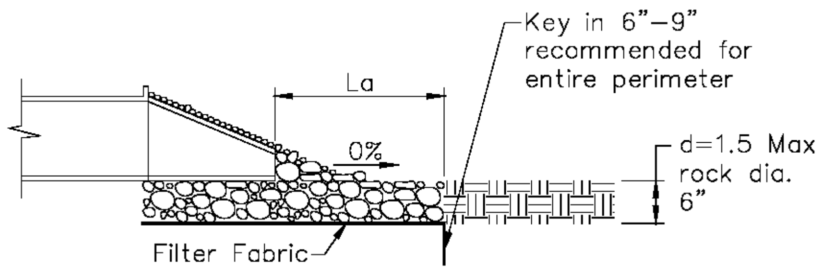


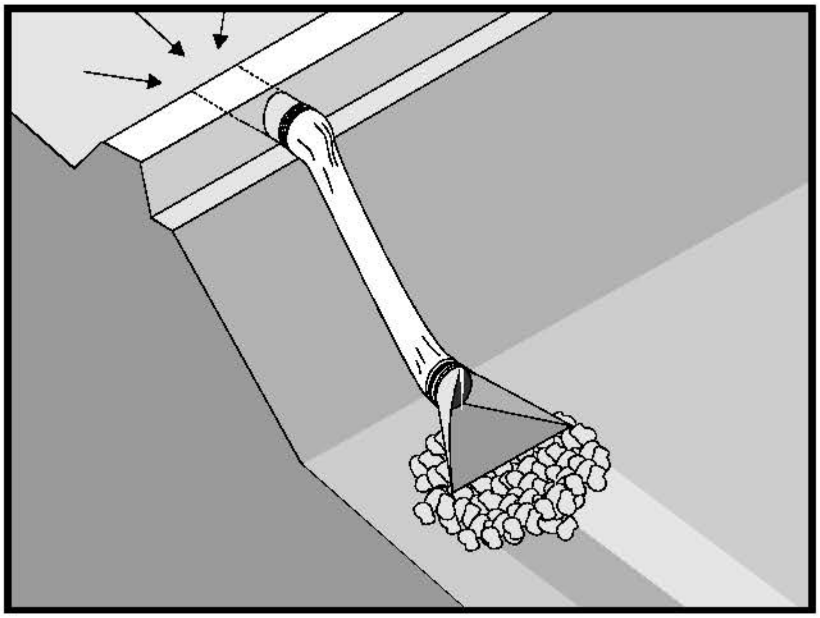
PLAN VIEW



SECTION A–A

Pipe Diameter inches	Discharge ft³/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS



Categories

EC	Erosion Control	☑
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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-9 Earth Dike, Drainage Swales

Description and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Suitable Applications

- Where concentrated flow of surface runoff must be conveyed down a slope in order to prevent erosion.
- Drainage for top of slope diversion dikes or swales.
- Drainage for top of cut and fill slopes where water can accumulate.
- Emergency spillway for a sediment basin.

Limitations

Installation is critical for effective use of the pipe slope drain to minimize potential gully erosion.

- Maximum drainage area per slope drain is 10 acres. (For large areas use a paved chute, rock lined channel, or additional pipes.)
- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.
  - During large storms, pipe slope drains may become clogged or over charged, forcing water around the pipe

and causing extreme slope erosion.

- If the sectional downdrain is not sized correctly, the runoff can spill over the drain sides causing gully erosion and potential failure of the structure.

- Dissipation of high flow velocities at the pipe outlet is required to avoid downstream erosion.

- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in energy dissipaters associated with slope drain outlets.

Implementation

General

The slope drain is applicable for any construction site where concentrated surface runoff can accumulate and must be conveyed down the slope in order to prevent erosion. The slope drain is effective because it prevents the stormwater from flowing directly down the slope by confining all the runoff into an enclosed pipe or channel. Due to the time lag between grading slopes and installation of permanent stormwater collection systems and slope stabilization measures, temporary provisions to intercept runoff are sometimes necessary. Particularly in steep terrain, slope drains can protect unstabilized areas from erosion.

Installation

The slope drain may be a rigid pipe, such as corrugated metal, a flexible conduit, or a lined terrace drain with the inlet placed on the top of a slope and the outlet at the bottom of the slope. This BMP typically is used in combination with a diversion control, such as an earth dike or drainage swale at the top of the slope.

The following criteria must be considered when siting slope drains.

- Permanent structures included in the project plans can often serve as construction BMPs if implemented early. However, the permanent structure must meet or exceed the criteria for the temporary structure.

- Inlet structures must be securely entrenched and compacted to avoid severe gully erosion.

- Slope drains must be securely anchored to the slope and must be adequately sized to carry the capacity of the design storm and associated forces.

- Outlets must be stabilized with riprap, concrete or other type of energy dissipator, or directed into a stable sediment trap or basin. See EC-10, Velocity Dissipation Devices.

- Debris racks are recommended at the inlet. Debris racks located several feet upstream of the inlet can usually be larger than racks at the inlet, and thus provide enhanced debris protection and less plugging.

- Safety racks are also recommended at the inlet and outlet of pipes where children or animals could become entrapped.

- Secure inlet and surround with dikes to prevent gully erosion and anchor pipe to slope.

- When using slope drains, limit drainage area to 10 acres per pipe. For larger areas, use a rock lined channel or a series of pipes.
- Size to convey at least the peak flow of a 10-year storm. The design storm is conservative due to the potential impact of system failures.
- Maximum slope generally limited to 2:1 (H:V) as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP EC-9, Earth Dikes and Drainage Swales. Top of interceptor dikes should be 12 in. higher than the top of the slope drain.
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials include both metal and plastic pipe, either corrugated or smooth wall. Concrete pipe can also be used.
- When installing slope drains:
  - Install slope drains perpendicular to slope contours.
  - Compact soil around and under entrance, outlet, and along length of pipe.
  - Securely anchor and stabilize pipe and appurtenances into soil.
  - Check to ensure that pipe connections are watertight.
  - Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
  - Protect outlet of slope drains using a flared end section when outlet discharges to a flexible energy dissipation device.
  - A flared end section installed at the inlet will improve flow into the slope drain and prevent erosion at the pipe entrance. Use a flared end section with a 6 in. minimum toe plate to help prevent undercutting. The flared section should slope towards the pipe inlet.

Design and Layout

The capacity for temporary drains should be sufficient to convey at least the peak runoff from a 10-year rainfall event. The pipe size may be computed using the Rational Method or a method established by the local municipality. Higher flows must be safely stored or routed to prevent any offsite concentration of flow and any erosion of the slope. The design storm is purposely conservative due to the potential impacts associated with system failures.

As a guide, temporary pipe slope drains should not be sized smaller than shown in the following table:

Minimum Pipe Diameter (Inches)	Maximum Drainage Area (Acres)
12	1.0
18	3.0
21	5.0
24	7.0
30	10.0

Larger drainage areas can be treated if the area can be subdivided into areas of 10 acres or less and each area is treated as a separate drainage. Drainage areas exceeding 10 acres must be designed by a Registered Civil Engineer and approved by the agency that issued the grading permit.

Materials:

Soil type, rainfall patterns, construction schedule, local requirements, and available supply are some of the factors to be considered when selecting materials. The following types of slope drains are commonly used:

- **Rigid Pipe:** This type of slope drain is also known as a pipe drop. The pipe usually consists of corrugated metal pipe or rigid plastic pipe. The pipe is placed on undisturbed or compacted soil and secured onto the slope surface or buried in a trench. Concrete thrust blocks must be used when warranted by the calculated thrust forces. Collars should be properly installed and secured with metal strappings or watertight collars.

- **Flexible Pipe**: The flexible pipe slope drain consists of a flexible tube of heavy duty plastic, rubber, or composite material. The tube material is securely anchored onto the slope surface. The tube should be securely fastened to the metal inlet and outlet conduit sections with metal strappings or watertight collars.

- **Section Downdrains**: The section downdrain consists of pre-fabricated, section conduit of half round or third round material. The sectional downdrain performs similar to a flume or chute. The pipe must be placed on undisturbed or compacted soil and secured into the slope.

- **Concrete-lined Terrace Drain:** This is a concrete channel for draining water from a terrace on a slope to the next level. These drains are typically specified as permanent structures and if installed early, can serve as slope drains during construction, which should be designed according to local drainage design criteria.

Costs

- Cost varies based on pipe selection and selected outlet protection.

Corrugated Steel Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12"	$19.60 per LF
15"	$22.00
18"	$26.00
24"	$32.00
30"	$50.00
PVC Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12"	$24.50
14"	$49.00
16"	$51.00
18"	$54.00
20"	$66.00
24"	$93.00
30"	$130.00

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.

- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.

- Insert inlet for clogging or undercutting. Remove debris from inlet to maintain flows. Repair undercutting at inlet and if needed, install flared section or rip rap around the inlet to prevent further undercutting.

- Inspect pipes for leakage. Repair leaks and restore damaged slopes.

- Inspect slope drainage for accumulations of debris and sediment.

- Remove built up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).
- Pipe anchors must be checked to ensure that the pipe remains anchored to the slope. Install additional anchors if pipe movement is detected.

References

Draft – Sedimentation and Erosion Control, An Inventory of Current Practices, U.S.E.P.A., April 1990.

Metzger, M.E. 2004. Managing mosquitoes in stormwater treatment devices. University of California Division of Agriculture and Natural Resources, Publication 8125. On-line: http://anrcatalog.ucdavis.edu/pdf/8125.pdf

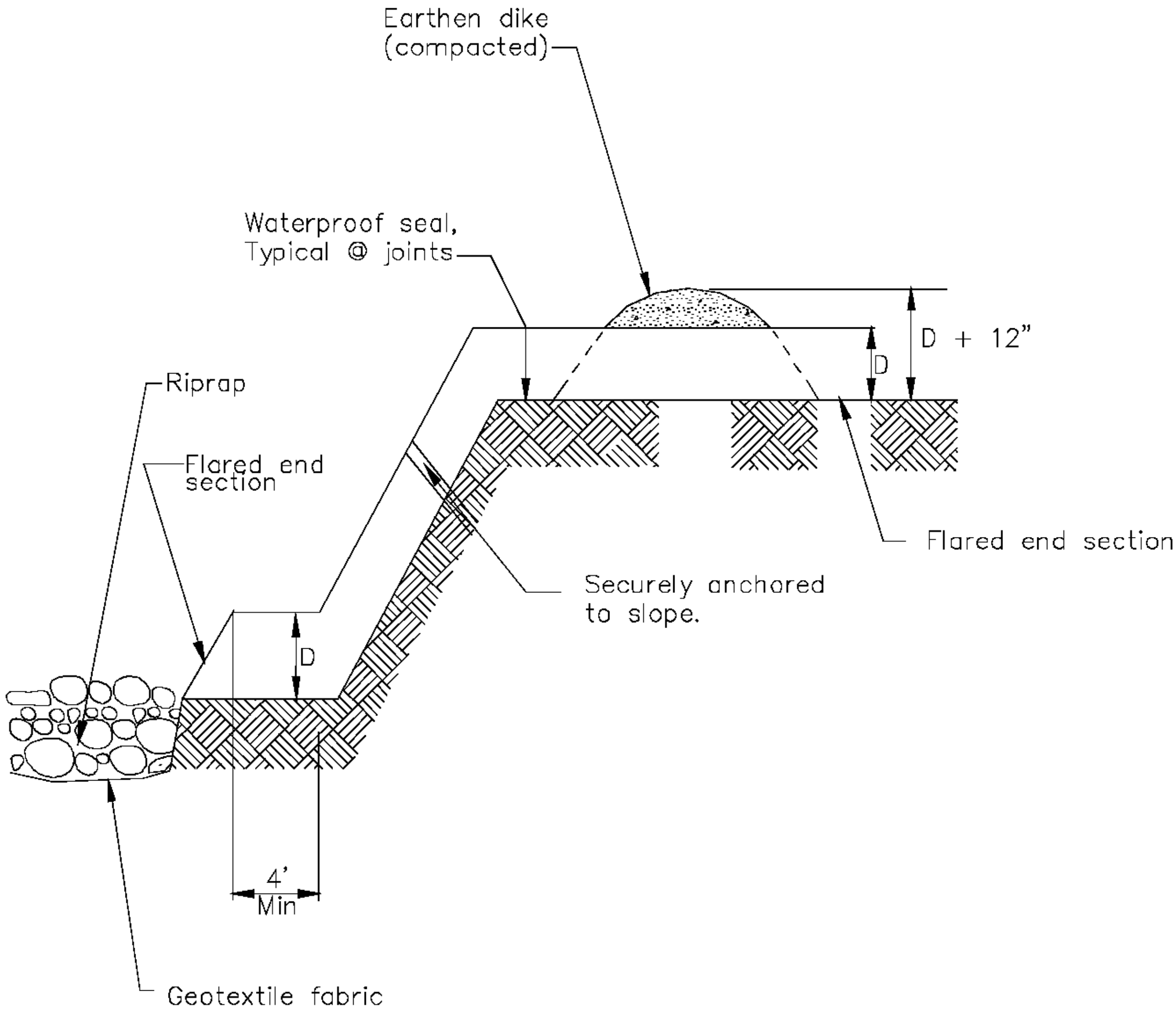
National Association of Home Builders (NAHB). Stormwater Runoff & Nonpoint Source Pollution Control Guide for Builders and Developers. National Association of Home Builders, Washington, D.C., 1995

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



TYPICAL SLOPE DRAIN

NOT TO SCALE

Soil Preparation/Roughening EC-15

Description and Purpose

Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. This can include soil testing (for seed base, soil characteristics, or nutrients), as well as roughening surface soils by mechanical methods (including sheepsfoot rolling, track walking, scarifying, stair stepping, and imprinting) to prepare soil for additional BMPs, or to break up sheet flow. Soil Preparation can also involve tilling topsoil to prepare a seed bed and/or incorporation of soil amendments, to enhance vegetative establishment.

Suitable Applications

Soil preparation: Soil preparation is essential to proper vegetative establishment. In particular, soil preparation (i.e. tilling, raking, and amendment) is suitable for use in combination with any soil stabilization method, including RECPs or sod. Soil preparation should not be confused with roughening.

Roughening: Soil roughening is generally referred to as track walking (sometimes called imprinting) a slope, where treads from heavy equipment run parallel to the contours of the slope and act as mini terraces. Soil preparation is most effective when used in combination with erosion controls. Soil Roughening is suitable for use as a complementary process for controlling erosion on a site. Roughening is not intended to be used as a stand-alone BMP, and should be used with perimeter controls, additional erosion control measures, grade breaks, and vegetative establishment for maximum effectiveness. Roughening is intended to only affect surface soils and should not compromise slope stability or overall compaction. Suitable applications for soil roughening include:

Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-7 Geotextiles and Mats

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- Along any disturbed slopes, including temporary stockpiles, sediment basins, or compacted soil diversion berms and swales.

- Roughening should be used in combination with hydraulically applied stabilization methods, compost blanket, or straw mulch; but should not be used in combination with RECPs or sod because roughening is intended to leave terraces on the slope.

Limitations

- Preparation and roughening must take place prior to installing other erosion controls (such as hydraulically applied stabilizers) or sediment controls (such as fiber rolls) on the faces of slopes.

- In such cases where slope preparation is minimal, erosion control/revegetation BMPs that do not require extensive soil preparation - such as hydraulic mulching and seeding applications - should be employed.

- Consideration should be given to the type of erosion control BMP that follows surface preparation, as some BMPs are not designed to be installed over various types of tillage/roughening, i.e., RECPs (erosion control blankets) should not be used with soil roughening due to a "bridging" effect, which suspends the blanket above the seed bed.

- Surface roughness has an effect on the amount of mulch material that needs to be applied, which shows up as a general increase in mulch material due to an increase in surface area (Topographic Index -see EC-3 Hydraulic Mulching).

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

General

A roughened surface can significantly reduce erosion. Based on tests done at the San Diego State Erosion Research Laboratory, various roughening techniques on slopes can result in a 12 - 76% reduction in the erosion rate versus smooth slopes.

Materials

Minimal materials are required unless amendments and/or seed are added to the soil. The majority of soil roughening/preparation can be done with equipment that is on hand at a normal construction site, such as bull dozers and compaction equipment.

Installation Guidelines

Soil Preparation

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.

- Based upon soil testing conducted, apply additional soil amendments (e.g. fertilizers, additional seed) to the soil to help with germination. Follow EC-4, Hydroseeding, when selecting and applying seed and fertilizers.

Cut Slope Roughening:

- Stair-step grade or groove the cut slopes that are steeper than 3:1.
- Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.
- Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in toward the vertical wall.
- Do not make individual vertical cuts more than 2 feet (0.6 m) high in soft materials or more than 3 feet (0.9 m) high in rocky materials.
- Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

Fill Slope Roughening:

- Place on fill slopes with a gradient steeper than 3:1 in lifts not to exceed 8 inches (0.2 m), and make sure each lift is properly compacted.
- Ensure that the face of the slope consists of loose, uncompacted fill 4-6 inches (0.1-0.2 m) deep.
- Use grooving or tracking to roughen the face of the slopes, if necessary.
- Do not blade or scrape the final slope face.

Roughening for Slopes to be Mowed:

- Slopes which require mowing activities should not be steeper than 3:1.
- Roughen these areas to shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting.
- Make grooves close together (less than 10 inches), and not less than 1 inch deep, and perpendicular to the direction of runoff (i.e., parallel to the slope contours).
- Excessive roughness is undesirable where mowing is planned.

Roughening With Tracked Machinery:

- Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
- Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.
- Seed and mulch roughened areas as soon as possible to obtain optimum seed germination and growth.

Costs

Costs are based on the additional labor of tracking or preparation of the slope plus the cost of any required soil amendment materials.

Inspection and Maintenance

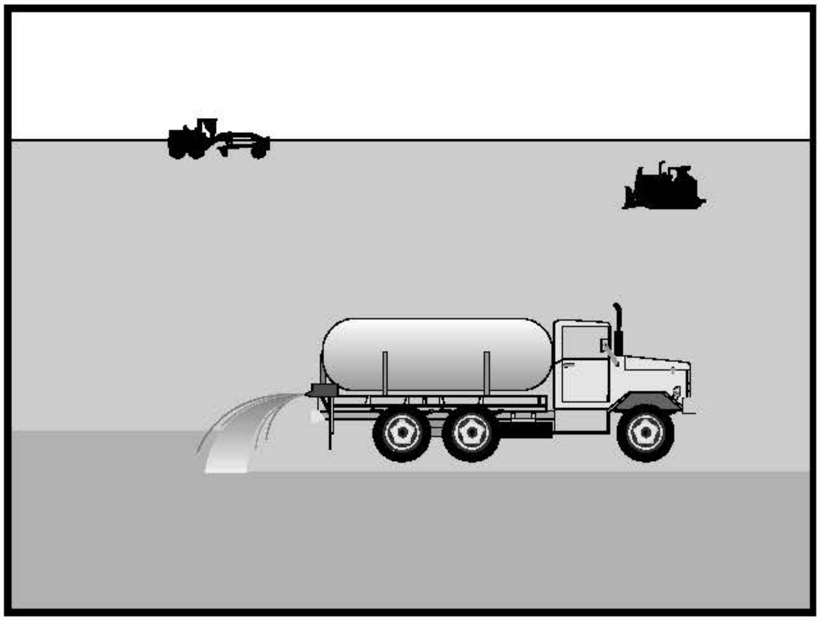
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check the seeded slopes for signs of erosion such as rills and gullies. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.
- Inspect BMPs weekly during normal operations, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Wind Erosion Control WE-1



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

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- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyls, acrylic), clay additives (e.g. bentonite, montimorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	x	x	x	x	x			x
Disturbed Areas Subject to Traffic			x	x	x	x		x
Material Stockpiles		x	x	x			x	x
Demolition			x			x	x	
Clearing/ Excavation			x	x				x
Truck Traffic on Unpaved Roads			x	x	x	x	x	
Tracking					x	x		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

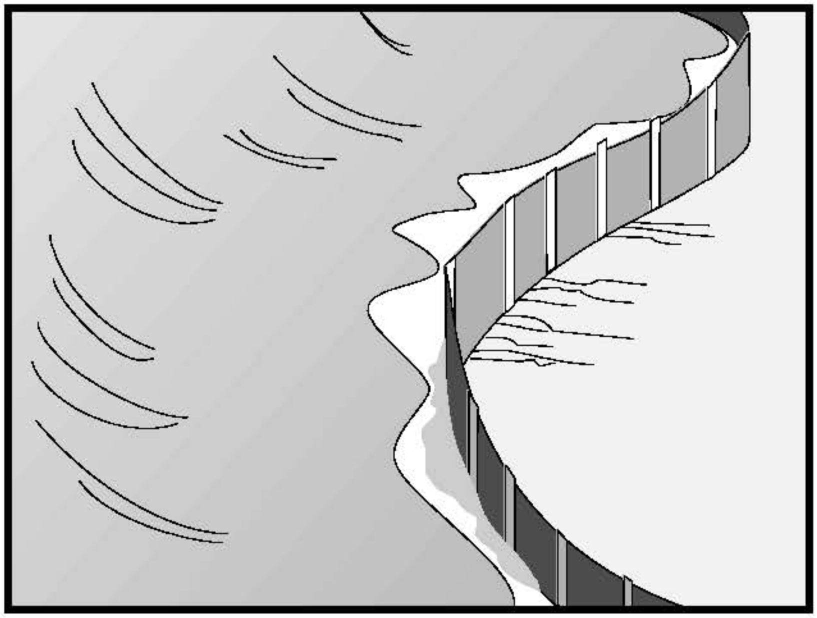
California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Silt Fence SE-1



Categories

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Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-10 Storm Drain Inlet Protection

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (SE-10). Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

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Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard. Runoff typically ponds temporarily on the upstream side of silt fence.
- Do not use silt fence to divert water flows or place across any contour line. Fences not constructed on a level contour, or fences used to divert flow will concentrate flows resulting in additional erosion and possibly overtopping or failure of the silt fence.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- The maximum length of slope draining to any point along the silt fence should be 200 ft or less.
- The maximum slope perpendicular to the fence line should be 1:1.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft^2 of ponding area should be provided for every acre draining to the fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.

- Silt fences should remain in place until the disturbed area is permanently stabilized, after which, the silt fence should be removed and properly disposed.
- Silt fence should be used in combination with erosion source controls up slope in order to provide the most effective sediment control.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

The fence should be supported by a plastic or wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Woven geotextile material should contain ultraviolet inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 °F to 120 °F.

- Layout in accordance with attached figures.
- For slopes steeper than 2:1 (H:V) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to sensitive receiving waters or Environmentally Sensitive Areas (ESAs), silt fence should be used in conjunction with erosion control BMPs.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the slope of area draining to the silt fence is 4:1 (H:V) or less.
- Used for shorter durations, typically 5 months or less
- Area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Use is generally limited to 8 months or less.
- Area draining to fence produces moderate sediment loads.
- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
  - Fence fabric has higher tensile strength.
  - Fabric is reinforced with wire backing or additional support.
  - Posts are spaced closer than pre-manufactured, standard silt fence products.
  - Posts are metal (steel or aluminum)

Materials

<u>Standard Silt Fence</u>

- Silt fence material should be woven geotextile with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491.

- Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts or bar reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes, use number four or greater bar. Provide end protection for any exposed bar reinforcement for health and safety purposes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).

- Bottom of the silt fence should be keyed-in a minimum of 12 in.

- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.

- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench.

- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.

- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.

- The trench should be backfilled with native material and compacted.

- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where, due to specific site conditions, a 3 ft setback is not available, the silt fence may be constructed at the toe of the slope, but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and more difficult to maintain.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of $^1/_3$ and a maximum of ½ the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 inches into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the gerotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
  - Ease of installation (most often done with a 2 person crew). In addition, installation using static slicing has been found to be more efficient on slopes, in rocky soils, and in saturated soils.
  - Minimal soil disturbance.
  - Greater level of compaction along fence, leading to higher performance (i.e. greater sediment retention).
  - Uniform installation.
  - Less susceptible to undercutting/undermining.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is $7 per linear foot based on vendor research. Range of cost is $3.50 - $9.10 per linear foot.
- In tests, the slicing method required 0.33 man hours per 100 linear feet, while the trenched based systems required as much as 1.01 man hours per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.

- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.
- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

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Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

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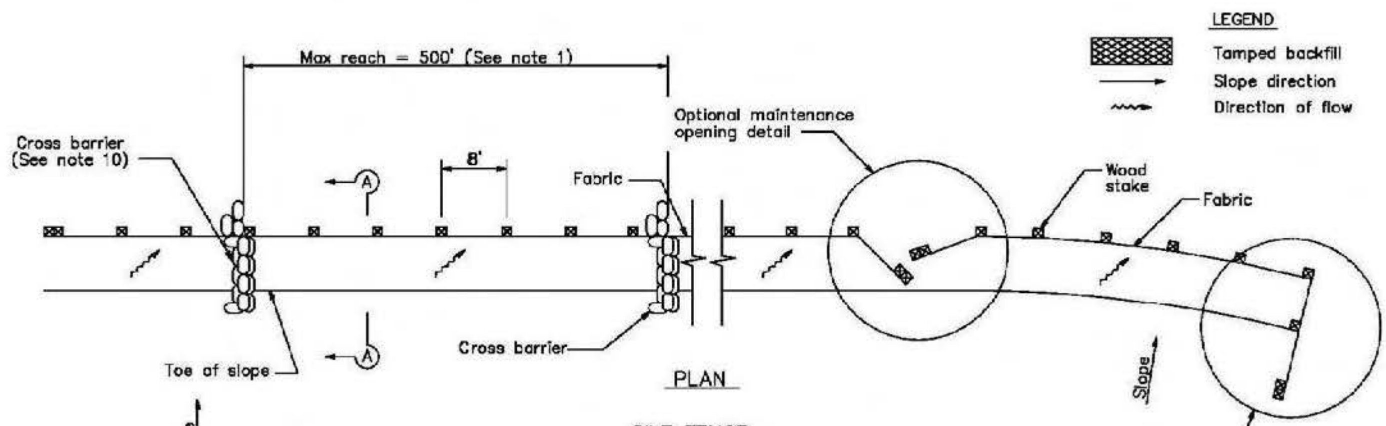
Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

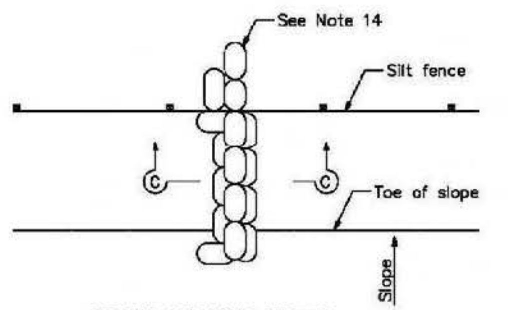


PLAN

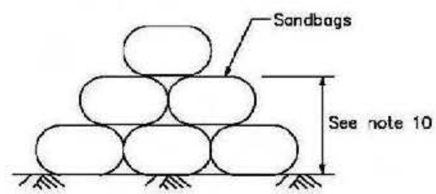
SILT FENCE

NOTES

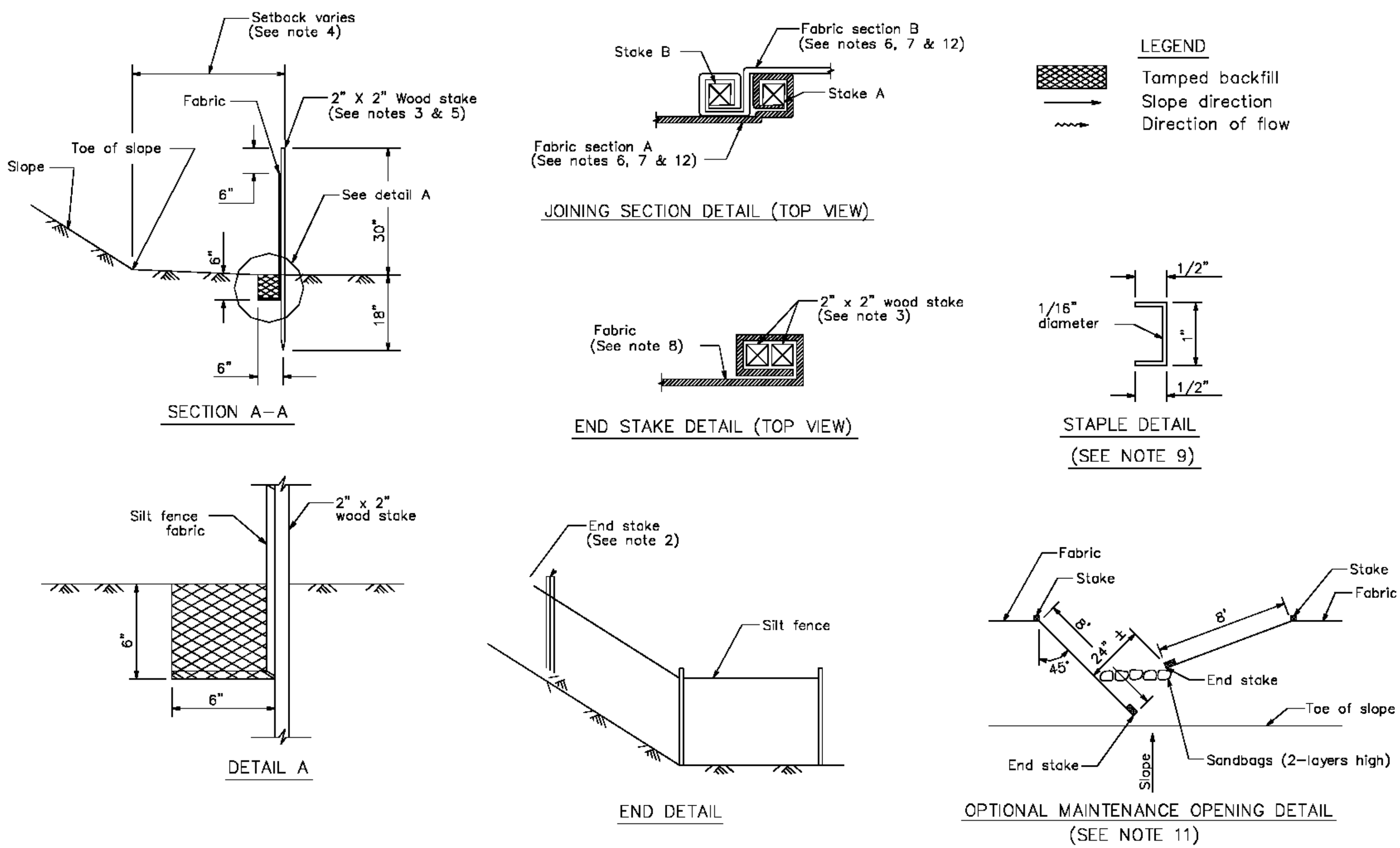
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'-0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'-0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3-4 bags to cross barrier on downgradient side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.



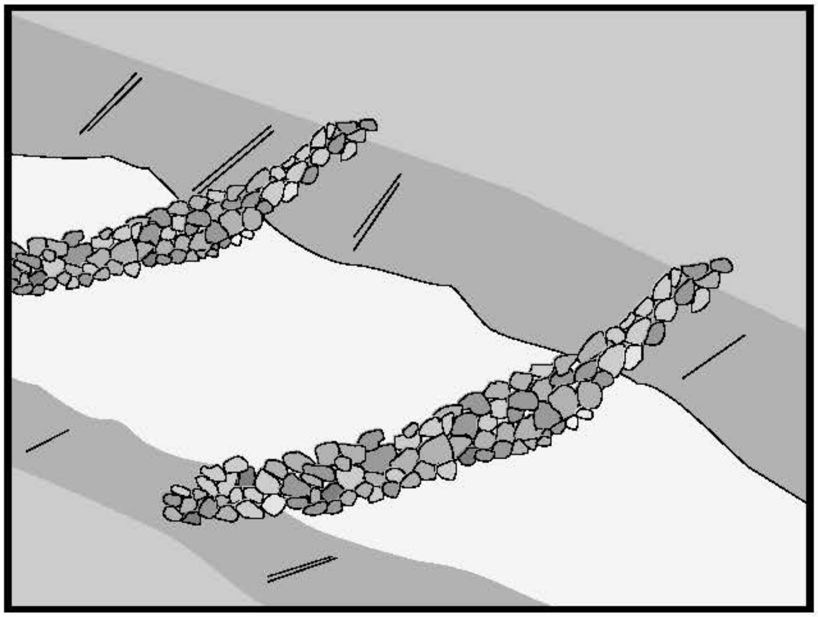
CROSS BARRIER DETAIL



SECTION C-C


Setback varies
(See note 4)
Fabric
2" X 2" Wood stake
(See notes 3 & 5)
Toe of slope
Slope
6"
See detail A
30"
6"
18"
6"
SECTION A–A
Stake B
Fabric section B
(See notes 6, 7 & 12)
Stake A
Fabric section A
(See notes 6, 7 & 12)
JOINING SECTION DETAIL (TOP VIEW)
LEGEND
Tamped backfill
Slope direction
Direction of flow
2" x 2" wood stake
(See note 3)
Fabric
(See note 8)
END STAKE DETAIL (TOP VIEW)
1/2"
1/16"
diameter
1"
1/2"
STAPLE DETAIL
(SEE NOTE 9)
Silt fence
fabric
2" x 2"
wood stake
6"
6"
DETAIL A
End stake
(See note 2)
Silt fence
END DETAIL
Fabric
Stake
8'
24" ±
45°
8'
Stake
Fabric
End stake
Toe of slope
End stake
Slope
Sandbags (2–layers high)
OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)

Check Dams SE-4



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- To act as a grade control structure.

Limitations

- Not to be used in live streams or in channels with extended base flows.
- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion potential or sediment-laden flow is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Do not construct check dams with straw bales or silt fence.
- Water suitable for mosquito production may stand behind check dams, particularly if subjected to daily non-stormwater discharges.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Using check dams to reduce channel slope reduces the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Thus, check dams are dual-purpose and serve an important role as erosion controls as well as as sediment controls. Note that use of 1-2 isolated check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity should be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a "permanent" ditch or swale being constructed early and used as a "temporary" conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, either:

- Don't use check dams. Consider alternative BMPs, or.
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam (see "Spacing Between Check Dams" detail at the end of this fact sheet). The center section of the dam should be lower than the edge sections (at least 6 inches), acting as a spillway, so that the check dam will direct flows to the center of the ditch or swale (see "Typical Rock Check Dam" detail at the end of this fact sheet). Bypass or side-cutting can occur if a sufficient spillway is not provided in the center of the dam.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products can also be used as check dams (e.g. HDPE check dams, temporary silt dikes (SE-12)), and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber, and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam should completely span the ditch or swale to prevent washout. The rock used should be large enough to stay in place given the expected design flow through the channel. It is recommended that abutments be extended 18 in. into the channel bank. Rock can be graded such that smaller diameter rock (e.g. 2-4 in) is located on the upstream side of larger rock (holding the smaller rock in place); increasing residence time.

Log check dams are usually constructed of 4 to 6 in. diameter logs, installed vertically. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

See fiber rolls, SE-5, for installation of fiber roll check dams.

Gravel bag and sand bag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet (see "Gravel Bag Check Dam" detail at the end of this fact sheet).

Manufactured products, such as temporary silt dikes (SE-12), should be installed in accordance with the manufacturer's instructions. Installation typically requires anchoring or trenching of products, as well as regular maintenance to remove accumulated sediment and debris.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.

- Check dams should be placed at a distance and height to allow small pools to form between each check dam.

- For multiple check dam installation, backwater from a downstream check dam should reach the toes of the upstream check dam.

- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap should be cleaned following each storm event.

- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.

- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.

Materials

- Rock used for check dams should typically be 8-12 in rock and be sufficiently sized to stay in place given expected design flows in the channel. Smaller diameter rock (e.g. 2 to 4 in) can be placed on the upstream side of larger rock to increase residence time.

- Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms.

- Sandbags used for check dams should conform to SE-8, Sandbag Barrier.

- Fiber rolls used for check dams should conform to SE-5, Fiber Rolls.

- Temporary silt dikes used for check dams should conform to SE-12, Temporary Silt Dikes.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.

- Tightly abut bags and stack according to detail shown in the figure at the end of this section (pyramid approach). Gravel bags and sandbags should not be stacked any higher than 3 ft.

- Upper rows or gravel and sand bags shall overlap joints in lower rows.

- Fiber rolls should be trenched in, backfilled, and firmly staked in place.

- Install along a level contour.

- HDPE check dams, temporary silt dikes, and other manufactured products should be used and installed per manufacturer specifications.

Costs

Cost consists of labor costs if materials are readily available (such as gravel on-site). If material must be imported, costs will increase. For other material and installation costs, see SE-5, SE-6, SE-8, SE-12, and SE-14.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Replace missing rock, bags, rolls, etc. Replace bags or rolls that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.
- Inspect areas behind check dams for pools of standing water, especially if subjected to daily non-stormwater discharges.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed.

References

Draft – Sedimentation and Erosion Control, and Inventory of Current Practices, USEPA, April 1990.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

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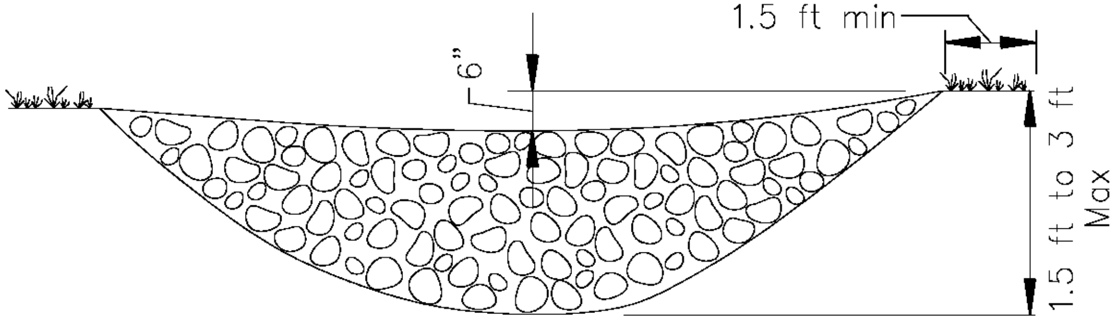
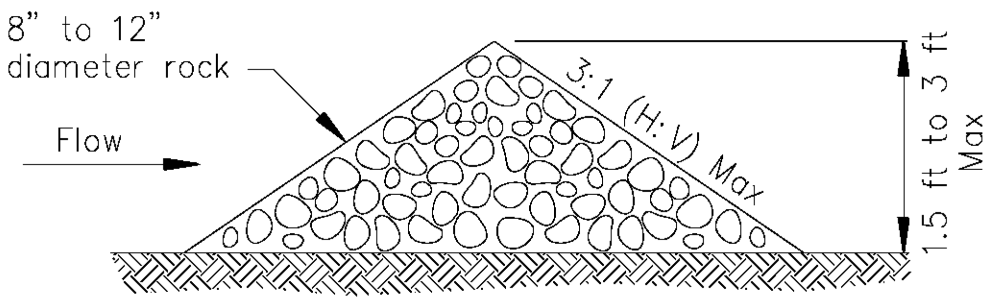
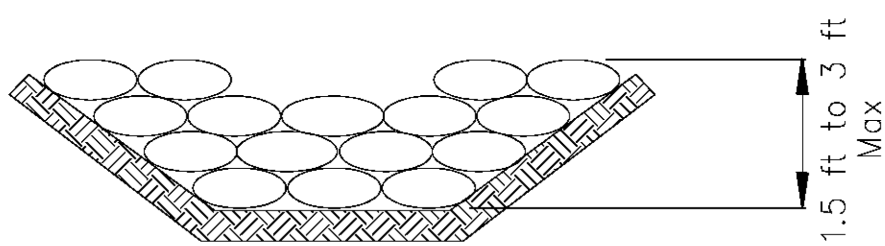


ELEVATION

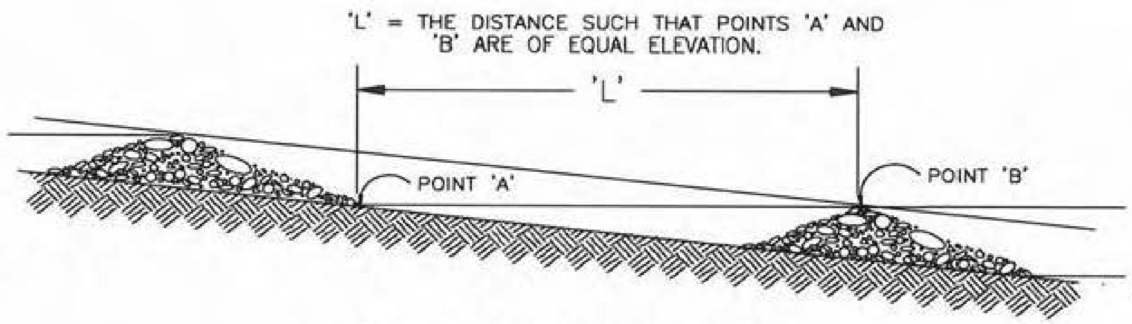


TYPICAL ROCK CHECK DAM SECTION

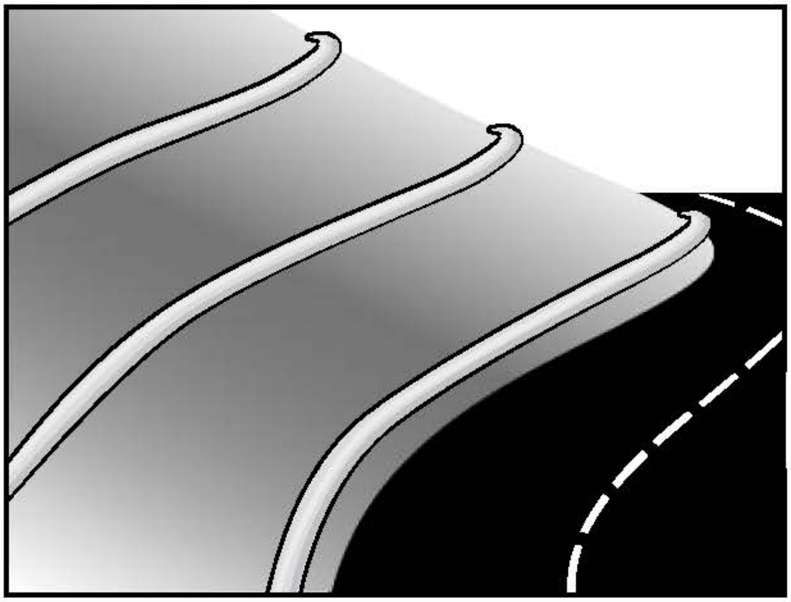
ROCK CHECK DAM
NOT TO SCALE



GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE



SPACING BETWEEN CHECK DAMS



Description and Purpose

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped by netting, which can be photodegradable or natural. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.
- At operational storm drains as a form of inlet protection.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

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- Around temporary stockpiles.

Limitations

- Fiber rolls are not effective unless trenched in and staked.
- Not intended for use in high flow situations.
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months depending upon local conditions.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed free rice straw, flax, or a similar agricultural material bound into a tight tubular roll by netting.
- Typical fiber rolls vary in diameter from 9 in. to 20 in. Larger diameter rolls are available as well.

Installation

- Locate fiber rolls on level contours spaced as follows:
  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be ¼ to 1/3 of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.

- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Typically, fiber rolls encased with plastic netting are used for a temporary application because the netting does not biodegrade. Fiber rolls used in a permanent application are typically encased with a biodegradeable material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But, they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for regular fiber rolls range from $20 - $30 per 25 ft roll.

Material costs for PAM impregnated fiber rolls range between 7.00-$9.00 per linear foot, based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed

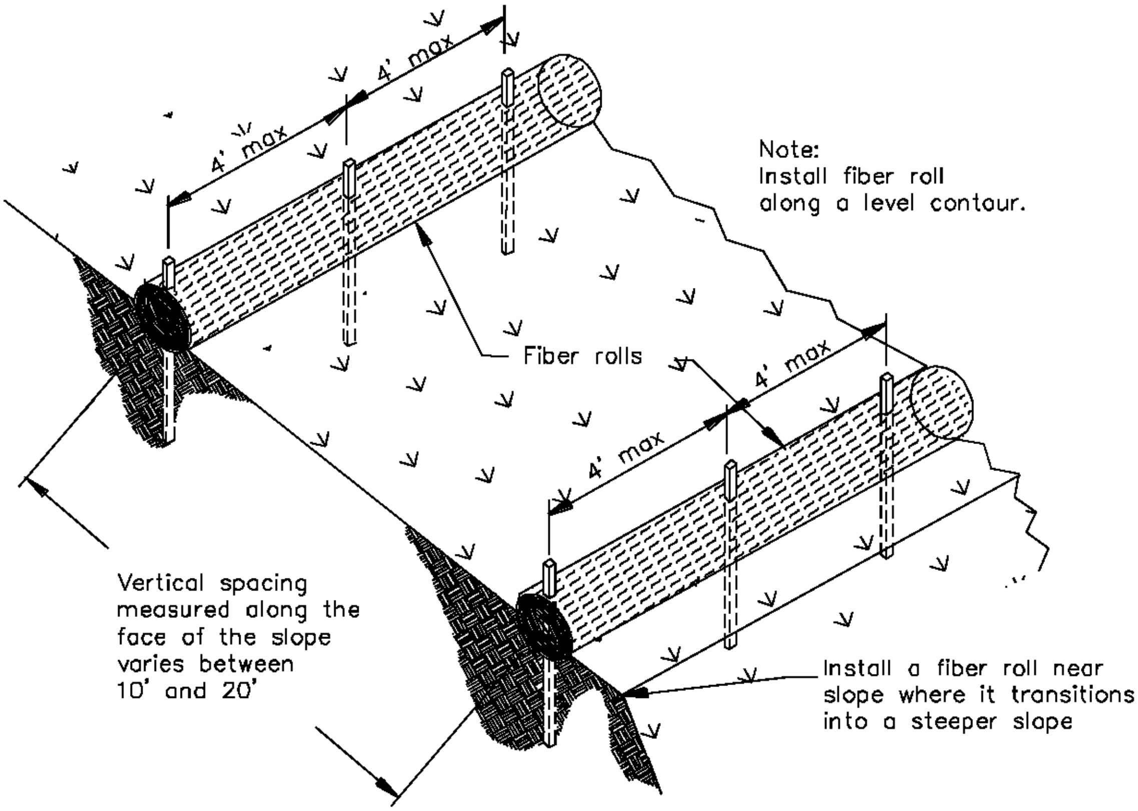
in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.

- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

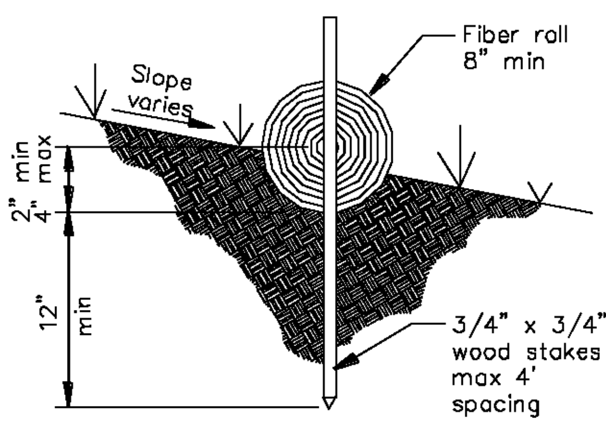
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



TYPICAL FIBER ROLL INSTALLATION
N.T.S.



ENTRENCHMENT DETAIL
N.T.S.

Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.

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- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $58/hour (3 yd^3 hopper) to $88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

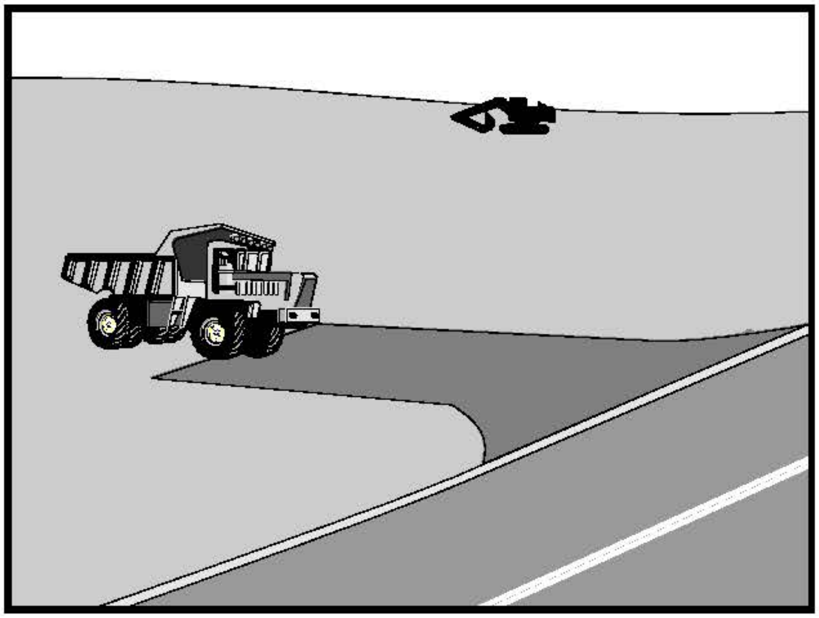
Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.



Categories		
EC	Erosion Control	☒
SE	Sediment Control	☒
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WE	Wind Erosion Control	
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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

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Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if 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.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

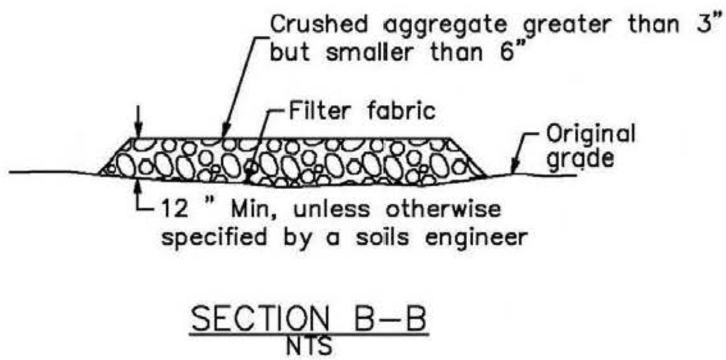
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

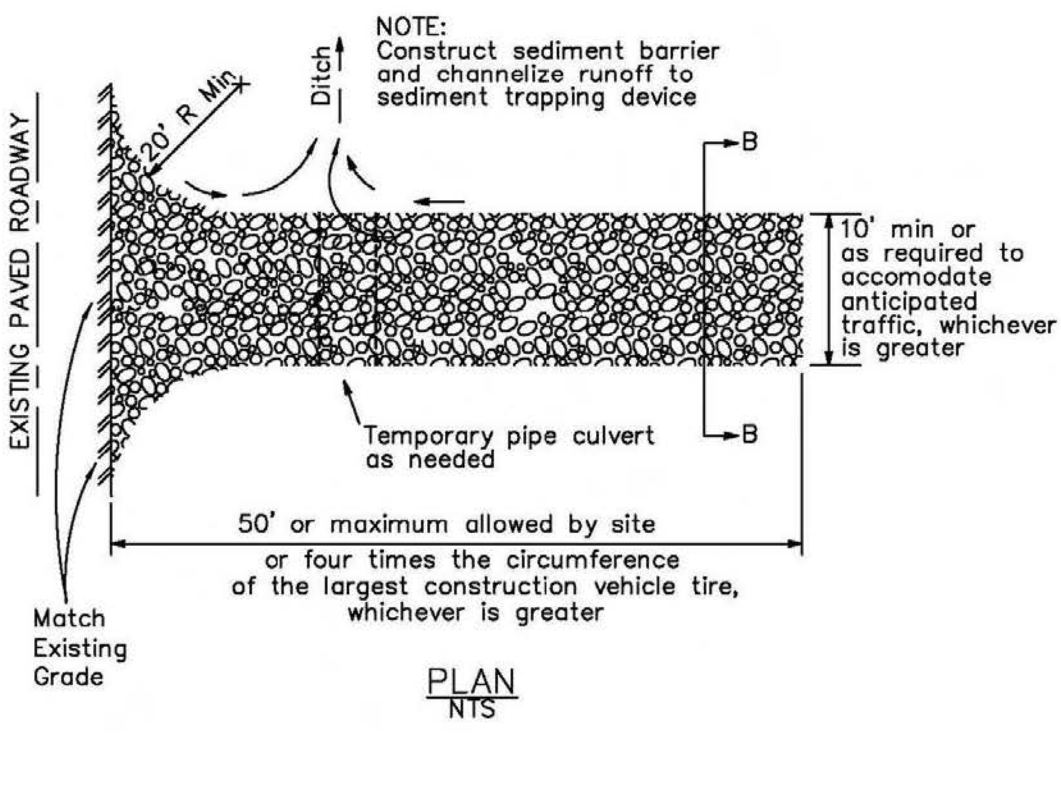
Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

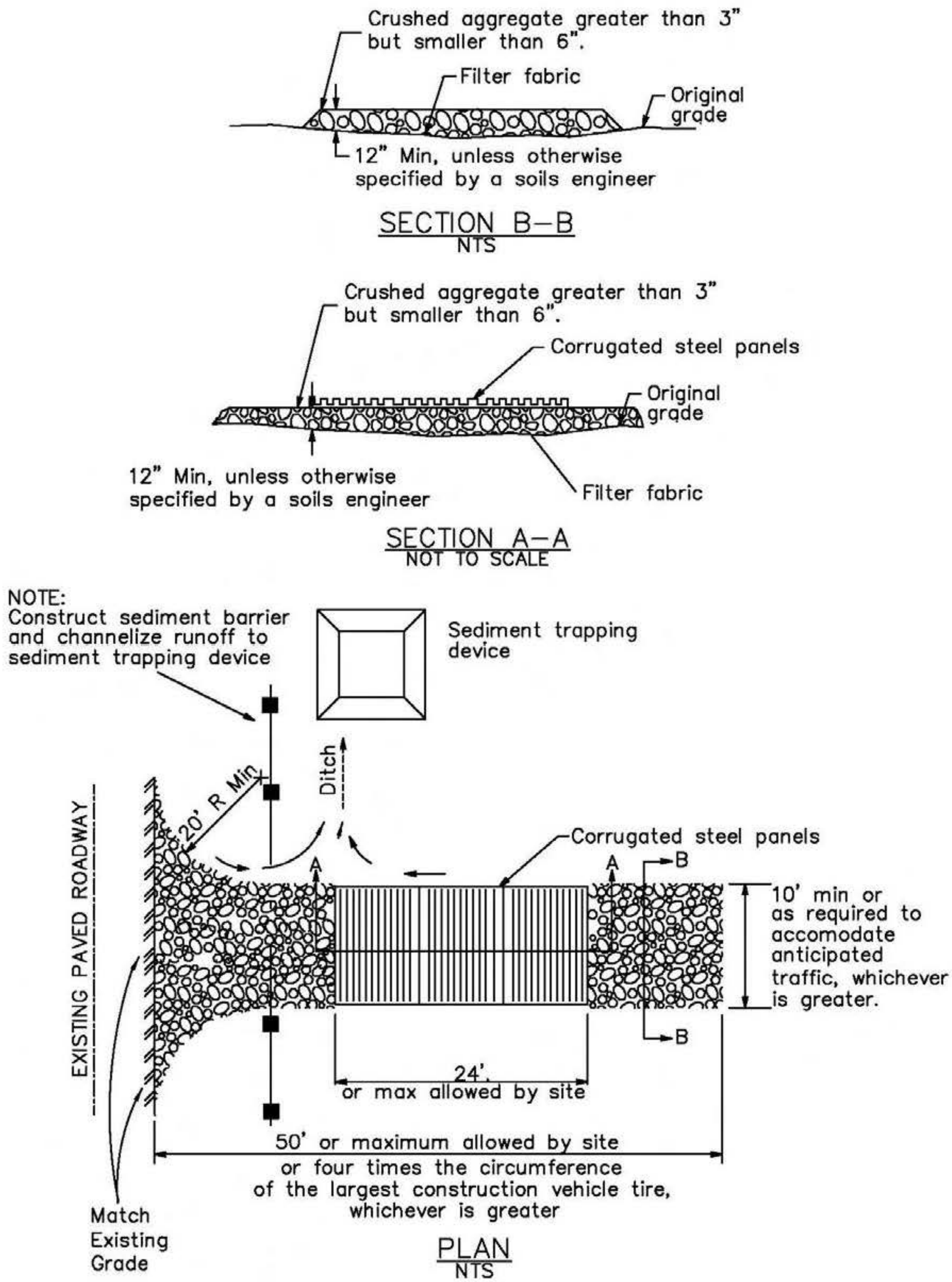
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



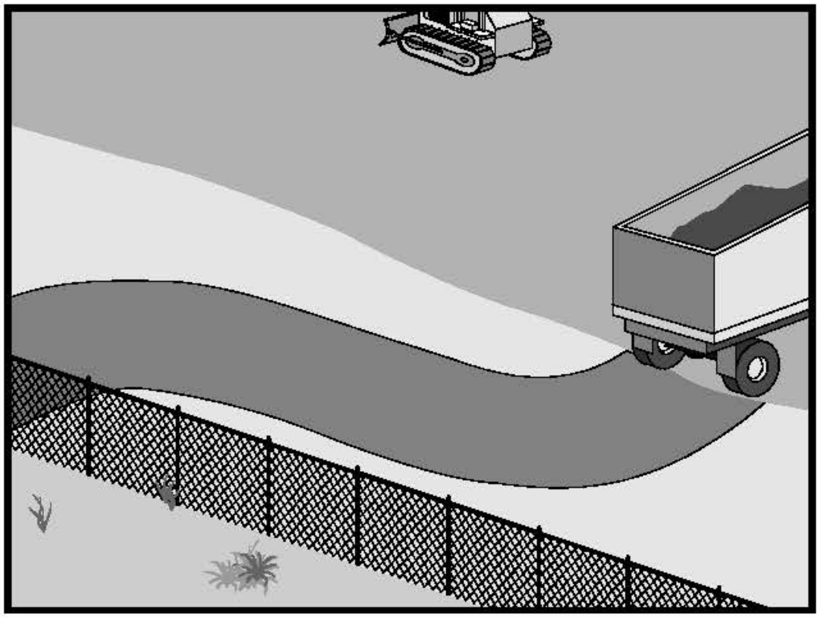
Crushed aggregate greater than 3"
but smaller than 6"
Filter fabric
Original grade
12 " Min, unless otherwise specified by a soils engineer
SECTION B-B
NTS



NOTE:
Construct sediment barrier and channelize runoff to sediment trapping device
Ditch
20' R Min
EXISTING PAVED ROADWAY
B
B
10' min or as required to accomodate anticipated traffic, whichever is greater
Temporary pipe culvert as needed
50' or maximum allowed by site
or four times the circumference of the largest construction vehicle tire, whichever is greater
Match Existing Grade
PLAN
NTS


Crushed aggregate greater than 3" but smaller than 6".
Filter fabric
Original grade
12" Min, unless otherwise specified by a soils engineer
SECTION B–B
NTS
Crushed aggregate greater than 3" but smaller than 6".
Corrugated steel panels
Original grade
12" Min, unless otherwise specified by a soils engineer
Filter fabric
SECTION A–A
NOT TO SCALE
NOTE:
Construct sediment barrier and channelize runoff to sediment trapping device
Sediment trapping device
Ditch
20' R Min
EXISTING PAVED ROADWAY
Corrugated steel panels
A
A
B
B
10' min or as required to accomodate anticipated traffic, whichever is greater.
24', or max allowed by site
50' or maximum allowed by site or four times the circumference of the largest construction vehicle tire, whichever is greater
Match Existing Grade
PLAN
NTS

Stabilized Construction Roadway TC-2



Categories		
EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
  - Phased construction projects and offsite road access
  - Construction during wet weather
- Construction roadways and detour roads:
  - Where mud tracking is a problem during wet weather
  - Where dust is a problem during dry weather
  - Adjacent to water bodies
  - Where poor soils are encountered

Limitations

- The roadway must be removed or paved when construction is complete.
- Certain chemical stabilization methods may cause stormwater or soil pollution and should not be used. See WE-1, Wind Erosion Control.

- Management of construction traffic is subject to air quality control measures. Contact the local air quality management agency.
- Materials will likely need to be removed prior to final project grading and stabilization.
- Use of this BMP may not be applicable to very short duration projects.

Implementation

General

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires that generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather

Installation/Application Criteria

Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative where construction will be phased, the early application of gravel or chemical stabilization may solve potential erosion and stability problems. Temporary gravel roadway should be considered during the rainy season and on slopes greater than 5%.

Temporary roads should follow the contour of the natural terrain to the maximum extent possible. Slope should not exceed 15%. Roadways should be carefully graded to drain transversely. Provide drainage swales on each side of the roadway in the case of a crowned section or one side in the case of a super elevated section. Simple gravel berms without a trench can also be used.

Installed inlets should be protected to prevent sediment laden water from entering the storm sewer system (SE-10, Storm Drain Inlet Protection). In addition, the following criteria should be considered.

- Road should follow topographic contours to reduce erosion of the roadway.
- The roadway slope should not exceed 15%.
- Chemical stabilizers or water are usually required on gravel or dirt roads to prevent dust (WE-1, Wind Erosion Control).
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

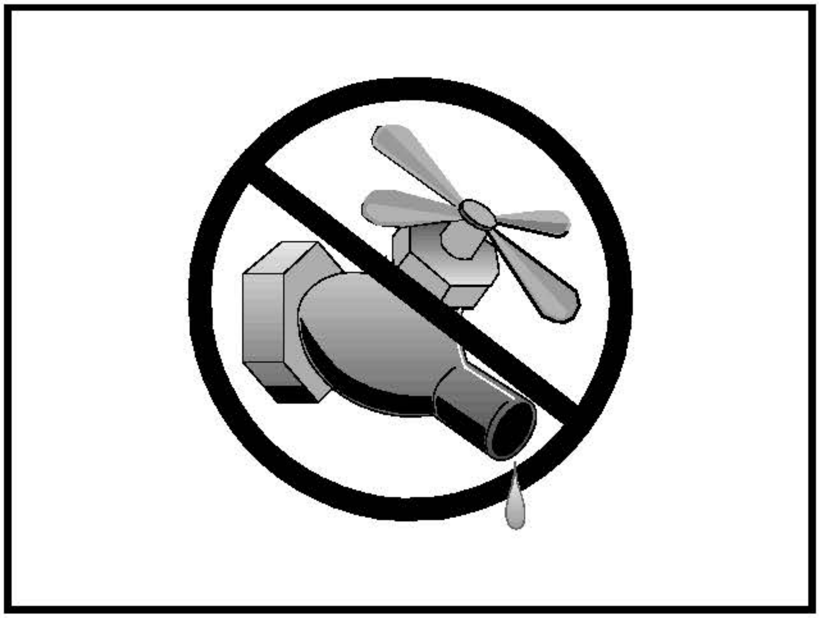
Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Water Conservation Practices NS-1



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.
- Direct construction water runoff to areas where it can soak

into the ground or be collected and reused.

- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.

- Lock water tank valves to prevent unauthorized use.

Costs
The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance
- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.

- Repair water equipment as needed to prevent unintended discharges.

  - Water trucks

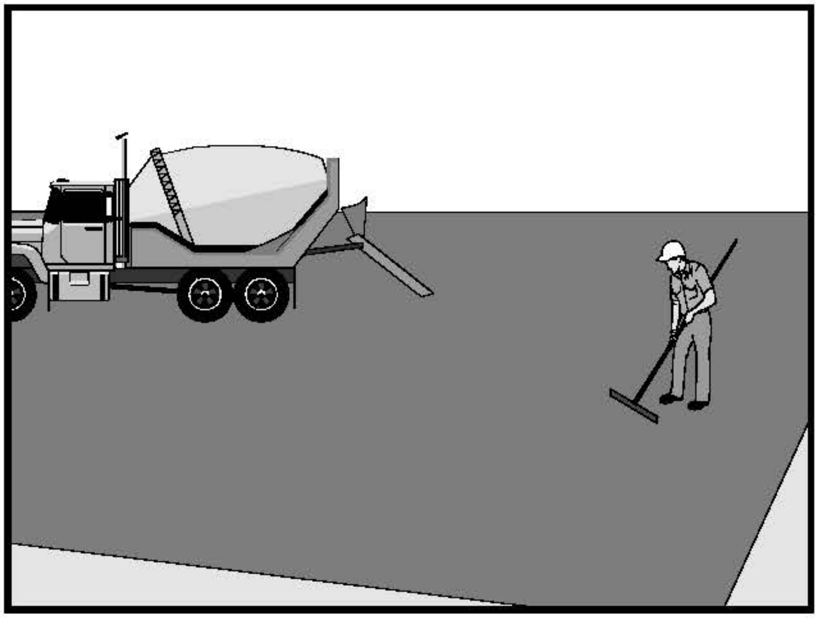
  - Water reservoirs (water buffalos)

  - Irrigation systems

  - Hydrant connections

References
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Paving and Grinding Operations NS-3



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☒

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.
- Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

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Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runon (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
    - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of)or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
    - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
  - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
  - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.

- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.

- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.

- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.

- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.

- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.

- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Sample stormwater runoff required by the General Permit.

- Keep ample supplies of drip pans or absorbent materials onsite.

- Inspect and maintain machinery regularly to minimize leaks and drips.

References

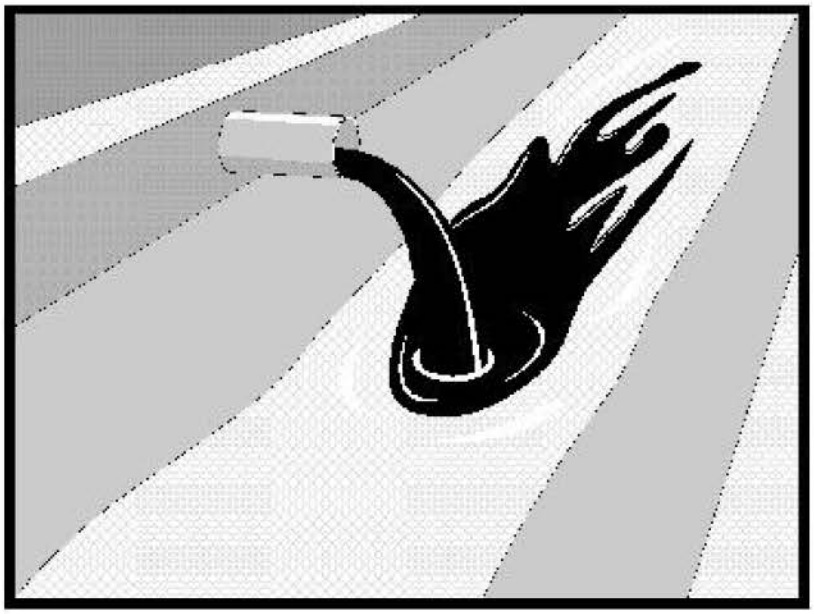
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Illicit Connection/Discharge NS-6



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.
- Inspect site regularly during project execution for evidence

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of illicit connections, illegal dumping or discharges.

- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** – unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season
  - Unusual flows in sub drain systems used for dewatering
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the non-irrigation season
  - Non-standard junction structures
  - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect the site regularly to check for any illegal dumping or discharge.

- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.

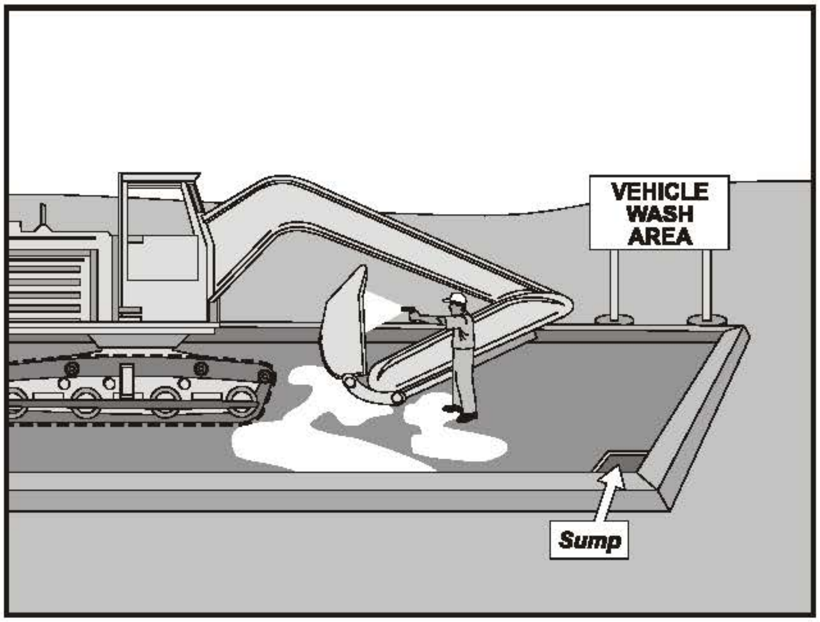
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - No discharge of wash waters to storm drains or watercourses
  - Used only when necessary
- When cleaning vehicles and equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
  - Use positive shutoff valve to minimize water usage
  - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

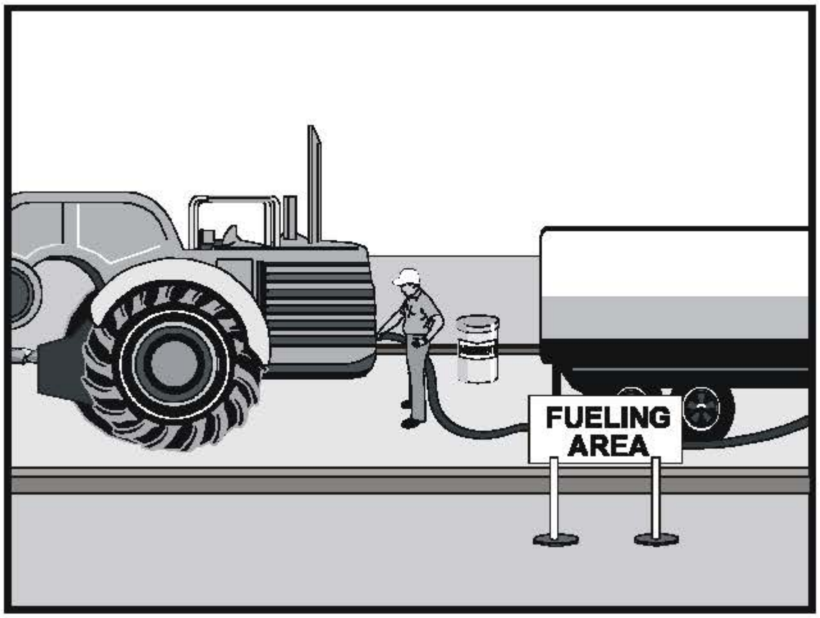
Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.
- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should

be disposed of properly after use.

- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

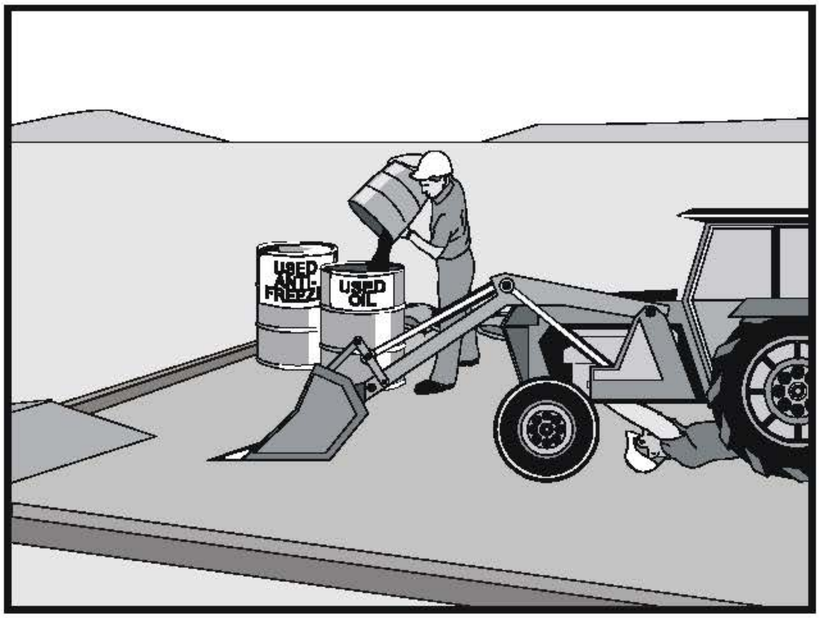
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Categories

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WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and

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Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.

- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.

- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,- trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Keep ample supplies of spill cleanup materials onsite.

- Maintain waste fluid containers in leak proof condition.

- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.

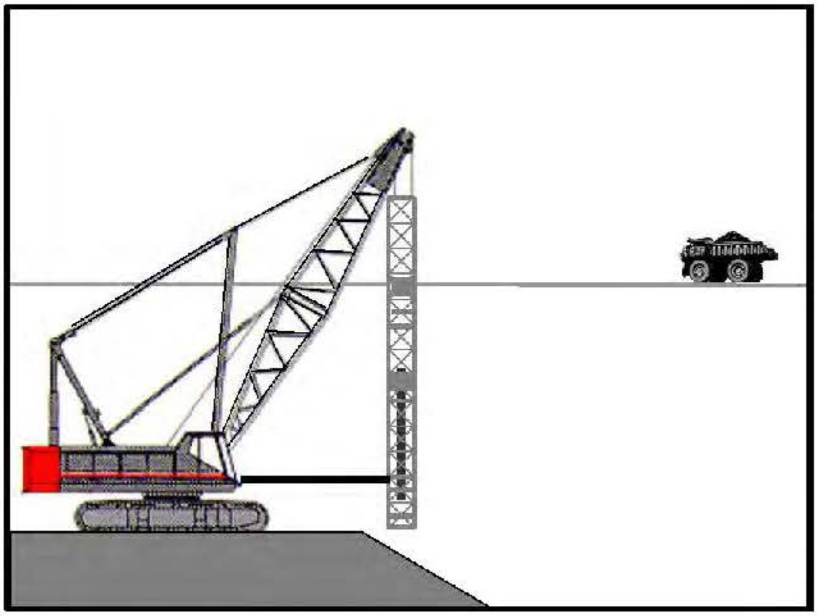
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

Suitable Applications

These procedures apply to all construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving (impact and vibratory) takes place, including operations using pile shells as well as construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Implementation

- Use drip pans or absorbent pads during vehicle and equipment operation, maintenance, cleaning, fueling, and storage. Refer to NS-8, Vehicle and Equipment Cleaning, NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.

- Have spill kits and cleanup materials available at all locations of pile driving. Refer to WM-4, Spill Prevention

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and Control.

- Equipment that is stored or in use in streambeds, or on docks, barges, or other structures over water bodies should be kept leak free.

- Park equipment over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads. The storage or use of equipment in streambeds or other bodies of water must comply with all applicable permits.

- Implement other BMPs as applicable, such as NS-2, Dewatering Operations, WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.

- When not in use, store pile-driving equipment away from concentrated flows of stormwater, drainage courses, and inlets. Protect hammers and other hydraulic attachments from runon and runoff by placing them on plywood and covering them with plastic or a comparable material prior to the onset of rain.

- Use less hazardous products, e.g., vegetable oil, when practicable.

Costs

All of the above measures can be low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

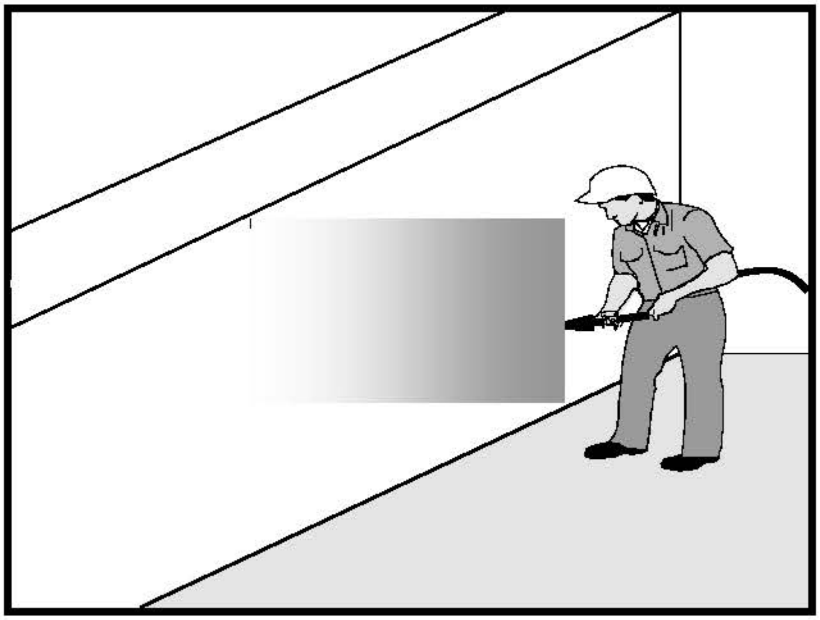
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Inspect equipment every day at startup and repair equipment as needed (i.e., worn or damaged hoses, fittings, and gaskets). Recheck equipment at shift changes or at the end of the day and scheduled repairs as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Categories

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NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

Chemical Curing

- Avoid over spray of curing compounds.
- Minimize the drift by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, Material Delivery and Storage.
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.
- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Education

- Educate employees, subcontractors, and suppliers on proper concrete curing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete curing procedures.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.
- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

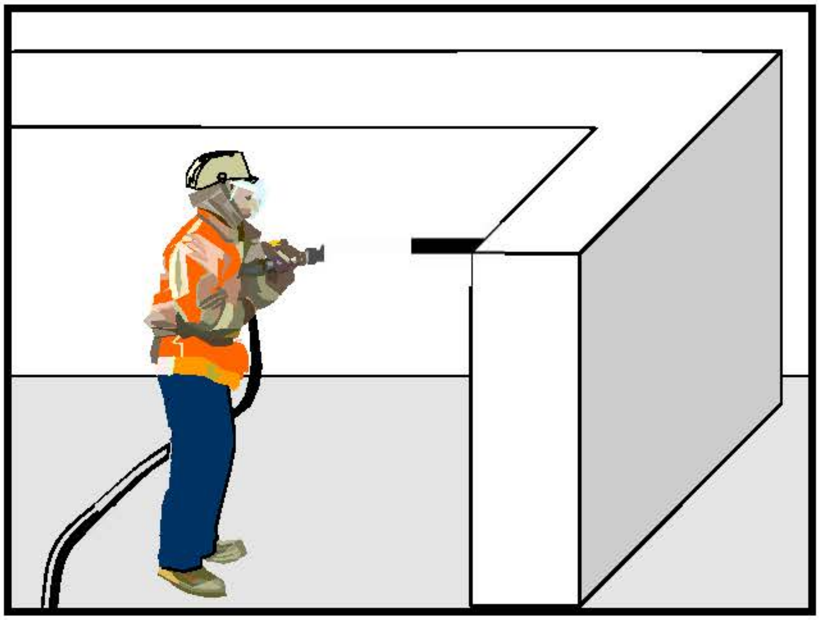
References

Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Categories

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Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	☑

Potential Alternatives

None

Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

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Limitations
- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation
- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 Dewatering Operations.
- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.
- Refer to WM-8, Concrete Waste Management for disposal of concrete debris.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

Education
- Educate employees, subcontractors, and suppliers on proper concrete finishing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete finishing procedures.

Costs
These measures are generally of low cost.

Inspection and Maintenance
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts concrete dust and debris as required by the General Permit.

- Sweep or vacuum up debris from sandblasting at the end of each shift.
- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.
- Inspect containment structures for damage prior to use and prior to onset of forecasted rain.

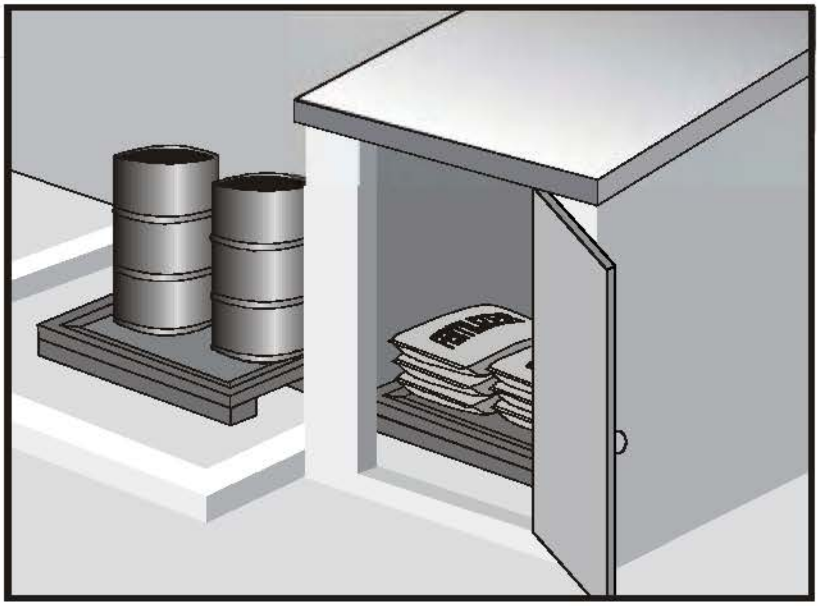
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Material Delivery and Storage WM-1



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Legend:

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☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

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- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
    - Avoid transport near drainage paths or waterways.
    - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
    - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.

- Stockpiles should be protected in accordance with WM-3, Stockpile Management.

- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.

- Proper storage instructions should be posted at all times in an open and conspicuous location.

- An ample supply of appropriate spill clean up material should be kept near storage areas.

- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.

- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.

- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.

- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.

- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Keep storage areas clean and well organized, including a current list of all materials onsite.

- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

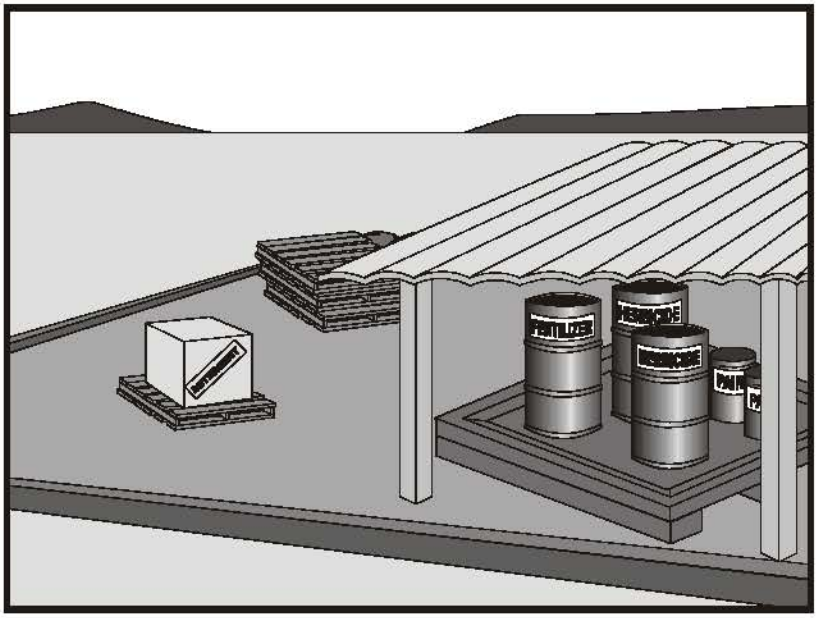
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
  - Do not treat soil that is water-saturated or frozen.
  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

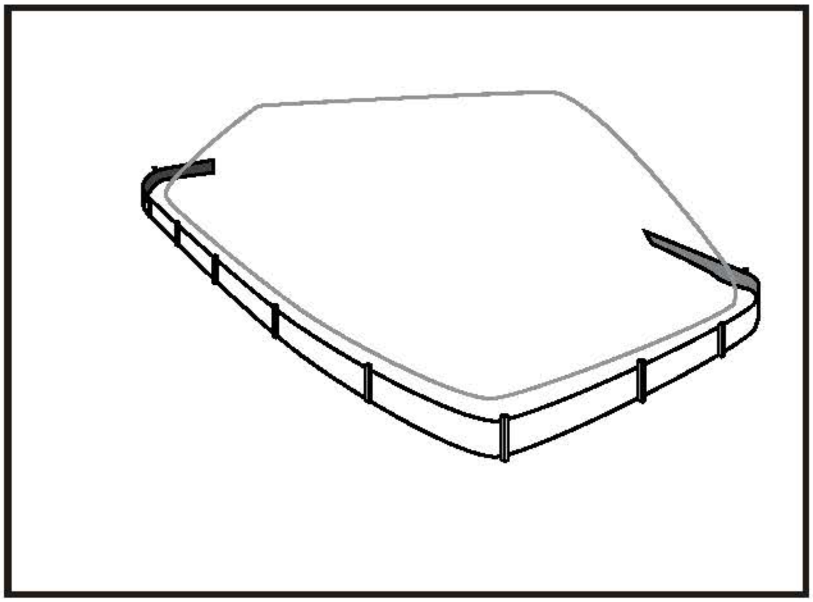
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Stockpile Management WM-3



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of plastic materials should be avoided when feasible and photodegradable plastics should not be used.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

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- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater run-on using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials should be protected further as follows:

Soil stockpiles

- Cover and project soil stockpiles with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Consider temporary vegetation for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Provide covers and protect these stockpiles with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

- Cover cold mix stockpiles and place them on plastic sheeting (or comparable material) and surround the stockpiles with a berm all times.

Stockpiles of fly ash, stucco, hydrated lime

- Cover stockpiles of materials that may raise the pH of runoff (i.e., basic materials) with plastic and surround the stockpiles with a berm at all times.

Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate)

- Cover treated wood with plastic sheeting (or comparable material) and surround with a berm at all times.

Protection of Active Stockpiles

Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

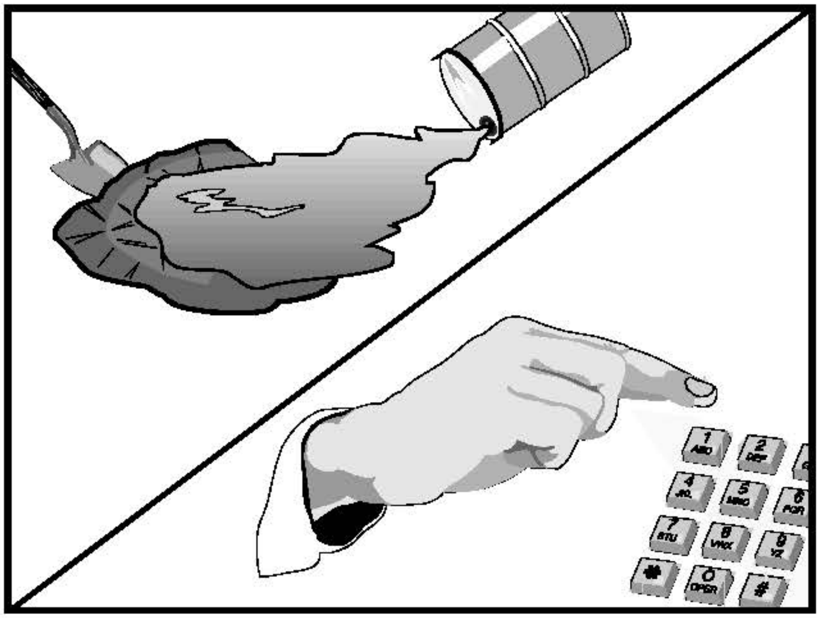
Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Spill Prevention and Control WM-4



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

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- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.

- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.

- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

- Use absorbent materials on small spills rather than hosing down or burying the spill.

- Absorbent materials should be promptly removed and disposed of properly.

- Follow the practice below for a minor spill:

  - Contain the spread of the spill.

  - Recover spilled materials.

  - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

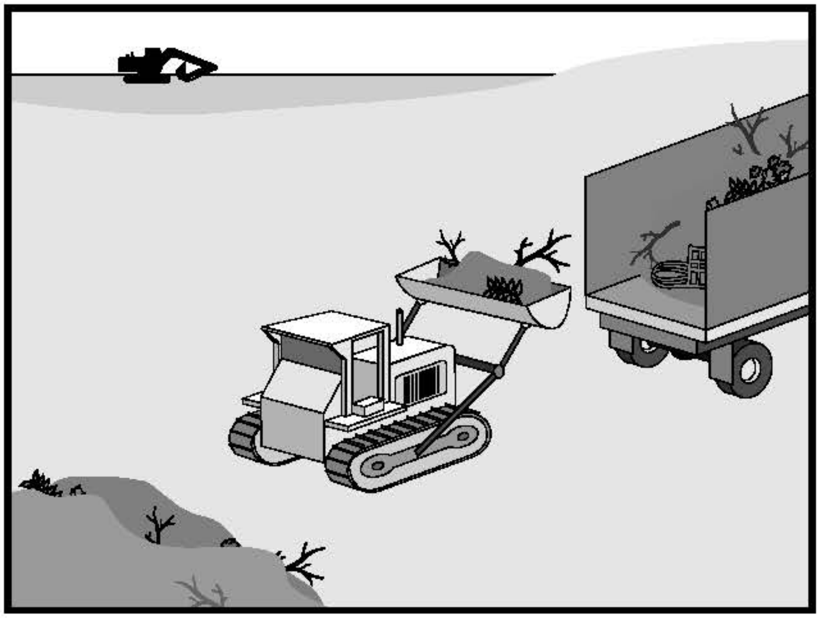
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials
- Highway planting wastes, including vegetative material,

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plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

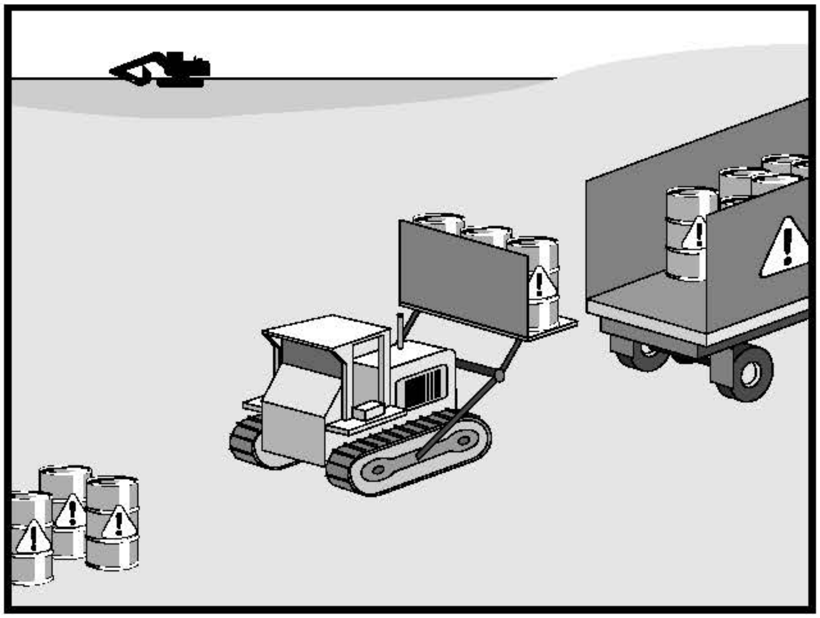
References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Hazardous Waste Management WM-6



Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Concrete Curing Compounds
- Palliatives
- Septic Wastes
- Stains
- Wood Preservatives
- Asphalt Products
- Pesticides
- Acids
- Paints
- Solvents
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
  - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
  - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
  - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
  - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.

- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.

- Drums should not be overfilled and wastes should not be mixed.

- Unless watertight, containers of dry waste should be stored on pallets.

- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.

- Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.

- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.

- The following actions should be taken with respect to temporary contaminant:

  - Ensure that adequate hazardous waste storage volume is available.

  - Ensure that hazardous waste collection containers are conveniently located.

  - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

  - Minimize production or generation of hazardous materials and hazardous waste on the job site.

  - Use containment berms in fueling and maintenance areas and where the potential for spills is high.

  - Segregate potentially hazardous waste from non-hazardous construction site debris.

  - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events..
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.

- A copy of the hazardous waste manifests should be provided.

References

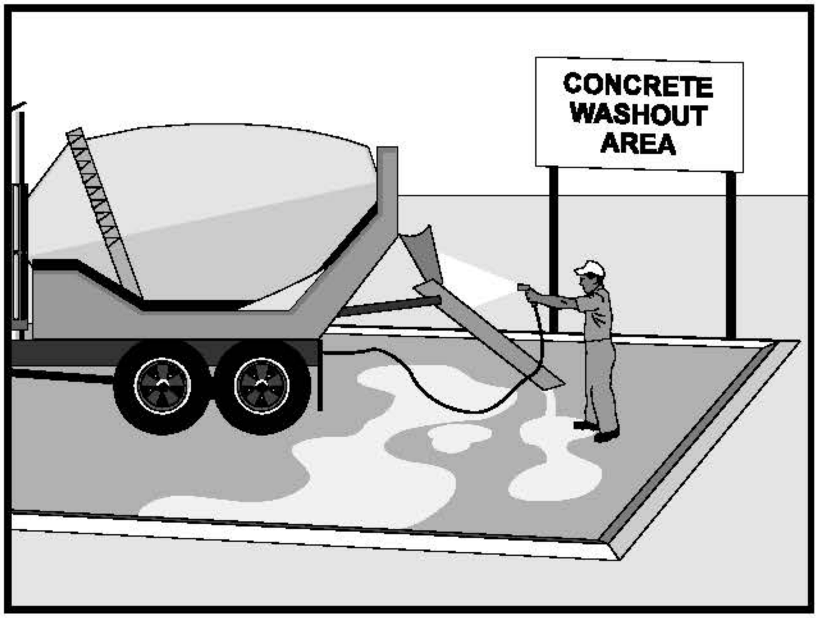
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Waste Management **WM-8**



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives
None

Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.

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- Concrete trucks and other concrete-coated equipment are washed onsite.
- Mortar-mixing stations exist.
- Stucco mixing and spraying .
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
  - Washout should be lined so there is no discharge into the underlying soil.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.

- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.

- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.

- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).

- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.

- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.

- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.

- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.

- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
  - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
  - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
  - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a "roll-off"; this concrete washout facility should be properly sealed to prevent leakage, and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations..

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Temporary concrete washout facilities should 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. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.

- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

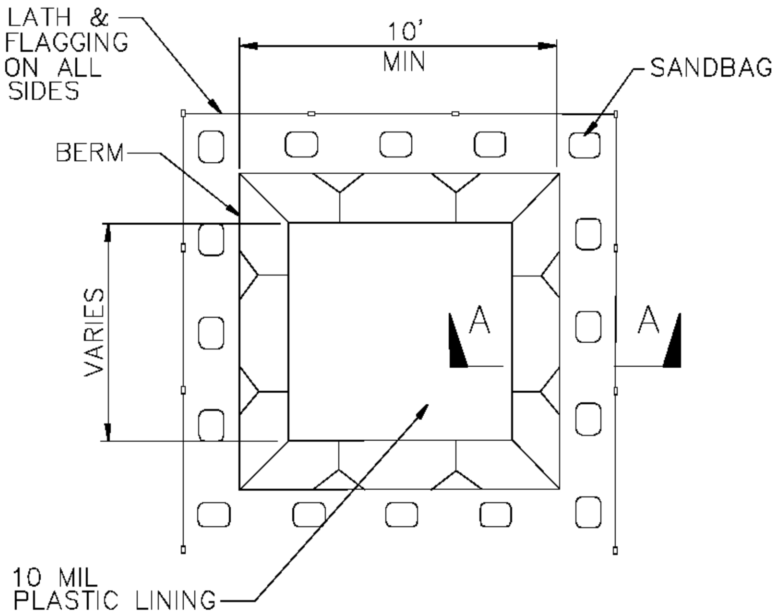
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

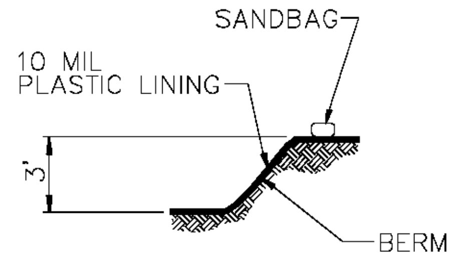
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

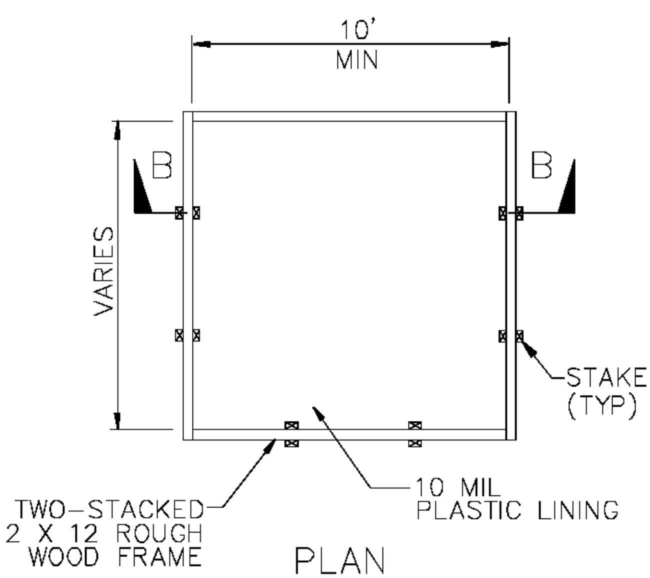
Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



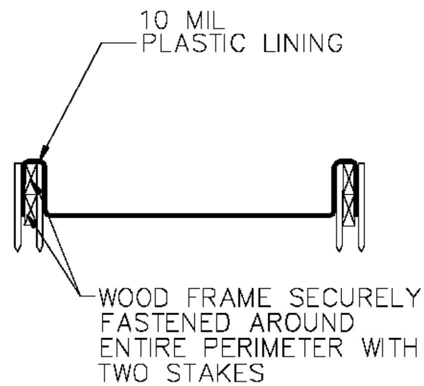
PLAN
NOT TO SCALE
TYPE "BELOW GRADE"



SECTION A–A
NOT TO SCALE



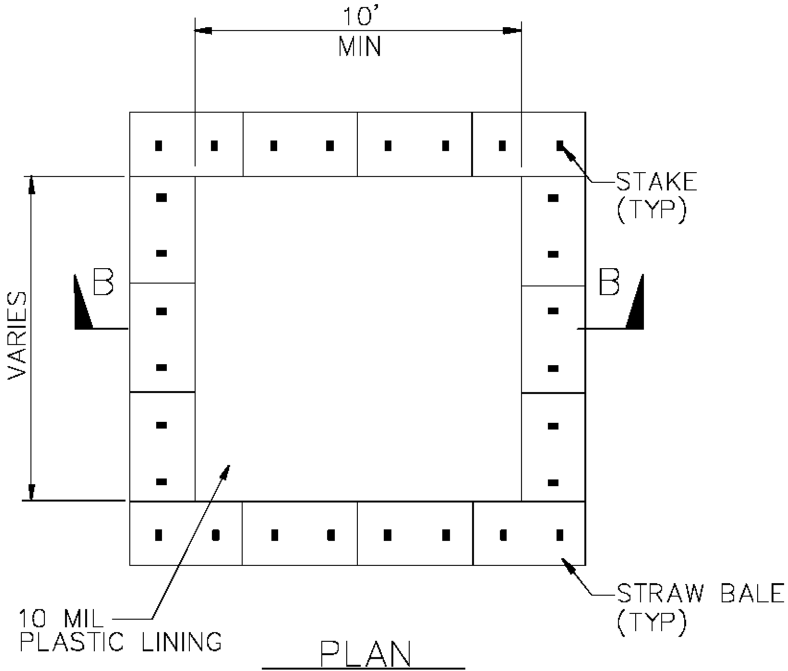
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



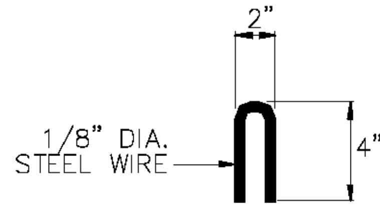
SECTION B–B
NOT TO SCALE

NOTES

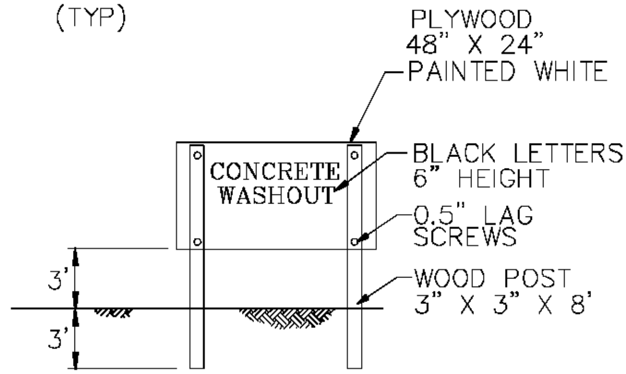
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



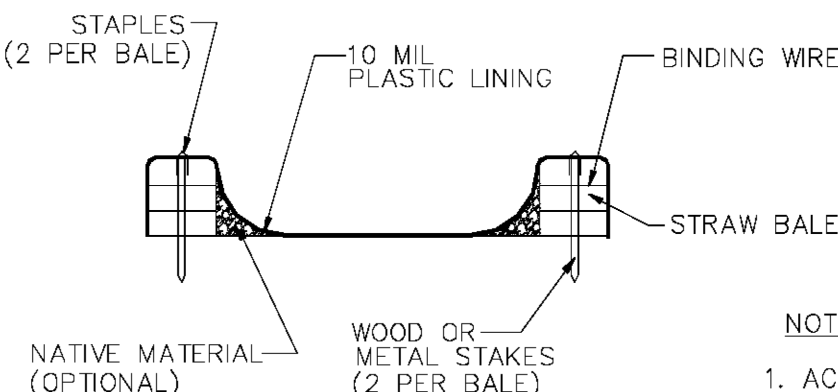
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

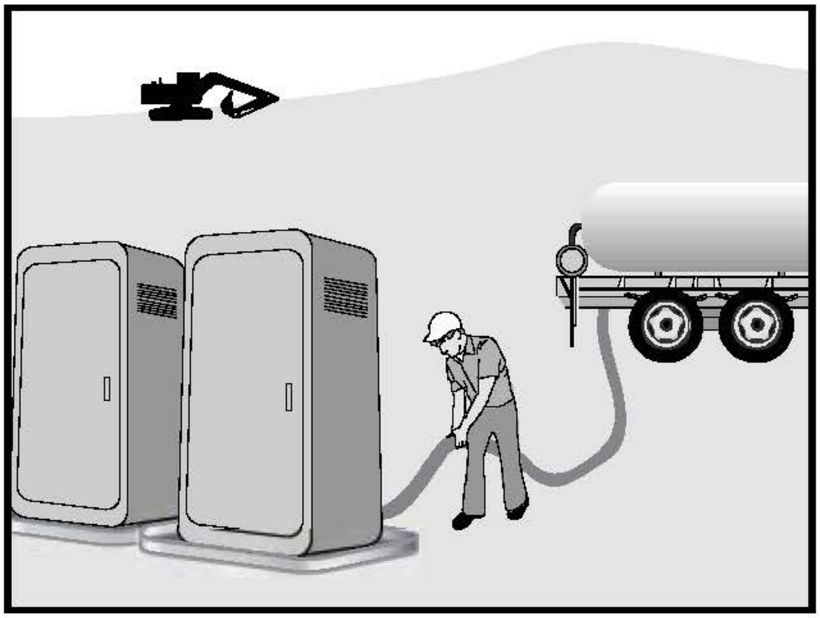


SECTION B–B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Sanitary/Septic Waste Management WM-9



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑

Potential Alternatives

None

Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

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- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Arrange for regular waste collection.

- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Trash Management Plan	**Spec. No: R-PLN-000-002**	**REV. A**
Project: Panoche Valley Solar	Client: Panoche Valley Solar, LLC	
Location: Paicines, San Benito County, CA	Project No: 176055	

APPROVAL STATUS							
PREPARED	W.H.D	**DATE**	1-28-15	**APPROVED BY**		**DATE**	
CHECKED BY		**DATE**		**APPROVED BY**		**DATE**	

REVISION STATUS						
REV	**DESCRIPTION**	**REVISED BY**	**CHECKED BY**	**APPROVAL**	**ISSUED BY**	**DATE**
A	ISSUED FOR INFORMATION	WHD		AH-I	HRM	28JAN15

Trash Management Plan	Spec. No: R-PLN-000-002	REV. A
Project: Panoche Valley Solar	Client: Panoche Valley Solar, LLC	
Location: Paicines, San Benito County, CA	Project No: 176055	

This document is intended to outline the process and procedures to be implemented by AMEC to aid in the successful construction of the Panoche Valley Solar plant in an environmentally responsible manner. This plan was developed using best management practices and aims to help the project comply with both state and local debris, recycling and reuse ordinances.

The project plan will require the commitment and participation of several parties both internal and external to AMEC. All involved contractors and parties will have experience with BMP's from past projects of similar size / duration and will be required to communicate, promote, implement and educate all employees to fully comply with the project trash management program. Besides the several obvious environmental benefits, proper housekeeping and management of debris is indicative of a safer job site and as such the Trash Management Plan will be actively implemented and monitored by AMEC.

Trash/Debris Containment

The project will generate various types of debris depending on the stage of construction. Over 50% of debris generated from construction activities will be recyclable material which will include; cardboard, packaging material, scrap wire, dunnage, scrap metal and plastics/cans. All other trash generated will be segregated from recyclables and disposed separately.

The site will be provided with several dumpsters strategically placed around the jobsite at various stages of progress. Trash cans will be placed throughout the job site in addition to dumpsters. Locations of trash cans will include but are not limited to; all trailer complexes and areas in close proximity to any ongoing work activity. Quantity and frequency of placement will be determined as manpower and activity increases. All trash cans shall have lids, as will any trash dumpsters on the project.

Trash dumpsters will be placed at the two main laydown areas located just east of little Panoche road and also at satellite laydown areas around the site. Recycling dumpsters will vary in placement as these will move periodically as progress is made to avoid workers having to travel long distances from the work area. The remote location of the project and space available will allow for flexibility in the location and relocation of dumpsters as needed. Each dumpster will be clearly labeled as to its intended purpose to avoid cross contamination amongst the various kinds of trash and debris. (Trash, cardboard, plastics & cans, scrap metal and wire)

All contractors and vendors shall be made aware of said locations via weekly subcontractor meetings and will be required to dispose of each kind of debris in its appropriate containment. Dumpster location and proper disposal will also be part of the mandatory site orientation for all new employees prior to working on site.

Trash/Debris Collection and Recovery

Each contractor shall be responsible for cleaning, collecting and properly disposing of all trash and debris associated with its scope of work and shall ensure the appropriate containment is being utilized with each deposit. Work areas shall be picked up throughout the work day to avoid any unreasonable accumulation of debris and shall be completely free of all trash and debris at the end of each workday. The reuse of items such as dunnage, packaging and protective covers will be encouraged to reduce the amount of debris introduced to site. Such items to be reused shall be consolidated, neatly stacked and secured against wind. No trash bags shall be left outside of any dumpster overnight as the high walls of the dumpsters will serve as protection from wild life.

Arrangements for offsite disposal and collection will be made with one or multiple local trash management/recycling companies. Recyclables will be scheduled on an as needed basis (cardboard, scrap metal, scrap wire, dunnage etc.) all other trash will be properly disposed offsite on a once weekly basis at a minimum and may increase in frequency with manpower and project needs. Frequent and timely removal of all waste from the project site will comply with county code ordinance 15.01.026

With the above mentioned collection plan, AMEC aims to be in compliance with county code ordinance chapter 15 which calls for solid waste material to be handled in a manner as to discourage the harboring and breeding of rodents and insects and avoid unreasonable pollution of the air or constitute a fire hazard. Any and all inspections by a county official as mentioned in ordinance 15.01.022 will be welcomed and met with full and complete cooperation by AMEC and all subcontractors and or vendors.

Enforcement and follow through

The success of any program depends on the participants buy-in and education, as previously mentioned, all participating contractors will have prior experience with similar projects. Such experience and knowledge of what is expected will provide the foundation to implement and enforce the site plan. Waste handling and debris disposal requirements and expectations will be included in project documents (subcontracts, etc.) securing commitment from each contractor on site.

Front line supervision will play a key role in educating the workforce, implementing and enforcing the site plan. Each foreman will be held accountable for the upkeep of their crews work areas and will be the point of contact if any deficiencies are found.

The site safety management team will have a vested interest in ensuring the trash management plan is implemented and followed as AMEC firmly believes a well-managed trash program promotes a positive site safety culture. Periodic inspections of the site for loose debris throughout the life of the project will help maintain the program, auditing the project for proper housekeeping will be part of the site safety teams weekly “safety walks”. Additionally, the constant presence and interaction from the entire site management team on a daily basis will play a key role in keeping the trash management plan on track. Feedback from all parties involved will be encouraged and implemented to facilitate involvement.

Appendix I: BMP Inspection Form

BMP INSPECTION REPORT

Date and Time of Inspection:			Date Report Written:	
Inspection Type: (Circle one)	Weekly *Complete Parts I,II,III and VII*	Pre-Storm *Complete Parts I,II,III,IV and VII*	During Rain Event *Complete Parts I, II, III, V, and VII*	Post-Storm *Complete Parts I,II,III,VI and VII*

Part I. General Information

Site Information			
Construction Site Name:			
Construction stage and completed activities:			Approximate area of site that is exposed:
Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:

Weather	
Estimate storm beginning: (date and time)	Estimate storm duration: (hours)
Estimate time since last storm: (days or hours)	Rain gauge reading and location: (in)
Is a “Qualifying Event” predicted or did one occur (i.e., 0.5” rain with 48-hrs or greater between events)? (Y/N) If yes, summarize forecast:	

Exemption Documentation (explanation required if inspection could not be conducted). Visual inspections are not required outside of business hours or during dangerous weather conditions such as flooding or electrical storms.

Inspector Information	
Inspector Name:	Inspector Title:
Signature:	Date:

Part II. BMP Observations. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level 1 Sites	Failures or other short comings (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent for leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			
Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			

Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
Erodible landscape material has not been applied 2 days before a forecasted rain event or during an event			
Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill, and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Run-On and Run-Off Controls			
Run-on to the site is effectively managed and directed away from all disturbed areas.			
Other			
Are the project SWPPP and BMP plan up to date, available on-site and being properly implemented?			

Part III. Descriptions of BMP Deficiencies		
Deficiency	**Repairs Implemented: Note - Repairs must begin within 72 hours of identification and, complete repairs as soon as possible.**	
	Start Date	**Action**
1.		
2.		
3.		
4.		

Part IV. Additional Pre-Storm Observations. Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source(s) of pollutants(s).	
	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	
Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	
Notes:	

Part V. Additional During Storm Observations. If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.	
Outfall, Discharge Point, or Other Downstream Location	
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-Storm Observations. Visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event, and observe (inspect) 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. Complete Part VII (Corrective Actions) as needed.	
Discharge Location, Storage or Containment Area	**Visual Observation**

Part VII. Additional Corrective Actions Required. **Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if SWPPP change is required.**	
Required Actions	**Implementation Date**

Part VII. Additional Corrective Actions Required. **Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if SWPPP change is required.**	
Required Actions	**Implementation Date**

BMP INSPECTION REPORT

Date and Time of Inspection:		Date Report Written:		
Inspection Type: (Circle one)	Weekly *Complete Parts I,II,III and VII*	Pre-Storm *Complete Parts I,II,III,IV and VII*	During Rain Event *Complete Parts I, II, III, V, and VII*	Post-Storm *Complete Parts I,II,III,VI and VII*
Part I. General Information				
Site Information				
Construction Site Name:				
Construction stage and completed activities:			Approximate area of site that is exposed:	
Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:	
Weather				
Estimate storm beginning: (date and time)		Estimate storm duration: (hours)		
Estimate time since last storm: (days or hours)		Rain gauge reading and location: (in)		
Is a "Qualifying Event" predicted or did one occur (i.e., 0.5" rain with 48-hrs or greater between events)? (Y/N) If yes, summarize forecast:				
Exemption Documentation (explanation required if inspection could not be conducted). Visual inspections are not required outside of business hours or during dangerous weather conditions such as flooding or electrical storms.				
Inspector Information				
Inspector Name:		Inspector Title:		
Signature:			Date:	

Part II. BMP Observations. **Describe deficiencies in Part III.**			
Minimum BMPs for Risk Level 1 Sites	Failures or other short comings (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent for leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			
Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			

Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
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Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill, and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Run-On and Run-Off Controls			
Run-on to the site is effectively managed and directed away from all disturbed areas.			
Other			
Are the project SWPPP and BMP plan up to date, available on-site and being properly implemented?			

Part III. Descriptions of BMP Deficiencies		
Deficiency	**Repairs Implemented: Note - Repairs must begin within 72 hours of identification and, complete repairs as soon as possible.**	
	Start Date	**Action**
1.		
2.		
3.		
4.		

Part IV. Additional Pre-Storm Observations. Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source(s) of pollutants(s).	
	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	
Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	
Notes:	

Part V. Additional During Storm Observations. If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.	
Outfall, Discharge Point, or Other Downstream Location	
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-Storm Observations. Visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event, and observe (inspect) 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. Complete Part VII (Corrective Actions) as needed.	
Discharge Location, Storage or Containment Area	**Visual Observation**

.

N/A – Not required for Risk Level 1

Appendix K: Training Reporting Form

Trained Contractor Personnel Log

Stormwater Management Training Log and Documentation

Project Name: Panoche Valley Solar
WDID #: ___________________________________

Stormwater Management Topic: (check as appropriate)

☐ Erosion Control ☐ Sediment Control
☐ Wind Erosion Control ☐ Tracking Control
☐ Non-Stormwater Management ☐ Waste Management and Materials Pollution Control
☐ Stormwater Sampling

Specific Training Objective: ____

Location: ______________________ Date: __________________________

Instructor:______________________ Telephone: _____________________

Course Length (hours): ___________

Attendee Roster (Attach additional forms if necessary)

Name	Company	Phone
Mark Noyes, President	Panoche Valley Solar, LLC 100 Summit Lake Drive, Suite 410 Valhalla, NY 10595	914-419-6701

As needed, add proof of external training (e.g., course completion certificates, credentials for QSP, QSD).

Appendix L: Responsible Parties

Authorization of Approved Signatories

Project Name: Panoche Valley Solar

WDID #: ____

Name of Personnel	Project Role	Company	Signature	Date

______________________________ ______________________________

LRP's Signature Date

Mark Noyes, President (914) 419-6701

______________________________ ______________________________

LRP Name and Title Telephone Number

Identification of QSP

Project Name: Panoche Valley Solar

WDID #: ___________________________________

The following are QSPs associated with this project

Name of Personnel(1)	Company	Date
TBD		

(1) If additional QSPs are required on the job site add additional lines and include information here

Appendix M:Contractors and Subcontractors

CONTRACTOR & SUBCONTRACTORS

Contractor: AMEC Kamtech, Inc., 1979 Lakeside Parkway, Suite 400, Tucker, GA 30084

Subcontractors: All American Fence Erectors (Desert Tortoise Fence), 16653 Walnut St., Hesperia, CA 92345

Cubit Engineering, Inc. (Survey Services), 16490 Walnut St., Unit B-3, Hesperia, CA 92345

HT Solar (Test Pile Installation & Removal), 2295 S. Lipan St., Denver, CO 80223

Kleinfelder (Pile & Soil Testing), 611 Corporate Circle, Suite C, Golden, CO 80401

Additional Subcontractors to be determined.

Appendix N: Construction General Permit

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Arnold Schwarzenegger
Governor

Division of Water Quality
1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Fax (916) 341-5463 • http://www.waterboards.ca.gov

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2010-0014-DWQ
NPDES NO. CAS000002

Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on:	**September 2, 2009**
Order No. 2009-0009-DWQ became effective on:	**July 1, 2010**
Order No. 2009-0009-DWQ shall expire on:	**September 2, 2014**
This Order, which amends Order No. 2009-0009-DWQ, was adopted by the State Water Resources Control Board on:	**November 16, 2010**
This Order shall become effective on:	**February 14, 2011**

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-0009-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on **November 16, 2010.**

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

FINAL ADOPTED CHANGES TO
Order No. 2009-0009-DWQ
November 16, 2010

Fact Sheet pages 11-12 Obtaining and Terminating Permit Coverage

The appropriate Legally Responsible Person (LRP) must obtain coverage under this General Permit~~, except in two limited circumstances. First, where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties, the utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project is responsible for obtaining coverage under the General Permit. Second, where there is a lease of a mineral estate (oil, gas, geothermal, aggregate, precious metals, and/or industrial metals), the lessee is responsible for obtaining coverage under the General Permit.~~ To obtain coverage, the LRP or the LRP's Approved Signatory ~~or other entity described above~~ must file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

Section II(A)(2) Conditions for Permit Coverage, page 14

2. The ~~utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project~~ Legally Responsible Person is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

Section II(C)(4) Conditions for Permit Coverage, page 18

4. When an LRP with active General Permit coverage transfers its LRP status to another person or entity that qualifies as an LRP, the existing LRP shall inform the new LRP of the General Permit's requirements. ~~When an LRP owns property with active General Permit coverage, and the LRP sells the property, or a parcel thereof, to another person, that person shall become an LRP with respect to whatever parcel was sold. The existing LRP shall inform the new LRP of the General Permit's requirements~~. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

Section IV(I) – Special Provisions pages 24-25

I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notices of Termination~~s~~ (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

   ~~a. The LRP's Approved Signatory must be one of the following:~~

   ~~i. For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;~~

   ~~ii. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;~~

   ~~iii. For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA);~~

   ~~iv. For the military: Any military officer who has been designated.~~

   ~~v. For a public university: An authorized university official~~

~~b~~. 2. Changes to Authorization. If an ~~a~~Approved ~~s~~Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an ~~a~~Approved ~~s~~Signatory.

~~2.~~ 3. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's ~~a~~Approved ~~s~~Signatory ~~as described above~~.

Attachment A, Section E(9) - Special Provisions pages 10-11

8. Electronic Signature and Certification Requirements

a. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5-Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5-Glossary) must submit all information electronically via SMARTS. ~~For Linear Underground/Overhead projects, the Legally Responsible Person is the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP. The LRP's Approved Signatory must be one of the following:~~

~~i For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:~~

~~(1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or~~

~~(2) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;~~

~~ii For a partnership or sole proprietorship: a general partner or the proprietor, respectively; or~~

~~iii For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA).~~

b. Changes to Authorization. If an ~~a~~Approved ~~s~~Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an ~~a~~Approved ~~s~~Signatory.

c. All SWPPP revisions, annual reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, USEPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's ~~a~~Approved ~~s~~Signatory ~~as described above~~.

Appendix 5 – Glossary

Approved Signatory
A person who has been authorized by the Legally Responsible Person ~~legal authority~~ to sign, certify, and electronically submit Permit Registration Documents, ~~and~~ Notices of Termination ~~on behalf of the Legally Responsible Person~~, and any other documents, reports, or information required by the General Permit, the State or Regional Water Board, or U.S. EPA. The Approved Signatory must be one of the following:

1. For a corporation or limited liability company: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation or limited liability company; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

3. For a municipality, State, Federal, or other public agency: a princip~~le~~al executive officer, ranking elected official, city manager, council president, or any other authorized public employee with managerial responsibility over the construction or land disturbance project (including, but not limited to, project manager, project superintendent, or resident engineer);

4. For the military: any military officer or Department of Defense civilian, acting in an equivalent capacity to a military officer, who has been designated;

5. For a public university: an authorized university official;

6. For an individual: the individual, because the individual acts as both the Legally Responsible Person and the Approved Signatory; or

7. For any type of entity not listed above (e.g. trusts, estates, receivers): an authorized person with managerial authority over the construction or land disturbance project.

Legally Responsible Person

The Legally Responsible Person (LRP) will typically be the project proponent. The categories of persons or entities that are eligible to serve as the LRP are set forth below. For any construction or land disturbance project where multiple persons or entities are eligible to serve as the LRP, those persons or entities shall select a single LRP. In exceptional circumstances, a person or entity that qualifies as the LRP may provide written authorization to another person or entity to serve as the LRP. In such a circumstance, the person or entity that provides the authorization retains all responsibility for compliance with the General Permit. Except as provided in category 2(d), a contractor who does not satisfy the requirements of any of the categories below is not qualified to be an LRP.

The following persons or entities may serve as a LRP:

1. ~~The~~ A person, company, agency, or other entity that possesses a real property interest (including, but not limited to, fee simple ownership, easement, leasehold, or other rights of way) in the land ~~who possesses the title of the land or the leasehold interest of a mineral estate~~ upon which the construction or land disturbance activities will occur for the regulated site. ~~For linear underground/overhead projects, it is in the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP.~~

2. In addition to the above, the following persons or entities may also serve as an LRP:

   a. For linear underground/overhead projects, the utility company, municipality, or other public or private company or agency that owns or operates the LUP;

   b. For land controlled by an estate or similar entity, the person who has day-to-day control over the land (including, but not limited to, a bankruptcy trustee, receiver, or conservator);

   c. For pollution investigation and remediation projects, any potentially responsible party that has received permission to conduct the project from the holder of a real property interest in the land; or

   d. For U.S. Army Corp of Engineers projects, the U.S. Army Corps of Engineers may provide written authorization to its bonded contractor to serve as the LRP, provided, however, that the U.S. Army Corps of Engineers is also responsible for compliance with the general permit, as authorized by the Clean Water Act or the Federal Facilities Compliance Act.

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Division of Water Quality
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Arnold Schwarzenegger
Governor

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

This Order was adopted by the State Water Resources Control Board on:	**September 2, 2009**
This Order shall become effective on:	**July 1, 2010**
This Order shall expire on:	**September 2, 2014**

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ [as amended by Order No. 2010-0014-DWQ] except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Arnold Schwarzenegger
Governor

Division of Water Quality

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**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES**

**ORDER NO. 2010-0014-DWQ
NPDES NO. CAS000002**

Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on:	**September 2, 2009**
Order No. 2009-0009-DWQ became effective on:	**July 1, 2010**
Order No. 2009-0009-DWQ shall expire on:	**September 2, 2014**
This Order, which amends Order No. 2009-0009-DWQ, was adopted by the State Water Resources Control Board on:	**November 16, 2010**
This Order shall become effective on:	**February 14, 2011**

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-0009-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on **November 16, 2010.**

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2012-0006-DWQ
NPDES NO**. CAS000002**

Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on:	**September 2, 2009**
Order No. 2009-0009-DWQ became effective on:	**July 1, 2010**
Order No. 2010-0014-DWQ became effective on:	**February 14, 2011**
Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ shall expire on:	**September 2, 2014**
This Order, which amends Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ, was adopted by the State Water Resources Control Board on:	**July 17, 2012**
This Order No. 2012-0006-DWQ shall become effective on:	**July 17, 2012**

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-000-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on July 17, 2012.

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Tam M. Doduc
Board Member Steven Moore
Board Member Felicia Marcus

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

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LIST OF APPENDICES

STATE WATER RESOURCES CONTROL BOARD
ORDER NO. 2009-0009-DWQ
[AS AMENDED BY ORDER NO. 2010-0014-DWQ]
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
GENERAL PERMIT NO. CAS000002

WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

I. FINDINGS

A. General Findings

The State Water Resources Control Board (State Water Board) finds that:

1. The federal Clean Water Act (CWA) prohibits certain discharges of storm water containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act (CWA) §§ 301 and 402(p)). The U.S. Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the CWA's mandate to control pollutants in storm water runoff discharges. (Title 40 Code of Federal Regulations (C.F.R.) Parts 122, 123, and 124). The federal statutes and regulations require discharges to surface waters comprised of storm water associated with construction activity, including demolition, clearing, grading, and excavation, and other land disturbance activities (except operations that result in disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale), to obtain coverage under an NPDES permit. The NPDES permit must require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in storm water runoff. The NPDES permit must also include additional requirements necessary to implement applicable water quality standards.

2. This General Permit authorizes discharges of storm water associated with construction activity so long as the dischargers comply with all requirements, provisions, limitations and prohibitions in the permit. In addition, this General Permit regulates the discharges of storm water associated with construction activities from all Linear

Underground/Overhead Projects resulting in the disturbance of greater than or equal to one acre (Attachment A).

3. This General Permit regulates discharges of pollutants in storm water associated with construction activity (storm water discharges) to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.

4. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.

5. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), pursuant to Section 13389 of the California Water Code.

6. Pursuant to 40 C.F.R. § 131.12 and State Water Board Resolution No. 68-16,[1] which incorporates the requirements of § 131.12 where applicable, the State Water Board finds that discharges in compliance with this General Permit will not result in the lowering of water quality standards, and are therefore consistent with those provisions. Compliance with this General Permit will result in improvements in water quality.

7. This General Permit serves as an NPDES permit in compliance with CWA § 402 and will take effect on July 1, 2010 by the State Water Board provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, the General Permit will not become effective until such objection is withdrawn.

8. Following adoption and upon the effective date of this General Permit, the Regional Water Quality Control Boards (Regional Water Boards) shall enforce the provisions herein.

9. Regional Water Boards establish water quality standards in Basin Plans. The State Water Board establishes water quality standards in various statewide plans, including the California Ocean Plan. U.S. EPA establishes water quality standards in the National Toxic Rule (NTR) and the California Toxic Rule (CTR).

[1] Resolution No. 68-16 generally requires that existing water quality be maintained unless degradation is justified based on specific findings.

10. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.

11. The primary storm water pollutant at construction sites is excess sediment. Excess sediment can cloud the water, which reduces the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and greases.

12. Construction activities can impact a construction site's runoff sediment supply and transport characteristics. These modifications, which can occur both during and after the construction phase, are a significant cause of degradation of the beneficial uses established for water bodies in California. Dischargers can avoid these effects through better construction site design and activity practices.

13. This General Permit recognizes four distinct phases of construction activities. The phases are Grading and Land Development Phase, Streets and Utilities Phase, Vertical Construction Phase, and Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants. This General Permit also recognizes inactive construction as a category of construction site type.

14. Compliance with any specific limits or requirements contained in this General Permit does not constitute compliance with any other applicable requirements.

15. Following public notice in accordance with State and Federal laws and regulations, the State Water Board heard and considered all comments and testimony in a public hearing on 06/03/2009. The State Water Board has prepared written responses to all significant comments.

16. Construction activities obtaining coverage under the General Permit may have multiple discharges subject to requirements that are specific to general, linear, and/or active treatment system discharge types.

17. The State Water Board may reopen the permit if the U.S. EPA adopts a final effluent limitation guideline for construction activities.

B. Activities Covered Under the General Permit

18. Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

19. Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

20. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.

21. Construction activity associated with Linear Underground/Overhead Utility Projects (LUPs) including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

22. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[2]

23. Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction sites that intend to disturb one or more acres of land within the jurisdictional boundaries of

[2] Pursuant to the Ninth Circuit Court of Appeals' decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the site.

C. Activities Not Covered Under the General Permit

24. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

25. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

26. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

27. Construction activity and land disturbance involving discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit.

28. Construction activity that disturbs less than one acre of land surface, and that is not part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

29. Construction activity covered by an individual NPDES Permit for storm water discharges.

30. Discharges from small (1 to 5 acre) construction activities with an approved Rainfall Erosivity Waiver authorized by U.S. EPA Phase II regulations certifying to the State Board that small construction activity will occur only when the Rainfall Erosivity Factor is less than 5 (“R” in the Revised Universal Soil Loss Equation).

31. Landfill construction activity that is subject to the Industrial General Permit.

32. Construction activity that discharges to Combined Sewer Systems.

33. Conveyances that discharge storm water runoff combined with municipal sewage.

34. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

35. Discharges occurring in basins that are not tributary or hydrologically connected to waters of the United States (for more information contact your Regional Water Board).

D. Obtaining and Modifying General Permit Coverage

36. This General Permit requires all dischargers to electronically file all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting, and other compliance documents required by this General Permit through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website.

37. Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

38. This General Permit grants an exception from the Risk Determination requirements for existing sites covered under Water Quality Orders No. 99-08-DWQ, and No. 2003-0007-DWQ. For certain sites, adding additional requirements may not be cost effective. Construction sites covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at the Risk Level 1. LUPs covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage as a Type 1 LUP. The Regional Water Boards have the authority to require Risk Determination to be performed on sites currently covered under Water Quality Orders No. 99-08-DWQ and No. 2003-0007-DWQ where they deem it necessary. The State Water Board finds that there are two circumstances when it may be appropriate for the Regional Water Boards to require a discharger that had filed an NOI under State Water Board Order No. 99-08-DWQ to recalculate the site's risk level. These circumstances are: (1) when the discharger has a demonstrated history of noncompliance with State Water Board Order No. 99-08-DWQ or; (2) when the discharger's site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements.

E. Prohibitions

39. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit. Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may

contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural Best Management Practices (BMPs)[3]. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction.

40. This General Permit prohibits all discharges which contain a hazardous substance 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.

41. This General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the State Water Board and the nine Regional Water Boards.

42. Pursuant to the Ocean Plan, discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

43. This General Permit prohibits the discharge of any debris[4] from construction sites. Plastic and other trash materials can cause negative impacts to receiving water beneficial uses. The State Water Board encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality.

F. Training

44. In order to improve compliance with and to maintain consistent enforcement of this General Permit, all dischargers are required to appoint two positions - the Qualified SWPPP Developer (QSD) and the Qualified SWPPP Practitioner (QSP) - who must obtain appropriate training. Together with the key stakeholders, the State and Regional Water Boards are leading the development of this curriculum through a collaborative organization called The Construction General Permit (CGP) Training Team.

45. The Professional Engineers Act (Bus. & Prof. Code section 6700, et seq.) requires that all engineering work must be performed by a California licensed engineer.

[3] BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

[4] Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

G. Determining and Reducing Risk

46. The risk of accelerated erosion and sedimentation from wind and water depends on a number of factors, including proximity to receiving water bodies, climate, topography, and soil type.

47. This General Permit requires dischargers to assess the risk level of a site based on both sediment transport and receiving water risk. This General Permit contains requirements for Risk Levels 1, 2 and 3, and LUP Risk Type 1, 2, and 3 (Attachment A). Risk levels are established by determining two factors: first, calculating the site's sediment risk; and second, receiving water risk during periods of soil exposure (i.e. grading and site stabilization). Both factors are used to determine the site-specific Risk Level(s). LUPs can be determined to be Type 1 based on the flowchart in Attachment A.1.

48. Although this General Permit does not mandate specific setback distances, dischargers are encouraged to set back their construction activities from streams and wetlands whenever feasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Because there is a reduced risk to receiving waters when setbacks are used, this General Permit gives credit to setbacks in the risk determination and post-construction storm water performance standards. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board and local agency setback requirements, and to encourage voluntary setbacks wherever practicable.

49. Rain events can occur at any time of the year in California. Therefore, a Rain Event Action Plan (REAP) is necessary for Risk Level 2 and 3 traditional construction projects (LUPs exempt) to ensure that active construction sites have adequate erosion and sediment controls implemented prior to the onset of a storm event, even if construction is planned only during the dry season.

50. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Given their long settling time, dislodging these soils results in a significant risk that fine particles will be released into surface waters and cause unacceptable downstream impacts. If operated correctly, an Active Treatment System (ATS[5]) can prevent or reduce the release of fine particles from construction sites.

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[5] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.

Use of an ATS can effectively reduce a site's risk of impacting receiving waters.

51. Dischargers located in a watershed area where a Total Maximum Daily Load (TMDL) has been adopted or approved by the Regional Water Board or U.S. EPA may be required by a separate Regional Water Board action to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. Such dischargers may also be required to obtain an individual Regional Water Board permit specific to the area.

H. Effluent Standards

52. The State Water Board convened a blue ribbon panel of storm water experts that submitted a report entitled, “The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities,” dated June 19, 2006. The panel concluded that numeric limits or action levels are technically feasible to control construction storm water discharges, provided that certain conditions are considered. The panel also concluded that numeric effluent limitations (NELs) are feasible for discharges from construction sites that utilize an ATS. The State Water Board has incorporated the expert panel’s suggestions into this General Permit, which includes numeric action levels (NALs) for pH and turbidity, and special numeric limits for ATS discharges.

Determining Compliance with Numeric Limitations

53. This General Permit sets a pH NAL of 6.5 to 8.5, and a turbidity NAL of 250 NTU. The purpose of the NAL and its associated monitoring requirement is to provide operational information regarding the performance of the measures used at the site to minimize the discharge of pollutants and to protect beneficial uses and receiving waters from the adverse effects of construction-related storm water discharges. An exceedance of a NAL does not constitute a violation of this General Permit.

54. This General Permit requires dischargers with NAL exceedances to immediately implement additional BMPs and revise their Storm Water Pollution Prevention Plans (SWPPPs) accordingly to either prevent pollutants and authorized non-storm water discharges from contaminating storm water, or to substantially reduce the pollutants to levels consistently below the NALs. NAL exceedances are reported in the State Water Boards SMARTS system, and the discharger is

required to provide an NAL Exceedance Report when requested by a Regional Water Board.

I. Receiving Water Limitations

55. This General Permit requires all enrolled dischargers to determine the receiving waters potentially affected by their discharges and to comply with all applicable water quality standards, including any more stringent standards applicable to a water body.

J. Sampling, Monitoring, Reporting and Record Keeping

56. Visual monitoring of storm water and non-storm water discharges is required for all sites subject to this General Permit.

57. Records of all visual monitoring inspections are required to remain on-site during the construction period and for a minimum of three years.

58. For all Risk Level 3/LUP Type 3 and Risk Level 2/LUP Type 2 sites, this General Permit requires effluent monitoring for pH and turbidity. Sampling, analysis and monitoring requirements for effluent monitoring for pH and turbidity are contained in this General Permit.

59. Risk Level 3 and LUP Type 3 sites with effluent that exceeds the Receiving Water Monitoring Triggers contained in this General Permit and with direct discharges to receiving water are required to conduct receiving water monitoring. An exceedance of a Receiving Water Monitoring Trigger does not constitute a violation of this General Permit.

60. This General Permit establishes a 5 year, 24 hour (expressed in inches of rainfall) as an exemptions to the receiving water monitoring requirements for Risk Level 3 and LUP Type 3 dischargers.

61. If run-on is caused by a forest fire or any other natural disaster, then receiving water monitoring triggers do not apply.

62. For Risk Level 3 and LUP Type 3 sites larger than 30 acres and with direct discharges to receiving waters, this General Permit requires bioassessment sampling before and after site completion to determine if significant degradation to the receiving water's biota has occurred. Bioassessment sampling guidelines are contained in this General Permit.

63. A summary and evaluation of the sampling and analysis results will be submitted in the Annual Reports.

64. This General Permit contains sampling, analysis and monitoring requirements for non-visible pollutants at all sites subject to this General Permit.

65. Compliance with the General Permit relies upon dischargers to electronically self-report any discharge violations and to comply with any Regional Water Board enforcement actions.

66. This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. For LUPs, these documents may be retained in a crew member's vehicle and made available upon request.

K. Active Treatment System (ATS) Requirements

67. Active treatment systems add chemicals to facilitate flocculation, coagulation and filtration of suspended sediment particles. The uncontrolled release of these chemicals to the environment can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity). Additionally, the batch storage and treatment of storm water through an ATS' can potentially cause physical impacts on receiving waters if storage volume is inadequate or due to sudden releases of the ATS batches and improperly designed outfalls.

68. If designed, operated and maintained properly an ATS can achieve very high removal rates of suspended sediment (measured as turbidity), albeit at sometimes significantly higher costs than traditional erosion/sediment control practices. As a result, this General Permit establishes NELs consistent with the expected level of typical ATS performance.

69. This General Permit requires discharges of storm water associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality.

70. For ATS discharges, this General Permit establishes technology-based NELs for turbidity.

71. This General Permit establishes a 10 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based numeric effluent limitations for ATS discharges. Exceedances of the ATS turbidity NEL constitutes a violation of this General Permit.

L. Post-Construction Requirements

72. This General Permit includes performance standards for post-construction that are consistent with State Water Board Resolution No. 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing Its Incorporation," and 2008-0030, “Requiring Sustainable Water Resources Management.“ The requirement for all construction sites to match pre-project hydrology will help ensure that the physical and biological integrity of aquatic ecosystems are sustained. This “runoff reduction” approach is analogous in principle to Low Impact Development (LID) and will serve to protect related watersheds and waterbodies from both hydrologic-based and pollution impacts associated with the post-construction landscape.

73. LUP projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

M. Storm Water Pollution Prevention Plan Requirements

74. This General Permit requires the development of a site-specific SWPPP. The SWPPP must include the information needed to demonstrate compliance with all requirements of this General Permit, and must be kept on the construction site and be available for review. The discharger shall ensure that a QSD develops the SWPPP.

75. To ensure proper site oversight, this General Permit requires a Qualified SWPPP Practitioner to oversee implementation of the BMPs required to comply with this General Permit.

N. Regional Water Board Authorities

76. Regional Water Boards are responsible for implementation and enforcement of this General Permit. A general approach to permitting is not always suitable for every construction site and environmental circumstances. Therefore, this General Permit recognizes that Regional Water Boards must have some flexibility and authority to alter, approve, exempt, or rescind permit authority granted under this

General Permit in order to protect the beneficial uses of our receiving waters and prevent degradation of water quality.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in Attachments A, B, C, D, E and F)[6]:

II. CONDITIONS FOR PERMIT COVERAGE

A. Linear Underground/Overhead Projects (LUPs)

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g. telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. The Legally Responsible Person is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

3. Only LUPs shall comply with the conditions and requirements in Attachment A, A.1 & A.2 of this Order. The balance of this Order is not applicable to LUPs except as indicated in Attachment A.

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[6] These attachments are part of the General Permit itself and are not separate documents that are capable of being updated independently by the State Water Board.

B. Obtaining Permit Coverage Traditional Construction Sites

1. The Legally Responsible Person (LRP) (see Special Provisions, Electronic Signature and Certification Requirements, Section IV.I.1) must obtain coverage under this General Permit.

2. To obtain coverage, the LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

3. PRDs shall consist of:

   a. Notice of Intent (NOI)
   b. Risk Assessment (Section VIII)
   c. Site Map
   d. Storm Water Pollution Prevention Plan (Section XIV)
   e. Annual Fee
   f. Signed Certification Statement

   Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

   Attachment B contains additional PRD information. Dischargers must electronically file the PRDs, and mail the appropriate annual fee to the State Water Board.

4. This permit is effective on July 1, 2010.

   a. **Dischargers Obtaining Coverage On or After July 1, 2010:** All dischargers requiring coverage on or after July 1, 2010, shall electronically file their PRDs prior to the commencement of construction activities, and mail the appropriate annual fee no later than seven days prior to the commencement of construction activities. Permit coverage shall not commence until the PRDs and the annual fee are received by the State Water Board, and a WDID number is assigned and sent by SMARTS.

   b. **Dischargers Covered Under 99-08-DWQ and 2003-0007-DWQ:** Existing dischargers subject to State Water Board Order No. 99-08-DWQ (existing dischargers) will continue coverage under 99-08-DWQ until July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 99-08-DWQ will be terminated.

Existing dischargers shall electronically file their PRDs no later than July 1, 2010. If an existing discharger's site acreage subject to the annual fee has changed, it shall mail a revised annual fee no less than seven days after receiving the revised annual fee notification, **or else lose permit coverage**. All existing dischargers shall be exempt from the risk determination requirements in Section VIII of this General Permit until two years after permit adoption. All existing dischargers are therefore subject to Risk Level 1 requirements regardless of their site's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the Section VIII risk determination requirements.

5. The discharger is only considered covered by this General Permit upon receipt of a Waste Discharger Identification (WDID) number assigned and sent by the State Water Board Storm water Multi-Application and Report Tracking System (SMARTS). In order to demonstrate compliance with this General Permit, the discharger must obtain a WDID number and must present documentation of a valid WDID upon demand.

6. During the period this permit is subject to review by the U.S. EPA, the prior permit (State Water Board Order No. 99-08-DWQ) remains in effect. Existing dischargers under the prior permit will continue to have coverage under State Water Board Order No. 99-08-DWQ until this General Permit takes effect on July 1, 2010. Dischargers who complete their projects and electronically file an NOT prior to July 1, 2010, are not required to obtain coverage under this General Permit.

7. Small Construction Rainfall Erosivity Waiver

   EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

   Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

   If a small construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

8. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. Revising Permit Coverage for Change of Acreage or New Ownership

1. The discharger may reduce or increase the total acreage covered under this General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met (See Section II.D Conditions for Termination of Coverage); when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to this General Permit, is added to the site.

2. Within 30 days of a reduction or increase in total disturbed acreage, the discharger shall electronically file revisions to the PRDs that include:

   a. A revised NOI indicating the new project size;

   b. A revised site map showing the acreage of the site completed, acreage currently under construction, acreage sold/transferred or added, and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section II.D below.

   c. SWPPP revisions, as appropriate; and

   d. Certification that any new landowners have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address of the new landowner.

   e. If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

3. The discharger shall continue coverage under the General Permit for any parcel that has not achieved “Final Stabilization” as defined in Section II.D.

4. When an LRP with active General Permit coverage transfers its LRP status to another person or entity that qualifies as an LRP, the existing LRP shall inform the new LRP of the General Permit’s requirements. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP’s approved signatory, must submit PRDs in accordance with this General Permit’s requirements.

D. Conditions for Termination of Coverage

1. Within 90 days of when construction is complete or ownership has been transferred, the discharger shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met. The Regional Water Board will consider a construction site complete only when all portions of the site have been transferred to a new owner, or all of the following conditions have been met:

   a. For purposes of “final stabilization,” the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;

   b. There is no potential for construction-related storm water pollutants to be discharged into site runoff;

   c. Final stabilization has been reached;

   d. Construction materials and wastes have been disposed of properly;

   e. Compliance with the Post-Construction Standards in Section XIII of this General Permit has been demonstrated;

   f. Post-construction storm water management measures have been installed and a long-term maintenance plan[7] has been established; and

   g. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.

[7] For the purposes of this requirement a long-term maintenance plan will be designed for a minimum of five years, and will describe the procedures to ensure that the post-construction storm water management measures are adequately maintained.

2. The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.

3. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above (Section II.D.1) and the final stabilization condition (Section II.D.1.a) is attained by one of the following methods:

   a. “70% final cover method,” no computational proof required

      OR:

   b. “RUSLE or RUSLE2 method,” computational proof required

      OR:

   c. “Custom method”, the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the “final stabilization” requirement in Section II.D.1.a.

III. DISCHARGE PROHIBITIONS

A. Dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

B. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit.

C. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;
2. The discharge does not violate any other provision of this General Permit;
3. The discharge is not prohibited by the applicable Basin Plan;
4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the non-storm water discharge with construction materials or equipment.
5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;
6. The discharge is monitored and meets the applicable NALs; and
7. The discharger reports the sampling information in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not already authorized by this General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

D. Debris resulting from construction activities are prohibited from being discharged from construction sites.

E. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

IV. SPECIAL PROVISIONS

A. Duty to Comply

1. The discharger shall comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

2. The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

B. General Permit Actions

1. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

2. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

D. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

F. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

G. Duty to Maintain Records and Provide Information

1. The discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be available at the construction site until construction is completed.

2. The discharger shall furnish the Regional Water Board, State Water Board, or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

H. Inspection and Entry

The discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the discharger’s premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

2. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

3. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

4. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

2. Changes to Authorization. If an Approved Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an Approved Signatory.

3. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's Approved Signatory.

J. Certification

Any person signing documents under Section IV.I above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure 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."

K. Anticipated Noncompliance

The discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

L. Bypass

Bypass[8] is prohibited. The Regional Water Board may take enforcement action against the discharger for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;[9]

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance;

3. The discharger submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or

4. The discharger may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The discharger shall submit notice of an unanticipated bypass as required.

M. Upset

1. A discharger that wishes to establish the affirmative defense of an upset[10] in an action brought for noncompliance shall demonstrate,

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[8] The intentional diversion of waste streams from any portion of a treatment facility

[9] Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

[10] An exceptional incident in which there is unintentional and temporary noncompliance the technology based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the discharger can identify the cause(s) of the upset

b. The treatment facility was being properly operated by the time of the upset

c. The discharger submitted notice of the upset as required; and

d. The discharger complied with any remedial measures required

2. No determination made before an action of noncompliance occurs, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof

N. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

O. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

P. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

Q. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

R. Penalties for Violations of Permit Conditions

1. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[11] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

2. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

S. Transfers

This General Permit is not transferable.

T. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

[11] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

V. EFFLUENT STANDARDS & RECEIVING WATER MONITORING

A. Narrative Effluent Limitations

1. Storm water discharges and authorized non-storm water 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.

2. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

Table 1- Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level
pH	Field test with calibrated portable instrument	Risk Level 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5
		Risk Level 3			lower NAL = 6.5 upper NAL = 8.5
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2	1	NTU	250 NTU
		Risk Level 3			250 NTU

B. Numeric Action Levels (NALs)

1. For Risk Level 2 and 3 dischargers, the lower storm event average NAL for pH is 6.5 pH units and the upper storm event average NAL for

pH is 8.5 pH units. The discharger shall take actions as described below if the discharge is outside of this range of pH values.

2. For Risk Level 2 and 3 dischargers, the NAL storm event daily average for turbidity is 250 NTU. The discharger shall take actions as described below if the discharge is outside of this range of turbidity values.

3. Whenever the results from a storm event daily average indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.

4. The site evaluation shall be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

   a. Are related to the construction activities and whether additional BMPs are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

      AND/OR:

   b. Are related to the run-on associated with the construction site location and whether additional BMPs measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) what corrective action(s) were taken or will be taken with a description of the schedule for completion.

C. Receiving Water Monitoring Triggers

1. The receiving water monitoring triggers for Risk Level 3 dischargers with direct discharges to surface waters are triggered when the daily average effluent pH values during any site phase when there is a high risk of pH discharge[12] fall outside of the range of 6.0 and 9.0 pH units, or when the daily average effluent turbidity exceeds 500 NTU.

2. Risk Level 3 dischargers with with direct discharges to surface waters shall conduct receiving water monitoring whenever their effluent monitoring results exceed the receiving water monitoring triggers. If the pH trigger is exceeded, the receiving water shall be monitored for pH for the duration of coverage under this General Permit. If the turbidity trigger is exceeded, the receiving water shall be monitored for turbidity and SSC for the duration of coverage under this general permit.

3. Risk Level 3 dischargers with direct discharges to surfaces waters shall initiate receiving water monitoring when the triggers are exceeded unless the storm event causing the exceedance is determined after the fact to equal to or greater than the 5-year 24-hour storm (expressed in inches of rainfall) as determined by using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

   Verification of the 5-year 24-hour storm event shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

4. If run-on is caused by a forest fire or any other natural disaster, then receiving water monitoring triggers do not apply.

[12] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

VI. RECEIVING WATER LIMITATIONS

A. The discharger shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

B. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

C. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

D. Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL has been approved by the U.S. EPA, shall comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of the pollution.

VII. TRAINING QUALIFICATIONS AND CERTIFICATION REQUIREMENTS

A. General

The discharger shall ensure that all persons responsible for implementing requirements of this General Permit shall be appropriately trained in accordance with this Section. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Those responsible for preparing and amending SWPPPs shall comply with the requirements in this Section VII.

The discharger shall provide documentation of all training for persons responsible for implementing the requirements of this General Permit in the Annual Reports.

B. SWPPP Certification Requirements

1. **Qualified SWPPP Developer:** The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

    a. A California registered professional civil engineer;

    b. A California registered professional geologist or engineering geologist;

    c. A California registered landscape architect;

    d. A professional hydrologist registered through the American Institute of Hydrology;

    e. A Certified Professional in Erosion and Sediment Control (CPESC) ™ registered through Enviro Cert International, Inc.;

    f. A Certified Professional in Storm Water Quality (CPSWQ) ™ registered through Enviro Cert International, Inc.; or

    g. A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

2. The discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

3. **Qualified SWPPP Practitioner:** The discharger shall ensure that all BMPs required by this General Permit are implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   a. A certified erosion, sediment and storm water inspector registered through Enviro Cert International, Inc.; or

   b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

4. The LRP shall list in the SWPPP, the name of any Approved Signatory, and provide a copy of the written agreement or other mechanism that provides this authority from the LRP in the SWPPP.

5. The discharger shall include, in the SWPPP, a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

6. The discharger shall ensure that the SWPPP and each amendment will be signed by the Qualified SWPPP Developer. The discharger shall include a listing of the date of initial preparation and the date of each amendment in the SWPPP.

VIII. RISK DETERMINATION

The discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level(s) using the methodology in

Appendix 1. For any site that spans two or more planning watersheds,[13] the discharger shall calculate a separate Risk Level for each planning watershed. The discharger shall notify the State Water Board of the site's Risk Level determination(s) and shall include this determination as a part of submitting the PRDs. If a discharger ends up with more than one Risk Level determination, the Regional Water Board may choose to break the project into separate levels of implementation.

IX. RISK LEVEL 1 REQUIREMENTS

Risk Level 1 Dischargers shall comply with the requirements included in Attachment C of this General Permit.

X. RISK LEVEL 2 REQUIREMENTS

Risk Level 2 Dischargers shall comply with the requirements included in Attachment D of this General Permit.

XI. RISK LEVEL 3 REQUIREMENTS

Risk Level 3 Dischargers shall comply with the requirements included in Attachment E of this General Permit.

XII. ACTIVE TREATMENT SYSTEMS (ATS)

Dischargers choosing to implement an ATS on their site shall comply with all of the requirements in Attachment F of this General Permit.

[13] Planning watershed: defined by the Calwater Watershed documents as a watershed that ranges in size from approximately 3,000 to 10,000 acres http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://gis.ca.gov/catalog/BrowseRecord.epl?id=22175 .

XIII. POST-CONSTRUCTION STANDARDS

A. All dischargers shall comply with the following runoff reduction requirements unless they are located within an area subject to post-construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit that has an approved Storm Water Management Plan.

1. This provision shall take effect three years from the adoption date of this permit, or later at the discretion of the Executive Officer of the Regional Board.

2. The discharger shall demonstrate compliance with the requirements of this section by submitting with their NOI a map and worksheets in accordance with the instructions in Appendix 2. The discharger shall use non-structural controls unless the discharger demonstrates that non-structural controls are infeasible or that structural controls will produce greater reduction in water quality impacts.

3. The discharger shall, through the use of non-structural and structural measures as described in Appendix 2, replicate the pre-project water balance (for this permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to the 85^{th} percentile storm event (or the smallest storm event that generates runoff, whichever is larger). Dischargers shall inform Regional Water Board staff at least 30 days prior to the use of any structural control measure used to comply with this requirement. Volume that cannot be addressed using non-structural practices shall be captured in structural practices and approved by the Regional Water Board. When seeking Regional Board approval for the use of structural practices, dischargers shall document the infeasibility of using non-structural practices on the project site, or document that there will be fewer water quality impacts through the use of structural practices.

4. For sites whose disturbed area exceeds two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream[14] or larger stream and ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration.

[14] A first order stream is defined as a stream with no tributaries.

B. All dischargers shall implement BMPs to reduce pollutants in storm water discharges that are reasonably foreseeable after all construction phases have been completed at the site (Post-construction BMPs).

XIV. SWPPP REQUIREMENTS

A. The discharger shall ensure that the Storm Water Pollution Prevention Plans (SWPPPs) for all traditional project sites are developed and amended or revised by a QSD. The SWPPP shall be designed 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 Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water 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.

B. To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.

C. The discharger shall make the SWPPP 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 map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

XV. REGIONAL WATER BOARD AUTHORITIES

A. In the case where the Regional Water Board does not agree with the discharger's self-reported risk level (e.g., they determine themselves to be a Level 1 Risk when they are actually a Level 2 Risk site), Regional Water Boards may either direct the discharger to reevaluate the Risk Level(s) for their site or terminate coverage under this General Permit.

B. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

C. Regional Water Boards may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

D. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

E. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

XVI. ANNUAL REPORTING REQUIREMENTS

A. All dischargers shall prepare and electronically submit an Annual Report no later than September 1 of each year.

B. The discharger shall certify each Annual Report in accordance with the Special Provisions.

C. The discharger shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.

D. The discharger shall include storm water monitoring information in the Annual Report consisting of:

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 reports specified in Attachments C, D, and E.

E. The discharger shall provide training information 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.

Surface Treatment Plan

PANOCHE VALLEY
SOLAR PROJECT

Panoche Valley Solar LLC

Panoche Valley Solar Facility
San Benito County

October 1, 2015

Surface Treatment Plan

prepared for

Panoche Valley Solar LLC
Panoche Valley Solar Facility
San Benito, California

October 1, 2015

prepared by

AMEC Foster Wheeler

Document Number: R-PLN-000-003
Revision: 0 – Issued for Use

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1.0 INTRODUCTION

This Surface Treatment Plan has been prepared in accordance with mitigation measures set forth in the 2010 Final Environmental Impact Report (FEIR) and the 2014 Supplemental Environmental Impact Report (SEIR), MM AE-3.1. This Plan has also been prepared to comply with the intent of the FEIR and SEIR aesthetic requires, as there are no applicable aesthetic sections of the San Benito County Ordinances.

The purpose of this Surface Treatment Plan is to demonstrate the surface treatment of project structures and buildings satisfy the following measures: (1) their colors minimize visual intrusion and contrast by blending with the existing colors of the surrounding landscape, (2) their colors and finishes do not create excessive glare, and (3) their colors and finishes are consistent with local requirements.

2.0 SURFACE TREATMENT OVERVIEW

The proposed surface treatments were selected to minimize visual intrusion and contrast with the surrounding area where possible (desert sand tones). For some of the electrical equipment, only vendor standard colors are available and were therefore selected (ie. ANSI grey, sand white, etc).

Structural steel shall be hot dip galvanized or anodized aluminum as required to protect against corrosion and per manufacturer specifications. The galvanized steel will naturally dull due to weathering within about six months of exterior exposure as a zinc patina forms on the surface; therefore excessive glare due to galvanized finishes is not expected. The steel structures within the Pacific Gas and Electric (PG&E) switching station will be finished to PG&E's dulled steel finish standard. The galvanization specified was selected to provide a minimum of 30-years protection from corrosion.

The project structures and equipment are listed in the section below along with the surface treatment details including paint colors with color designation numbers as applicable. The painted equipment will be thoroughly cleaned to bare metal and then given a coat of corrosion resistant primer. All surfaces shall be given top powder coats of the paint specified below. The surface treatments will be completed by the manufactures prior to delivery to the jobsite. The appendix provides available samples of the surface treatments that will be installed.

3.0 STRUCTURE AND EQUIPMENT SURFACES

The surface treatment plans for the project structures and equipment are outlined below. All structures and equipment within the switchyard will be specified per PG&E required standards. Where standard color destinations are specified a specific paint manufacture may not be specified as the manufacture may vary.

Building and Electrical Control Buildings

Below is a summary of the building and electrical control structure surface treatments along with their site location. All buildings were selected with the vendor standard desert tone colors.

- Substation electrical protection and control building located in the substation – Vendor standard Light Stone by Trachte or similar
- Switching station protection and control building located in the switching station – Vendor standard Light Stone by Trachte
- Battery building located in the switching station – Vendor standard Light Stone by Trachte
- Operations building located west of substation area – Exterior wall panel and roof color will be desert toned such as Sagebrush Tan or Lightstone as shown on the Nucor building standard colors. The actual color will be determined with the selected supplier.

Substation and Switching Station Electrical Equipment

- Substation power transformers – ANSI 70 Sky-grey
- Substation circuit breakers – ANSI 70 Sky-grey or ANSI 61 Light grey
- Pad-mount station service transformers – Munsell Green #7GY3.29/1.5 or other Munsell Electric Power Industry Standard color
- Miscellaneous equipment - ANSI 70 Sky-grey or ANSI 61 Light grey expected, or similar

Solar Field Electrical Equipment

- Inverter and Medium Voltage Transformer (MVT) stations - Sand white (Valspar KPW0009). The inverter and MVT stations are approximately 40-ft long by 11-ft wide by 9-ft tall and may be visible from the project boundary. The color was required as the inverter manufacturer standard color. Additionally, the white color was selected for the MVT to reduce solar heating of the equipment and match the inverter standard color.
- Combining switchgear - Desert sand (RAL 1015). The color was selected to blend with the surrounding natural environment.
- Combiner boxes –Light grey (RAL 7035) expected or similar. The color was selected based on the manufacture standard colors and is expected to blend with the natural environment. The combiner boxes will be mounted on

posts approximately 3.5-ft above ground and located within the solar arrays between the rows of modules. The combiner boxes are not expected to be readily visible from the project boundary.

- Modules - glass: high transmission, low iron anti-reflection coated tempered glass; frame: anodized aluminum alloy. The layer of anti-reflection coating on the glass reduces the amount of light reflected off the modules. Additionally, since the surface of the modules are granular at a micro level, any reflected light rays are diffused in all directions so there is no mirror-like reflection or glare. The module cell color will be blue toned as shown on the module specification sheet in the appendices.

Structural Steel

- Tracker steel and support posts - Galvanized steel and anodized aluminum. The modules are supported on the tracker support steel. The tracker support posts will be approximately 3-ft to 5-ft above grade. The modules are expected to be visible from the project boundary, but the support steel is not expected to be readily visible as the modules will primarily cover/block the steel.
- Substation, switching station and other miscellaneous support steel – Galvanized steel. All of the steel within the switching station will be finished per PG&E dulled galvanization standard. The PG&E steel interconnection structures will have a height of approximately 90-ft. These structures may be visible outside the project boundary and will be galvanized with a dulled finish. All other steel support structures outside of the switching station will have a lower profile (approximately 10 to 20-feet high) and will be dulled due to natural weathering.

Site Fencing

The perimeter site fence will have finishes per the Chain Link Fence Manufacturer's Institute specification for galvanized fence. The fence framework, posts and rails will be hot dip galvanized per ASTM standards. The chain link fence fabric will be galvanized or aluminum coated steel wire. Where the perimeter fence crosses the existing transmission line that bisects the site, non-conductive composite fence panel sections will be installed. The composite fence will be provided in the manufacture's standard dark gray color. The perimeter fence will be 6-ft tall, and the substation and switching station fences will be 7-ft tall.

4.0 OPERATION AND MAINTENANCE

Prior to the start of commercial operation, Amec Foster Wheeler shall notify the County that surface treatment of all listed structures and buildings has been completed, and that they are ready for inspection. Amec Foster Wheeler shall submit to the County one set of electronic color photographs from the same key viewpoints (KVP) used for project analysis.

- KVP 1 – Southbound Little Panoche Road
- KVP 2 – Northbound Little Panoche Road

- KVP 3 – Eastbound Panoche Road
- KVP 4 – Northbound New Idria Road (at Panoche Road)
- KVP 5 – Adjacent to Panoche Access Road and Panoche Hills Wilderness Study Area

The painted equipment list above will be routinely monitored during operations for any paint deterioration or exposure of bare metal. The equipment will be provided with touch up paint that will be applied per manufacture recommendations if required.

The structural steel will also be monitored for excessive deterioration. As stated in the overview section above, the level of galvanization is expected to provide the necessary design life required for the life of the steel. Some level of steel deterioration is expected throughout the design life and these levels of deterioration were taken into consideration during design. Zich-rich paint will be applied if required per manufactures specification to touch up damaged galvanization.

Panoche Valley Solar, LLC will prepare status reports for the surface treatments as part of the Annual Compliance Reports.

5.0 COLOR SAMPLES

The following attachments include examples of the expected colors outlined in the plan above. Color chip examples are included for the custom colors (inverter, MV transformer, and switchgear).

Building and Electrical Control Building Color - Light Stone, applicable for substation protection and control building, switching station protection and controls building, battery building

Micro Units Storage Solutions

STANDARD DOOR COLORS

Bright White	Cedar Red	Continental Brown	Polar Blue	Iced White
Garnet	Desert Tan	Royal Blue	Evergreen	Sunset Orange
Patriot Red	Shale	Matte Black		

STANDARD TRIM COLORS

Iced White	Cedar Red	Continental Brown	Polar Blue	Evergreen
Garnet	Desert Tan	Royal Blue	Classic Beige	Sunset Orange
Matte Black	Patrician Bronze	Slate Gray	Cream Beige	Shale
Light Stone				

Not available on the Trachte Portable Self-Storage Container.

R-PANEL ROOF COLORS

Cedar Red	Royal Blue	Evergreen	Iced White	Classic Beige
Slate Gray	Cream Beige	Galvalume		

Included on Trachte buildings 1" : 12" pitch or more. Optional on all other building types.

Not available on the Trachte Portable Self-Storage Container.

STANDING SEAM ROOF COLORS

Colonial Red	Harbor/Regal Blue	Evergreen	Galvalume	Regal White
Roman Blue	Patrician Bronze	Surrey Beige		

30 other colors are available. Contact Trachte for further information.

Not available on the Trachte Portable Self-Storage Container.

WALL COLORS

Slate Gray	Iced White	Cream Beige	Classic Beige	Light Stone

Note: Colors shown may differ from actual colored panel material.
For a steel color sample, Contact Trachte.

Nucor Standard Panel Paint Systems

WALL

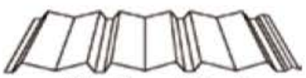
Nucor Classic Wall™

36" Panel Coverage / 26 Gauge*

Nucor Reverse Classic Panel™

36" Panel Coverage / 26 Gauge*

Nucor Accent Panel™



36" Panel Coverage / 26 Gauge*

ROOF

Nucor CFR™

24" Panel Coverage / 24 Gauge*

Nucor Classic Roof™

36" Panel Coverage / 26 Gauge*

Nucor VR16 II™

16" Panel Coverage / 24 Gauge*

Our Silicone Polyester paint is a two-coat system that utilizes cool coating technology and offers superior quality and durability.

Colors shown are representative of actual colors offered and are NOT intended for matching purposes. Exact color match should be made from metal color chip samples.

Initial Solar Reflectance (IR) is the fraction of the total solar energy that is reflected away from a surface. To be considered "cool", products must have a Solar Reflectance of at least .25.

Initial Thermal Emittance (IE) is the relative ability of the roof panel to radiate absorbed heat.

Solar Reflectance Index (SRI) is calculated by using the values of solar reflectance, thermal emittance, and a medium wind coefficient. The higher the SRI value, the lower its surface temperature and consequently, the heat gain into the building.

Galvalume®† gutters, rake, and downspouts are available as an upcharge. Galvalume® ratings are .680 Initial Solar Reflectance (IR), .10 Initial Thermal Emittance (IE), and 56 Solar Reflectance Index (SRI).

Base angle flash is available in Burnished Slate and Polar White only.

All Standard Silicone Polyester colors shown on this chart feature a 25 year finish warranty. Unpainted Galvalume® panels feature a 25 year finish warranty. See Warranty Guide for specific warranty information. (Warranties apply only to the finish coat of exterior mounted panels. Backer side primer colors may vary.)

The term "TBS" on the Nucor Order Document refers to "To Be Selected from Standard Nucor Silicone Polyester Colors" as shown on this chart.

In keeping with a continuing program of product improvement, all information contained herein is subject to change without notice.

*Other gauges are available with extended lead-times and additional charges.
† Galvalume® is a registered trademark of BIEC International, Inc.

BURNISHED SLATE (BS)
IR: .31 IE: .86 SRI: 32

EVERGREEN (EG)
IR: .26 IE: .86 SRI: 25

AZTEC BLUE (AB)
IR: .25 IE: .86 SRI: 24

BRICK RED (BR)
IR: .32 IE: .85 SRI: 53

SAGEBRUSH TAN (SB)
IR: .47 IE: .85 SRI: 53

FOX GRAY (FG)
IR: .43 IE: .85 SRI: 47

LIGHTSTONE (LS)
IR: .59 IE: .87 SRI: 70

POLAR WHITE (PW)
IR: .66 IE: .86 SRI: 79

Munsell COLOR

(http://munsell.com/)

(877) 888-1720

Substation and switching station electrical equipment:
substation circuit breakers, misc. electrical equipment

Munsell ANSI Gray #61 Semi Gloss

(http://munsell.com/color-products/color-standards/munsell-ansi-color-standards/ansi-gray-61-semi-gloss/)

Substation and switching station electrical equipment:
substation power transformers, substation circuit breakers,
misc. electrical equipment

Munsell ANSI Gray #70 Semi Gloss, 5BG 7/0.4 sheet

(http://munsell.com/color-products/color-standards/munsell-ansi-color-standards/munsell-ansi-gray-70-semi-gloss-5bg-70-4-sheet/)

Munsell Electric Power Industry Standard

 (http://munsell.com/color-products/color-standards/munsell-electric-power-industry-standard/)

These four color standards represent legacy electric power industry standards. They're available based on specific Munsell color notations including Munsell Electric Power Industry Standard: 10BG 7.5/1.5 (http://www.xrite.com/product_overview.aspx?ID=926), 7.5BG 6/1.5 (http://www.xrite.com/product_overview.aspx?ID=927), 7GY 3.29/1.5 (http://www.xrite.com/product_overview.aspx?ID=929) and 9GY 1.5/2.6 sheet (http://www.xrite.com/product_overview.aspx?ID=928). Each sheet is 8.5" x 11" and is produced with paint on paper.

Additional color standards for electrical wires, cables and electrical components can be found in the NEMA (http://www.munsell.com/color-products/color-standards/nema-color-standards-family/) or EIA (http://www.munsell.com/color-products/color-standards/munsell-color-coding-charts/) color standards.

 (http://munsell.com/color-products/color-standards/munsell-electric-power-industry-standard/9gy-1-5-2-6-sheet/)

Munsell Electric Power Industry Standard 9GY 1.5/2.6 Sheet (http://munsell.com/color-products/color-standards/munsell-electric-power-industry-standard/9gy-1-5-2-6-sheet/)

 (http://munsell.com/color-products/color-standards/munsell-electric-power-industry-standard/7gy-3-29-1-5-sheet/)

Munsell Electric Power Industry Standard 7GY 3.29/1.5 Sheet (http://munsell.com/color-products/color-standards/munsell-electric-power-

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industry-standard/7gy-3-29-1-5-sheet/)


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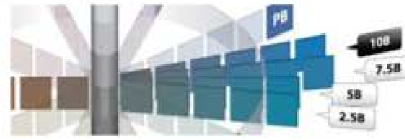
Munsell Electric Power Industry Standard 7.5BG 6/1.5 Sheet (http://munsell.com/color-products/color-standards/munsell-electric-power-industry-standard/75bg-6-15-sheet/)


(http://munsell.com/color-products/color-standards/munsell-electric-power-industry-standard/10bg-75-15-sheet/)

Munsell Electric Power Industry Standard 10BG 7.5/1.5 Sheet (http://munsell.com/color-products/color-standards/munsell-electric-power-industry-standard/10bg-75-15-sheet/)



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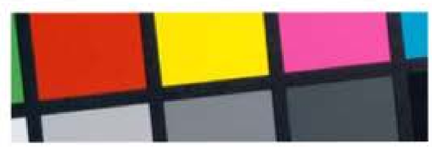

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X-Rite ColorChecker Targets (http://munsell.com/color-products/other-products/x-rite-colorchecker-targets/)

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We'd love to hear how YOU are using Munsell

Your Name *

Email *

Phone

ral 1000	ral 1001	ral 1002	ral 1003	ral 1004	ral 1005	ral 1006	ral 1007
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UL1703 certified products.
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Innovative solar cells
Four bus-bar cell technology provides a more robust and powerful module ideal for utility scale applications

Higher module efficiency
Polycrystalline 72-cell module with power output available to 315W (16.23% conversion efficiency)

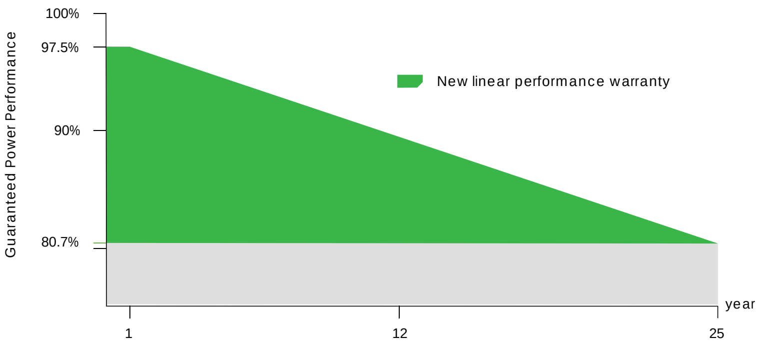
Low-light performance
Improved low light performance through advancements in glass technology and surface texturing

Strong and durable
Tested and tried to endure up to 5400Pa positive and 2400Pa negative loads

Weather resistance
Certified by TUV for high salt mist and ammonia resistance

LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty • 25 Year Linear Power Warranty



Traffic Control Plan

PANOCHE VALLEY
SOLAR PROJECT

Panoche Valley Solar LLC

Panoche Valley Solar Facility
San Benito County

October 7, 2015

Traffic Control Plan

prepared for

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1.0 INTRODUCTION

This Traffic Control Plan has been prepared in accordance with mitigation measures set forth in the 2010 Final Environmental Impact Report (FEIR) and the 2014 Supplemental Environmental Impact Report (SEIR), MM TR-1.1, MM TR-1.2, MM TR-1.3, and MM TR-1.4. This Plan has also been prepared in accordance with the applicable San Benito County, CA Code of Ordinances, Chapter 17.01 Motor Vehicles and Traffic and Fresno County, CA Code of Ordinances, Title 11 Vehicles and Traffic.

This document is intended to outline the process and procedures that will be implemented by Amec Foster Wheeler to aid in the successful construction of the Panoche Valley Solar facility in a responsible manner. This Plan was developed based on state and local traffic ordinances.

This Plan will require the commitment and participation of several parties both internal and external to Amec Foster Wheeler. Traffic Safety Awareness training will be implemented to communicate, promote, and educate all employees to fully comply with the Project's Traffic Safety Plan which will be actively implemented and monitored by Amec Foster Wheeler.

Overview

This Traffic Control Plan (TCP) will examine and recommend needs of traffic control along Little Panoche Road for anticipated traffic during the solar plant construction period. The Panoche Solar Farm Traffic Study, prepared by Hexagon Transportation Consultants Inc., was used to determine recommendations in this plan and the traffic control plan drawings. In addition, the existing roadway geometrics and signage were reviewed using aerial and ground level imagery. The Contractor's employee vehicles and delivery trucks will account for the majority of the traffic during construction period. Although Panoche Road provides access to the solar farm, delivery trucks will be restricted to use Little Panoche Road to and from Interstate 5 (I-5). A projection of approximately 550 Contractor employees per day are expected to be onsite during the construction period. Approximately 100 large trucks, delivering materials and equipment, are anticipated on a peak daily basis. The conditions of existing roadway and the projected volume of vehicles and trucks warrant a TCP.

Purpose

The purpose of this plan is to identify potential safety and operational issues for construction traffic along Little Panoche Road. This plan will also provide recommendation on traffic control for construction traffic along the roadway. Traffic control elements will be provided along Little Panoche Road from I-5 to Panoche Road using signage and flagging. This plan does not address heavy hauls, which will be submitted separately for approval by the designated heavy haul contractors.

2.0 TRAFFIC SAFETY PLAN

The following outlines the Traffic Safety Plan (TSP) that will be implemented during construction to satisfy the requirements of MM TR-1.4. The purpose of the TSP is to ensure the ability of emergency service providers to access the Panoche Valley region during project construction, and ensure the safety of the public and project traffic using regional roads during peak construction traffic conditions.

To establish traffic safety among construction employees, a Traffic Safety Awareness presentation will be incorporated in the site specific training requirements. All construction employees will be required to view the Traffic Safety Awareness presentation. Records of attendance will be maintained at the project site. The Traffic Safety Awareness presentation will be provided to all vendors for dissemination to delivery drivers for mandatory viewing. Additionally, handouts or pamphlets with a Traffic Safety Awareness summary will be provided to all delivery drivers as they arrive onsite.

The Traffic Safety Awareness presentation will outline:

- Driving routes to the job with existing speed limits and project speed limits
- Dangerous driving habits
- Safe driving habits
- Identifying Dangers on the Road
- Vehicle Preparedness and communication protocols

The following traffic safety items will also be implemented during construction:

- Appropriate project speed limits for delivery trucks and detail signage along Little Panoche Road for information of project drivers will be installed as identified in the TCP drawings.
- Amec Foster Wheeler will establish a contact list of heavy tow responders to facilitate fast response to accidents and minimize road closure time.
- PVS will implement a reimbursement agreement with the County Sheriff allowing stationing of additional emergency personnel at the project site during construction.
- PVS shall provide funding for additional California Highway Patrol (CHP) units to patrol Panoche Road, Little Panoche Road, and Highway 25 during project construction duration.
- Staggered work hours for construction employees will be implemented when the total number of workers onsite exceeds 100 people. The construction work-force traffic shall start and finish each workday in at least 2 separate groups with start times separated by at least 30 minutes.
- Amec Foster Wheeler will prohibit project construction delivery truck traffic from using Little Panoche Road, Panoche Road, and Highway 25 during normal commuting timeframes. Truck travel will commence a half hour after the morning commute and cease a half hour before the evening commute commences.

- No truck deliveries will be made to the project site on weekends except if scheduled 7 days in advance with the County. Occasional Saturday deliveries may be permitted without 7-days advance notice to the County in the event of an unforeseeable event. Notice will be made to the County as soon as practicable for these unscheduled weekend deliveries.
- The project will endeavor to ensure that traffic delays related to project construction shall not exceed 30 minutes. If road closures and traffic delays more than 30 minutes are anticipated, the variable notification signs identified on the TCP will provide advance warning of anticipated delays.
- The TCP identifies signs to be installed at each end of the one-way segments of Panoche Road, if there are no existing identification signs.
- The Traffic Safety Awareness presentation will encourage worker carpooling by providing each worker a map of public parking and waiting areas along the major commuting routes for informal carpooling.
- PVS will provide quarterly documentation to the County, in compliance with its APM AQ-2, summarizing incentives provided for workers to carpool. Such documentation shall be provided within 30 days of the end of each calendar quarter.

Escort Program

An escort/pilot vehicle program along Little Panoche Road for delivery trucks will be implemented for delivery truck traffic. As outlined above, the escorted delivery truck traffic will occur outside of normal commuting timeframes. All project delivery trucks will gather at the escort staging area west of the I-5 Exit #379 on the south side of Little Panoche Road as shown on the attached map. The pilot car at the I-5 staging area will communicate with the site to confirm the escort procession can leave the staging area. The pilot vehicle will then proceed with a controlled release of drivers toward the project site. Once the entire escort reaches the north staging area or the project site, a return escort led by a pilot car will proceed back toward I-5 with a controlled release of drivers. The two staging areas and pilot cars will be in direct communication during all escorts to ensure the deliveries are proceeding in a safe manner. If necessary for private vehicle passage, the turnouts identified on the attached map near Panoche Hills and Panoche Access Road (north of Mercy Hot Spring) will be used by the escorts and/or delivery trucks.

Monthly Traffic Safety Meetings

In order to be resolve additional traffic safety issues that may arise during construction, the Project Team will host a monthly meeting with County staff, CHP, and County Sheriff staff, to discuss the following issues that may arise, and any others that occur, and to define potential additional requirements to ensure traffic safety.

- Traffic Incidents. Amec Foster Wheeler will inform the County about each reported traffic incident involving project vehicles within 24 hours of its occurrence or as soon as possible, and include a recommendation for how each accident could have been avoided within 5-7 days once all facts surrounding the event have been gathered. This information shall be used to develop Adaptive Strategies to improve safety during the construction process, including recommended strategies for consideration.
- Additional Carpooling. If either traffic conditions or traffic incidents show impacts of concern to the County, CHP, or Sheriff's Office, PVS will endeavor to increase the level of worker carpooling to reduce vehicles on the public roads, including offering incentives to encourage carpooling (e.g., onsite meals).
- Assess Traffic Delays. Each known traffic delay of more than 30 minutes shall be reported to the County and the CHP, and all events shall be discussed in the next monthly meeting. Solutions to unforeseen repeated delays shall be developed and the County may require implementation of these solutions based on evaluation of data provided during construction.

3.0 ROADWAY MANAGEMENT

The following roadway management items will be implemented to monitor the roadway conditions to ensure safe public and construction access on the roadways adjacent to the site. "Never compromising on safety" is one of Amec Foster Wheeler's core values. Therefore the construction delivery routes will be maintained in safe condition throughout the duration of construction. Amec Foster Wheeler will regularly monitor the condition of Little Panoche Road during construction.

At least 30 days prior to the start of construction, video surveys of construction traffic routes will be conducted to document the existing road conditions. The surveys will be completed on Little Panoche Road from I-5 to Panoche Road and on Panoche Road from State Route 25 to Little Panoche Road. A copy of the video survey will be provided to the County of San Benito. Amec Foster Wheeler will restore all public roads that have been damaged due to project-related construction traffic.

Prior to the start of construction the sections of Little Panoche Road with existing deterioration will be repaired with asphalt chip-seal. The extents of the preconstruction repairs will be determined per the video survey results. Existing deterioration is known between mile segments 4.1 and 5.5 and will require chip-seal or compacted aggregate prior to construction. Additionally, the existing shoulders along Little Panoche Road will be built-up and/or flattened in areas where truck traffic will utilize shoulders. Preconstruction road repair details will be submitted to the County of San Benito by the road restoration contractor. Potential issues with heavy haul low-boy trailers due to pavement heaving will be contemplated by the heavy haul contractor as required.

Wheel load weight distribution shall be coordinated with the appropriate jurisdictions.

Management of existing culverts on Little Panoche Road is outlined in the section below.

4.0 CONSTRUCTION DELIVERY ROUTE

Little Panoche Road Description (Per Panoche Solar Farm Traffic Study)

Little Panoche Road is a two-lane county roadway that extends northeast from Panoche Road to I-5. A full access interchange is provided at the junction of I-5.

Little Panoche Road was measured to be 20 feet in width with one foot shoulders from Panoche Road to approximately 1,000 feet north of Panoche Road. Approximately four miles north of Panoche Road.

Little Panoche Road traverses mountainous terrain and pavement width narrows to as little as 16 feet with no shoulders. This segment of road (MP 4.05 to MP 5.9) will need to be flagged during truck deliveries, as there will not be adequate distance for vehicles to pass in opposing directions while trucks are traveling along the route. Although shoulders are not provided along the majority of Little Panoche Road, there are dirt shoulders provided throughout. “ROAD NARROWS” signing will be placed prior to all segments less than 18 feet in width. Temporary lane closure required due to roadway geometrics will be accomplished using flaggers at spot locations.

Sight distance along Little Panoche Road is adequate since its horizontal alignment is generally straight with very little vegetation. Pavement along Little Panoche Road is generally in fair condition. A five mile segment of Little Panoche Road is in very poor condition. This segment begins approximately four miles north of Panoche Road and extends to the north through mountainous terrain. There is temporary signage in place warning of the poor pavement conditions. Little Panoche Road will be inspected regularly and maintained to current existing conditions.

Bridges

Solargen Roadway Analysis, April 13, 2010 prepared by POWER ENGINEERS, INC. (POWER Eng) included a CalTrans Bridge Inspection Summary. Two (2) of the five (5) bridges are shown to have an operating rating above the standard maximum California Vehicle Code (CVC) of 80,000 pounds. Two (2) box culverts are relatively short in span and will only have two (2) axels on them at a time and not be subjected to the entire load, and ,therefore, should be able to accommodate normal non-oversized truck traffic. The one (1) bridge over Little Panoche Creek, however, does not contain an operating rating equal to that of a standard rating and is wide enough to be subjected to the majority of a fully loaded truck. This bridge has an operating rating of 57,981 pounds, per the POWER Eng and has a span of 47.2 ft. This bridge could be subjected to a load up to 68,000 pounds of a fully loaded, non-oversized truck. Contractor is to ensure this bridge is not subjected to vehicular traffic beyond its operating rating without proper precautions that will protect the structure from damage and over-exertion.

None of the bridges have a load rating high enough to withstand a heavy (200,000-pound) load based upon the CalTrans bridge inspection reports. Heavy hauls will be submitted separately for approval by the designated heavy haul contractors.

Culvert and Structure Log

The same POWER Eng analysis also included a log of all culverts and structures along Little Panoche Road. The POWER Eng report implies that all culverts will accommodate the expected loads traveling to the project site; however, Table 1 below summarizes the culvert locations which lack "sufficient cover depth" (i.e., 12 inches) and may be subject to damage by the expected loads. The POWER Eng report recommends that the contractor monitor these culverts weekly throughout the construction activities for damage. The report also recommended the use of ¾" steel plates when heavy loads (i.e. 200,000 lbs) are transported to the site. The POWER Eng report is attached for reference.

Table 1: Little Panoche Culvert Summary

Structure	Milepost	Type	Condition	Depth
7	4.05	8" CMP	Good	Shallow
20	8.9	6" CMP	Good	Shallow on east side of road
27	11.6	6" CMP	Good	Shallow on east side of road

The POWER Eng report states that all structures should adequately support heavy loads as long as the transported loads are distributed across truck axels sufficiently. Bridge inventory ratings and operating ratings can be found in Table 1 of the POWER Eng report. All bridges, culverts and structures will be protected from damage by large truck operations and shall not be loaded exceeding the operating ratings show in the POWER Eng report. Trucks exceeding the CalTrans maximum allowable gross or axel weight limit will provide an overweight permit.

5.0 TRAFFIC CONTROL DESIGN

Implementation of TCP for the duration of solar farm construction along Little Panoche Road will help warn, protect, and control traffic flow. This will be achieved through signage, flagging and time restrictions on deliveries to the site. There is no posted speed limit along the roadway; therefore the 85th percentile of 55 mph is assumed as the speed limit. The roadway is signed with warning and advisory curve speed signs in advance of sharp curves.

Using aerial and ground level imagery and previously prepared project reports, the roadway widths, existing signage and truck turning radii were evaluated. Based on this information, the TCP was prepared to address site constraints.

Amec Foster Wheeler will implement the following mitigation measures:

TCP Phase 1

- Large truck deliveries to the construction site will be restricted to use of Little Panoche Road to and from Interstate 5.
- Custom signage will be used to restrict the use of Panoche Road to private automobiles, shuttle buses (max length of 36 feet) and trucks with no more than two axles.
- Large truck deliveries and pilot car activity will be limited to daylight hours only.
- In areas the roadway narrows, trucks shall use a portion of dirt shoulder, only if necessary, to maneuver the roadway.
- Contractor will monitor roadway conditions (or will provide a monitor) to ensure safe conditions.
- Contractor will perform maintenance, as needed, to provide safe driving conditions for vehicles accessing the construction site (see Roadway Management section above).
- Temporary signing and flag persons shall be provided to adequately warn and advise traffic, as well as temporarily lane closures.
- Signage will be provided warning traffic of narrow pavement.

All trucks and buses shall be provided with instructions of safety measures being implemented:

- Construction deliveries (including heavy/combination trucks with more than two axles and single unit trucks with two axles) will be restricted of traveling to the project site via Little Panoche Road to and from I-5 only. Panoche Road will not be used for any deliveries.
- In the event that a pilot car is thought to be necessary in accompanying construction and equipment deliveries, said deliveries will be limited to traveling along Little Panoche Road during daylight hours. Deliveries will be scheduled to arrive at assigned staging areas near the I-5 and Little Panoche interchange. Deliveries will then be escorted to and from the site via a pilot car.
- Delivery truck drivers shall be informed that they shall remain within their existing dedicated travel lane and avoid the use of dirt shoulders whenever possible.
- All construction trucks drivers shall be informed of and required to adhere to designated traffic haul routes.

The attached traffic control plans show the proposed signing and locations for the project.

TCP Phase 2

Upon completion of the solar farm construction, all temporary signage provided shall be removed.

6.0 CONCLUSION

Little Panoche Road between Panoche Road and I-5 will be the primary access for truck deliveries throughout the duration of Panoche Valley Solar Farm construction. The current roadway condition warrants a traffic control plan to help warn, protect and control flow of construction traffic. Traffic control plan will accomplish this by adding additional signage and providing flag persons at critical locations along the roadway. The plan as presented will provide acceptable roadway travel to convey construction delivery traffic demand and maintain safe access throughout the duration of construction.

7.0 APPENDICES

Power Engineers - Solargen Roadway Analysis, April 13, 2010 - Final Environmental Impact Report Appendix 8b

http://www.cosb.us/Solargen/feir.htm

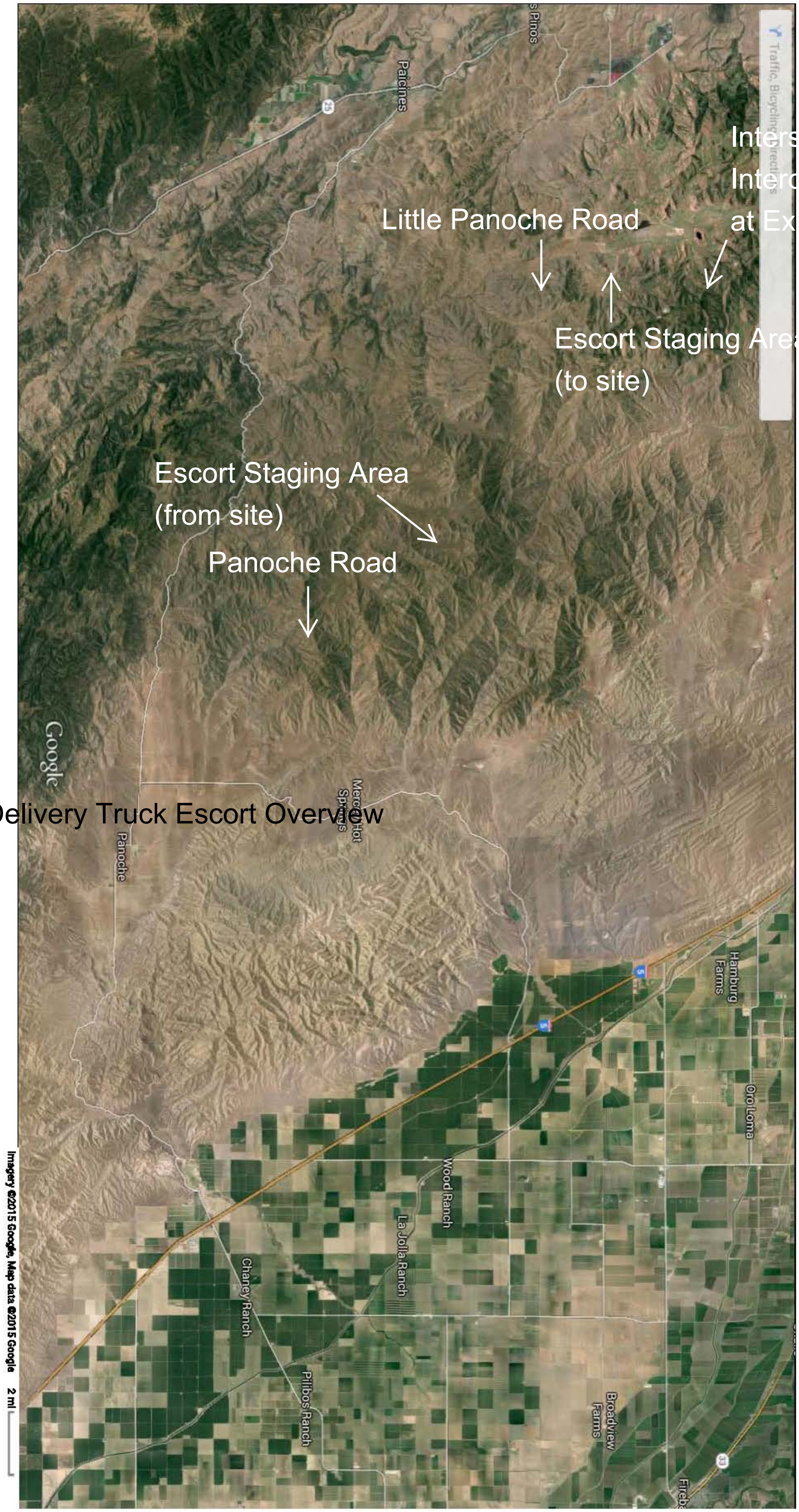
http://www.cosb.us/Solargen/feir/apps/app08b.pdf

Hexagon Transportation Consultants, Inc. Panoche Solar Farm Traffic Study, November 13, 2014 - Final Supplemental Environmental Impact Report Appendix 2

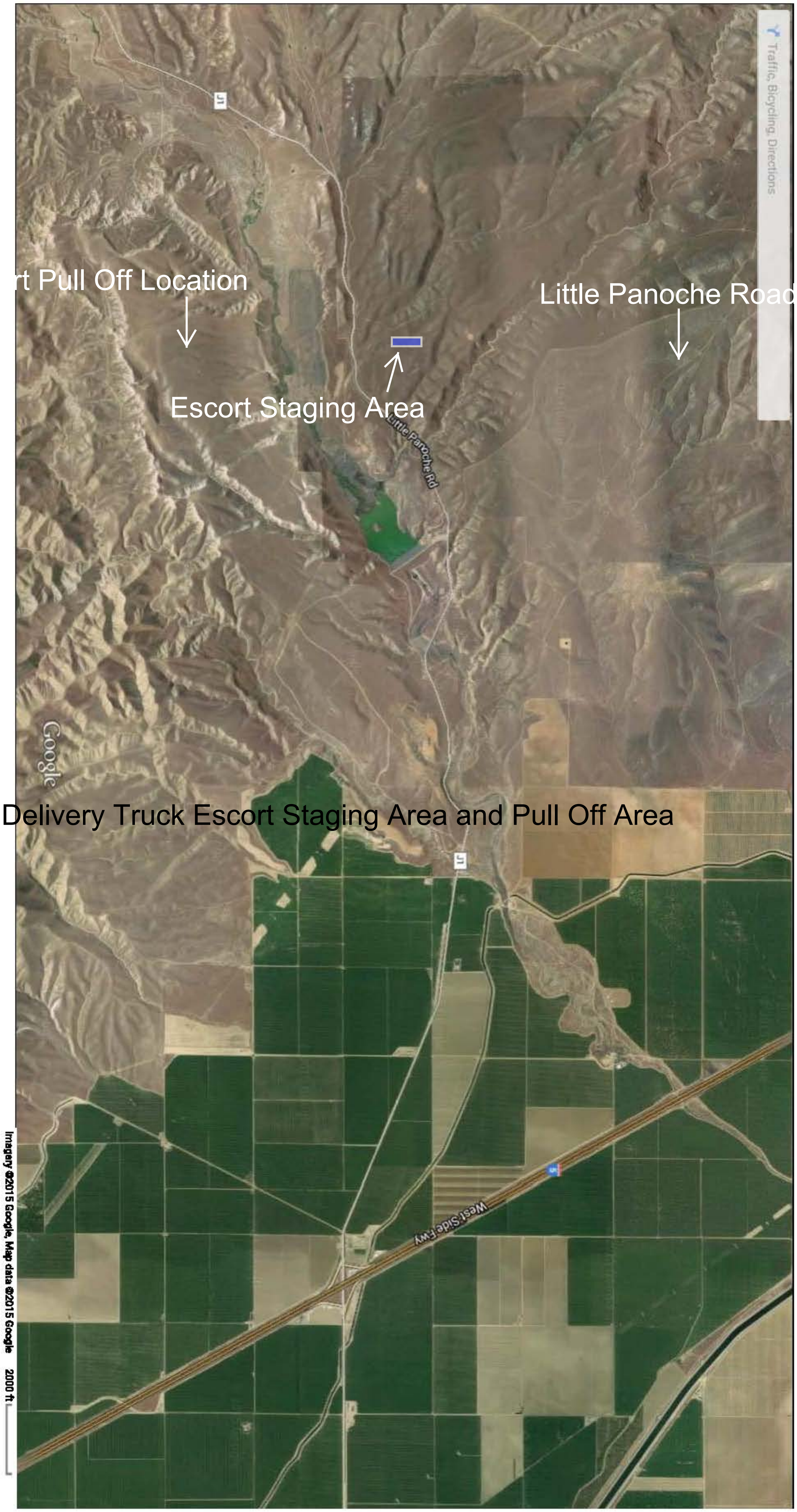
http://cosb.us/wp-content/uploads/PVSP_FSEIR1504_app02.pdf

Escort Program Maps – See attached

Panoche Valley Solar - Delivery Truck Escort Overview



Panoche Valley Solar - Delivery Truck Escort Staging Area and Pull Off Area



Panoche Valley Solar - Delivery Truck Escort Pull Off Area

Panoche Valley Solar Project
San Benito County, California
Unanticipated Discovery Plan:
Cultural Resources and Human Remains

INTRODUCTION

Pursuant to 36 Code of Federal Regulations (CFR) Part 800, this Cultural Resources Unanticipated Discovery Plan (Plan) was prepared due to the possibility of sensitive cultural resources situated in relative proximity of the proposed construction of the Panoche Valley Solar Project. This Plan outlines procedures to follow in accordance with state and federal laws, if cultural resources or human remains are discovered.

Panoche Valley Solar, LLC[1] (the Owner) will be constructing a 247 megawatt (MW) photovoltaic solar panel facility (Project) in San Benito County, California (Figure 1). The following protection measures were developed in coordination with the United States Army Corps of Engineers (USACE) for the Project to protect previously unidentified prehistoric and historical cultural and archaeological sites and/or human remains.

On July 21, 2015, the USACE Sacramento Office requested the Owner prepare an unanticipated discovery plan for cultural resources and human remains. This Plan has been prepared to satisfy that request.

Adherence to this Plan will protect cultural resources that are discovered, assist construction personnel in complying with applicable laws, and expedite the Project in the event of discovery.

This Plan describes the procedures for dealing with unanticipated discoveries during the course of Project construction within the State of California. This Plan is intended to:

- Maintain compliance with applicable federal, state laws, and tribal regulations during construction of the Project.
- Describe the regulatory procedures the Project or its representative will follow to prepare for and deal with unanticipated discoveries.

MONITORING

Little is known about the pattern of use or occupation in the region of the Panoche Valley. As a result, a minimum of one archaeological monitor (meeting or working directly under the supervision of someone who meets the Secretary of Interior's Standards) will be on site during

[1] Should Ownership of the Project be transferred to another entity, the new Owner will be responsible for adherence to the Plan.

ground disturbance activities. Once area has been disturbed and no buried resources identified the area will no longer require monitoring.

The monitoring archaeologist shall maintain daily monitoring logs while ground disturbance is occurring within the Project Footprint. A report of findings and actions taken will be completed and submitted quarterly to the County and USACE until all ground-disturbing activities are complete. Once the ground-disturbing activities are complete, then a final monitoring report covering the entire Project Footprint will be completed and submitted to the County and USACE. The Owner shall fully fund all monitoring and documentation activities.

TRAINING

Prior to beginning any work at the Project site, all Project personnel will attend a mandatory training session. The training may be presented in a recorded format.

All construction personnel shall be trained regarding the recognition of possible buried cultural remains and protection of all cultural resources, including prehistoric and historic resources during construction, prior to the initiation of construction or ground-disturbing activities. Training shall inform all construction personnel of the procedures to be followed upon the discovery of archaeological materials, including Native American burials. All personnel shall be instructed that unauthorized collection or disturbance of artifacts or other cultural materials within or outside the Project Footprint by the Owner, their representatives, their contractors, or their employees will not be allowed. Violators will be subject to prosecution under the appropriate state and federal laws, and violations will be grounds for removal from the Project. Unauthorized resource collection or disturbance may constitute grounds for the issuance of a stop work order.

All construction personnel will attend training so they are aware of the potential for inadvertently exposing buried archaeological deposits, their responsibility to avoid and protect all cultural resources, and the penalties for collection, vandalism, or inadvertent destruction of cultural resources.

The Owner shall provide to the USACE a list of construction personnel who have completed the cultural resources identification training and submitted with the quarterly monitoring reports. This list shall be updated as required when new personnel start work. No individual may work in the field without first participating in the training program.

The training session will cover:

- A review of the environmental setting (prehistory, ethnography, history) associated with the Project.
- A review of Native American cultural concerns and recommendations during Project implementation.
- The reason why monitoring is necessary, including state and federal cultural resources

laws and regulations.

- The types of subsurface archaeological remains with potential to occur in the Project area and how to recognize such remains.
- General monitoring procedures, emphasizing the importance of coordination, communication, and safety of all on-site personnel.
- Specific procedures to be followed in the event of discoveries, with particular emphasis on the importance of appropriate treatment for human remains and associated objects.
- A discussion of disciplinary and other actions that could be taken against persons violating historic preservation laws including penalties for collection, vandalism, or inadvertent destruction of cultural resources.

PROCEDURES FOR THE DISCOVERY OF CULTURAL RESOURCES

If the archeological monitor believes the discovery of a cultural resource has been unearthed, the archeological monitor will take appropriate steps to protect the discovery site. This will include flagging the immediate area of discovery and stopping work and establishing an exclusion zone.. Work in the immediate area will not resume until determination of treatment for the discovery has been completed.

In the event that any member of the construction work force or the archeological monitor believes that a cultural resource is encountered the following steps and measures will be implemented:

- All work within 100 feet (30 meters) on both sides of the discovery will immediately stop. The area of work stoppage will be adequate to provide security, protection, and integrity of the materials. A cultural resource can be prehistoric or historic and could consist of, but not be limited to:

    - Whole or fragmentary flake or ground stone tools,
    - Stone flaking debris,
    - An accumulation of shell, discolored fire-altered rock, or other subsistence related materials,
    - An area of charcoal or very dark soil with artifacts,
    - Stone tools, projectile points, or dense concentrations of stone artifacts,
    - Animal bones,
    - Charcoal/ash,
    - Fragments of ceramics, glass, or metal,
    - Rocks and minerals not common to the project site, and
    - A historic structure or assemblage of historic materials older than 50 years.

Any unanticipated discovery will be inspected by the archaeologist and shall be documented by the archaeologist on a Department of Parks and Recreation Primary Record and Archaeological Site Record (DPR 523) and an initial assessment of eligibility for inclusion in the National Register Historic Places (NRHP) must be submitted to the USACE. If the discovery is determined to have the potential for NRHP eligibility the USACE will consult with State Historic Preservation Office (SHPO) to further asses NRHP eligibility. If the site is NRHP eligible, the Owner will need to consider avoidance. If not avoidable then a Memorandum of Agreement (MOA) with a research design and recovery plan will be developed and submitted to USACE for approval.

The MOA will address potential adverse effects and mitigation/treatment measures including mapping, photography, sample collection, or excavation activity as deemed necessary by the Project archaeologist.

The recovery of a NRHP eligible site cannot be initiated unless a MOA is in place under Section 106 that is approved by the USACE. The MOA shall also make provisions for data collection, laboratory processing and technical analyses, final reporting, curation of archaeological remains, and shall be reviewed and approved by the USACE prior to implementation. All such work shall be fully funded by the Owner.

The appropriate protective measures will be implemented and a technical report of the finding(s), protective methods employed, and results will be submitted to the USACE once final determination of how to treat the discovery is made. The investigation and report will be performed in compliance with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 CFR 44734-44737); the Advisory Council on Historic Preservation (ACHP) publication "Treatment of Archaeological Properties" (ACHP 1980); and follow the guidelines set forth by the USACE and SHPO.

PROCEDURES FOR THE DISCOVERY OF HUMAN REMAINS

Any human remains, burial sites, or burial related materials that are discovered during construction will at all times be treated with dignity and respect.

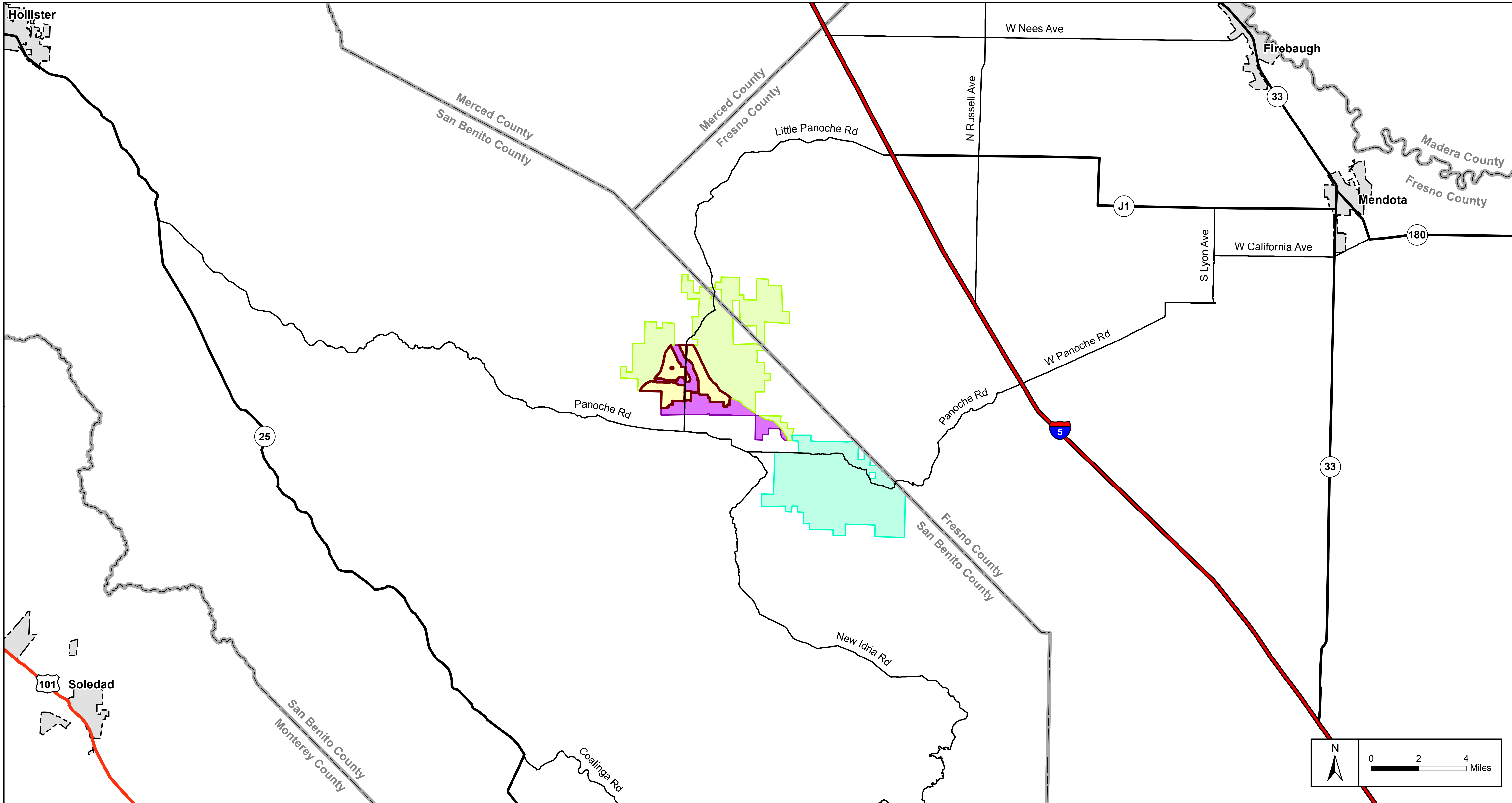
If human remains are uncovered, or in any other case when human remains (historic and/or Native American) are discovered during construction, the San Benito County Coroner, the County, and the USACE will be notified immediately to arrange their proper treatment and disposition and the Owner shall immediately cease all work activities within 300 feet of the discovery. If the remains are identified — on the basis of archaeological context, age, cultural associations, or biological traits — as those of a Native American, California Health and Safety Code 7050.5 and Public Resource Code 5097.98 require that the coroner notify the Native American Heritage Commission (NAHC) within 24 hours of discovery. The NAHC will then identify the Most Likely Descendent (MLD), who will determine the manner in which the remains are treated.

The USACE will complete the Section 106 process; including notification of SHPO/American Council on Historic Preservation (ACHP) and provide documentation/determination and resolve potential adverse effects.

Construction activities in the vicinity (300 feet) of the burial will cease while the archeological monitor and the USACE determines what appropriate consultation processes are required. After all construction activity has been halted and while the notification procedure is being implemented, steps will be taken to protect the human remains, including:

- Human remains and grave should not be removed or otherwise disinterred unless required in advance of some kind of disturbance, such as construction;
- Disinterment, when necessary, should be done carefully, respectfully, and completed, in accordance with proper archaeological methods;
- No ground-disturbing activity within a buffer zone of 300 feet from the discovery;
- Preventing vehicle traffic through that portion of the area of the undertaking beyond that necessary to remove vehicles and equipment already within the area;
- Providing protection in the form of tarps, shoring, protection from the elements, and any other procedures necessary to preserve of the remains; and
- Restricting personnel in the vicinity, excluding the archaeological monitor, Native America representative, and the supervising individual representing the USACE and the Owner.

The measures to protect the potential Native American remains and any associated artifacts will remain in effect until the Owner has received notice from the Native American monitor and the USACE (once compliance with Section 106 is obtained) to proceed with the construction activity in the buffered zone.



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Energy Renewal
PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

Panoche Valley Solar Project

Project Location

FIGURE

1

JH 2015-08-17

Weed Management Plan

Panoche Valley Solar Project
San Benito County, California

August 2015
Revised September 2015

Prepared for:
Panoche Valley Solar, LLC
845 Oak Grove Ave., Suite 202
Menlo Park, California 94025

Prepared by:
Energy Renewal Partners, LLC
305 Camp Craft Road, Suite 575
West Lake Hills, Texas 78746

Date:
August 28, 2015
Revised September 15, 2015

James McRacken Jr.
Senior Biologist

Trisha Elizondo
Principal

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<u>**Tables**</u>

<u>**APPENDICES**</u>

ACRONYMS

BLM	Bureau of Land Management
BMP	Best Management Practices
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
DC	Direct current
DPR	Department of Pesticide Regulation
EPA	Environmental Protection Agency
°F	degrees Fahrenheit
GIS	Geographic Information System
IPC	Invasive Plant Council
IPM	Integrated Pest Management
mph	miles per hour
NPPA	Native Plant Protection Act
PEIS	Programmatic Environmental Impact Statement
PVS	Panoche Valley Solar
ROD	Record of Decision

1.0 INTRODUCTION

1.1 Plan Purpose

The term “weed” refers to invasive, non-native plant species and weeds listed on federal and state noxious weed lists. In recent years, there has been an expansion of invasive, non-native (or "alien") plant species across the United States, including California. Invasive species create substantial economic losses for agriculture in both cropland and rangeland areas, and they often provide poorer habitat for wildlife than native vegetation. The proliferation of invasive plant species alters ecosystem processes and can threaten certain native species with extirpation. If left unchecked, these species can create economic impacts and disrupt native ecosystems.

This weed control plan is intended to provide: (1) monitoring, preventative, and management strategies for weed control during construction activities at the Panoche Valley Solar Project (the Project); (2) control and management of invasive/noxious weeds in areas temporarily disturbed during construction where native seed will aid in site revegetation will be focused; and (3), a long-term strategy for weed control and management during the operation of the Project.

1.2 Noxious Weed Definition

The term “noxious weed” is defined in the Federal Plant Protection Act (7 U.S. Code Chapter 104 - Plant Protection 7701 *et seq.*) as any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. Weeds (invasive non-native plants that threaten wildlands) are also defined by the California Invasive Plant Council (IPC) as are plants that are not native to, yet possess the potential to spread into, wildland ecosystems, and that also displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes.

1.3 Approach to Weed Management

This Weed Control Plan (WCP) is focused on the persistence of desired plant species and communities, rather than on simply eliminating weeds. Preventive programs are implemented to keep management areas free of weed species that are not yet established but that are known to be problematic in the vicinity of the Project. Priorities are set to reduce, suppress or eradicate weeds that have already established in the Project site, according to their actual and potential impacts on the land management, and according to the ability to control them now versus in the future. Weed control actions will be taken only when careful consideration indicates a lack of action would result in more damage than controlling it with the best available methods.

Weed management plans should be structured to provide a logical approach to weed management based on the best available information. This plan follows an adaptive management approach:

- Weed species are identified through an inventory of the Project site and by gathering information from other sources;

- Land management goals and weed management objectives are established and recorded for the property;

- Priorities are assigned to the weed species and weed infestations based on the severity of their impacts, while considering the ability to control them;

- Methods are considered for controlling weeds or otherwise diminishing their impacts and, if necessary, are reprioritized based on likely impacts on target and non-target species;

- Results of management actions are monitored, evaluated, and compared to weed management objectives for the Project site;

1.4 Plan Objectives

As a Mitigation Measure in the Panoche Valley Solar Farm Project Final Environmental Impact Report (FEIR) the Project is required to prepare and implement a comprehensive adaptive WCP to be administered during the construction and O&M of the Project. This document was prepared following guidance from other documents, including previously approved weed management plans for solar facilities. This WCP is intended to provide monitoring, preventative, and management (eradication and suppression) strategies for weed control during construction activities on the Project site. The WCP will also provide strategies for control and management of weeds in areas temporarily disturbed during construction where native seed will aid in site revegetation, and a long-term strategy for weed control and management during site O&M.

This WCP lists and assesses weeds that occur or could potentially occur in the Project site (Table 1). It also provides a list of weeds to be controlled, survey methods for weed presence during the construction and O&M phases, weed control methods, and reporting requirements (Tables 1 and 2).

Weed management objectives for the Project include the following:

- Prevention or Containment: Aims to prevent infestation, expansion and spread, and may be conducted with or without attempts to reduce infestation density. Prevention focuses on halting spread until suppression or eradication can be implemented, and is practical only to the extent that the spread of seeds or vegetative propagates can be prevented.
- Eradication: Aims to eliminate individuals of a particular species within a specified area. This will be the goal for most non-ubiquitous, high-density weed species within the Project site, and is appropriate where the weed is of considerable economic and environmental concern and the population size is manageable.
- Suppression: Aims at reducing current infestation density, but not necessarily directed at reducing the total area or boundary of the infestation. This applies to many ubiquitous and high-density weeds where eradication is not feasible.

1.5 Management Roles

Panoche Valley Solar (PVS), the Project owner, is responsible for the implementation this WCP. It is anticipated that PVS's contractors and other designated parties responsible for implementing components of this WPC will include the following:

- Contractor(s) – Contractual language will be included in construction documents and ongoing maintenance contracts to ensure that contractors, subcontractors, vendors, maintenance personnel and other parties, performing either construction or ongoing maintenance or repairs at the Project site, abide by and implement the provisions of the WCP. Implementing the construction provisions of this WPC will be a part of construction contracts. Restoration contractors, landscape contractors, and other specialists will implement specific provisions of the WCP either as subcontractors to the general construction contractor, or through independent contracts with PVS.
- Construction Manager – The construction manager will have ultimate oversight of the construction contractor to ensure compliance with the provisions of this WCP.
- Designated Biologist - A Designated Biologist will be designated by the Project owner to provide oversight of construction practices and ensure compliance with the provisions of the WCP. The Designated Biologist (including Biological Monitors as needed) will be contracted directly and coordinate with the Construction Manager to ensure contractor compliance with environmental requirements for construction. The Designated Biologist will also be responsible for the direction and oversight of compliance activities consistent with all onsite requirements. The Designated Biologist will be responsible for compliance with the provisions of the WCP plan and have authority to ensure compliance.
- Biological Monitor – PVS will have Biological Monitor(s), under the supervision of a Designated Biologist, to provide oversight of construction and maintenance practices and ensure compliance with the provisions of this plan. If deemed necessary by the Designated Biologist, the Biological Monitor(s) will coordinate with the Construction Manager to ensure contractor compliance with environmental requirements for construction and with the power plant operator to ensure compliance during ongoing maintenance activities.
- San Benito County – The County will review and approval of this WCP and shall be updated on weed eradication and monitoring post-construction.

2.0 APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

2.1 Federal Laws and Regulations

2.1.1 Federal Noxious Weed Act of 1974

The Federal Noxious Weed Act of 1974 (7 U.S.C. §§ 2801-2814, January 3, 1975, as amended 1988 and 1994) provides for the control and management of non-indigenous weeds that injure, or have the potential to injure, the interests of agriculture and commerce, wildlife resources, or the public health. The Act gives the Secretary of Agriculture broad powers in regulating transactions in and movement of noxious weeds. The act states that no person may import or move any noxious weed identified by regulations of the Secretary of Agriculture into or through the U.S., except in compliance with the regulations, which may require that permits be obtained. The act also requires each federal agency to develop a management program to control undesirable plants on federal lands under the agency's jurisdiction, and establish and adequately fund the program. Some of the provisions of this act were repealed by the Plant Protection Act of 2000 (PPA), including U.S.C. 2802 through 2813. However, Section 1 (findings and policy) and Section 15 (requirements of federal land management agencies to develop management plans) were not repealed (7 U.S.C. 2801 note; 7 U.S.C. 2814).

2.1.2 Plant Protection Act of 2000

The Plant Protection Act of 2000, as amended (7 U.S.C. 7701-7786) states that the detection, control, eradication, suppression, prevention, or retardation of the spread of plant pests or noxious weeds is necessary for the protection of the agriculture, environment, and economy of the U.S. This act defines the term ‘‘noxious weed’’ (7 U.S.C. 7702 § 403) to mean any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the U.S., the public health, or the environment. This act specifies that the Secretary of Agriculture may prohibit or restrict the importation, entry, exportation, or movement in interstate commerce of any noxious weed if it is determined “that the prohibition or restriction is necessary to prevent the introduction into the [U.S.] or the dissemination of a plant pest or noxious weed within the [U.S.],” and authorizes the issuance of implementing regulations. Subsequent regulations implemented by the Noxious Weed Control and Eradication Act of 2004 amended the PPA. This superseded the Federal Noxious Weed Act.

2.1.3 Noxious Weed Control and Eradication Act of 2004

The Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412) amended the PPA by adding a new subtitle, “Subtitle E - Noxious Weed Control and Eradication'' (7 U.S.C. 7781- 7786), which authorizes the Secretary of Agriculture to establish a program to provide financial and technical assistance to public and private landowners for the control or eradication of noxious weeds. This act defines noxious weeds and removes references to statutes that were repealed upon enactment of the PPA. This act prohibits the movement of a federally designated noxious weed into or through the U.S.

unless a permit is obtained for such movement and the movement is consistent with the specific conditions contained in the permit. This act specifies that such movement, under conditions specified in the permit, may not involve a danger of dissemination of the noxious weed in the U.S.; otherwise such a permit will not be issued.

2.2 State and Local Laws and Regulations

2.2.1 Native Plant Protection Act

The Native Plant Protection Act (NPPA) of the 1977 Fish and Game Code (Sections 1900 through 1913) directed the California Department of Fish and Wildlife (CDFW) to carry out the Legislature's intent to "preserve, protect and enhance rare and endangered plants in this State." The NPPA gave the CDFW the power to designate native plants as "endangered" or "rare" and protect endangered and rare plants from take.

2.2.2 California Food and Agricultural Code

Various portions of this code pertain to weed management. Specifically, Food and Agricultural Code Section 403 states that the California Department of Food and Agriculture (CDFA) should prevent the introduction and spread of injurious insect or animal pests, plant diseases, and weeds. Under Sections 7270 through 7224, the California Commissioner of Agriculture is granted the authority to investigate and control weeds, and specifically to provide funding, research, and assistance to weed management entities, including eligible weed management areas or county Agricultural Commissioners, for the control and abatement of weeds according to an approved integrated weed management plan.

California Food and Agriculture Code Section 5101 and 5205 provides for the certification of weed-free forage, hay, straw, and mulch. This portion of the code recognizes that many weeds are spread through hay, straw, and mulch, used for both forage and ground covers. The code allows for in-field inspection and certification of crops to ensure that live roots, rhizomes, stolons, seeds, or other propagative plant parts of weeds are not present in the crop to be harvested. Certified weed-free rice straw, and mulch materials will be required for use for erosion control on the Project.

2.2.3 San Benito County General Plan

San Benito County has a General Plan which requires that proposed development projects are compatible with policies set forth in the Conservation and Open Space Element, which provide for the protection, maintenance, and use of the County's natural resources (County of San Benito 1995). It is the policy of San Benito County to work with State, Federal, and local agencies and land owners to develop programs to reduce the destruction of plant and animal life and habitat caused by invasive plants and animals.

2.3 Conservation Management Plans

2.3.1 Bureau of Land Management

The Bureau of Land Management (BLM) has prepared a *Programmatic Environmental Impact Statement* (PEIS) for 17 Western States that describes vegetation treatments using herbicides for weed control. This document is the result of extensive public involvement and outlines the specific decisions, standard operating procedures, and mitigation measures for the use of herbicides on BLM lands. The selected alternative of the PEIS identifies the active herbicidal ingredients approved for use on BLM land, and the herbicidal ingredients that are no longer approved for use. The Record of Decision (ROD) for the PEIS defers to approved land use plans the determination of areas to be treated through BLM's integrated pest management program, and makes no land use or resource allocations in this regard.

The Herbicide Treatment Standard Operating Procedures, Appendix B of the PEIS (Appendix A), specifies management of weeds and application of pesticides on BLM land. In Appendix A, Table B-1, Prevention Measures, specifies avoidance measures to limit weed infestation, and Table B-2, Standard Operating Procedures for Applying Herbicides, provides details on herbicide application. The procedures listed in this Appendix A are incorporated as requirements of this plan even though the Project does not fall within any BLM managed lands.

2.3.2 Proposed Resource Management Plan/Final Environmental Impact Statement for the Southern Diablo Mountain Range and Central Coast of California

The BLM Hollister Field Office has prepared a Proposed Resource Management Plan/Final Environmental Impact Statement to provide direction for managing public lands in the Southern Diablo Mountain Range and Central Coast area of California. The BLM Hollister Field Office manages approximately 274,000 acres of land representing a variety of settings and landforms that provide habitat for numerous plant and animal species and offer recreation and other multiple-use opportunities. The Planning Area for the BLM Hollister Field Office encompasses a 12-county region in Central California which includes the Panoche Valley. The proposed document provides no specifics about weed management, but specifies an Integrated Pest Management (IPM) Plan would be developed to thwart the spread of noxious and invasive plant species. There is no managed BLM land within the Project site boundaries, however the BLM does manage lands adjacent to the Project's Conservation Lands.

3.0 WEED ASSESSMENT

3.1 Field Surveys

No targeted weed species surveys have been completed within the Project site, however, weed species were noted during the botanical field surveys during fall 2009 and early spring 2010. During the botanical protocol surveys, surveyors made lists of all plant species encountered in the field.

3.2 Known Weed Species Occurrences

Weed species are defined for this document as species of non-native plants that are included on the weed list of the California Invasive Plant Council (Cal-IPC 2014) as having a high or moderate overall rating. Species with a high overall rating 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. Species with a moderate rating 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.

Several invasive and noxious weed species are known to occur in the project vicinity. Table 1 lists the known potentially occurring weed species, and identifies which species were observed during site surveys. Each weed species noted below has a rating of high or moderate based on the California Invasive Species Council rating system (Cal-IPC 2014). Prominent weed species within the Project area include ripgut brome (*Bromus diandrus*), red brome (*Bromus madritensis* ssp. *rubens*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), rat-tail fescue (*Vulpia myuros*), Italian thistle (*Carduus pycnocephalus*), tocalote (*Centaurea melitensis*), knapweed/thistle (*Centaurea* sp.), rough/hairy cat's ear (*Hypochaeris radicata*), hoary cress (*Lepidium draba* ssp. *draba*), slender wild oat (*Avena barbata*), wild oat (*Avena fatua*), Bermuda grass (*Cynodon dactylon*), Italian rye grass (*Lolium multiflorum*), Harding grass (*Phalaris aquatic*), and dock (*Rumex* sp.).

4.0 WEED MANAGEMENT AREAS

Weed management will occur throughout the Project site; however, specific areas will require unique management considerations depending on a range of factors described in this section.

4.1 Temporary Disturbance Areas

The Project will be designed to minimize ground disturbances and resulting environmental impacts wherever practicable. Temporary disturbances to the Project site would result from initial site preparation from trenching for electrical conduit, grading of areas with slopes greater than five percent, construction staging and laydown areas, and temporary access roads. Culverts will be installed in a limited number of locations, as necessary, for crossing of natural washes. Site layout for the Project will be based on avoiding major washes and minimizing surface disturbing activities in order to preserve intact soil crusts on the Project site.

Weed management issues at temporary construction areas include soil disturbances during construction and temporary use that will create habitat(s) well suited to disturbance-adapted weed species and, therefore, measures to minimize the potential for weed introduction by personnel and equipment will be needed. Other temporary disturbance areas created during construction will follow a similar weed management strategy as those areas outlined below. Weed management measures for these areas, including monitoring frequency, target weed species, and control methods, are included in this plan.

4.2 Permanently Developed Areas

The areas describe in this section would be permanently developed, but could support weedy species along peripheral disturbed areas and function as seed reservoirs to adjacent natural habitats if not managed.

Construction of the Project is anticipated to begin in the first or second quarter of 2015. Construction would generally move in a clockwise manner beginning near the substation and the area south of Las Aquilas Creek and west of Little Panoche Road over an approximate 16 to 18-month construction period. Permanent disturbance would result from the construction of Project site perimeter roads and emergency access/egress points, maintenance transportation corridors, substation/switchyard and O&M facilities, parking areas, solar array footers, and equipment pads. Due to the modularity of solar photovoltaic facilities, construction will occur in incremental steps with sections of the solar field becoming operational before significant construction work on other sections of the field.

Soil disturbance during construction will create habitat well suited to disturbance-adapted invasive species, and continual movement within the area of personnel and heavy equipment will potentially introduce weed propagules. The area will require ongoing weed monitoring and maintenance during construction, and equipment will be required to cross track out devices prior to entering and leaving the Project site as specified below. During O&M activities, equipment and personnel will continue to access the area for maintenance of the inverters and solar arrays. Precipitation and wash water runoff from the cleaning of photovoltaic panels will provide a water source that could also support weed establishment and growth. These areas will require continual weed management and control.

Roads

Roadsides and the medians of unimproved service tracks are vulnerable to weed invasion. Roads often alter local hydrology and are subject to initial and ongoing disturbance during construction, maintenance, and use. Roads also provide topographic variation that could capture wind or waterborne seed; and may be subject to seed distribution from passing vehicles. Ongoing weed management will target roadside weeds.

Other Permanent Facilities

Peripheral areas throughout the facility are anticipated where conditions are suitable for weed establishment. This may include soils that have been cleared, compacted, or otherwise disturbed; areas where hydrology is altered, such as from increased drainage from developed areas or areas where continued vehicle or foot traffic persist. Ongoing weed management will survey and target these areas for management to avoid creation of weed seed reservoir areas, which could affect adjacent undisturbed habitats.

5.0 MONITORING AND SURVEY METHODS

5.1 Weed Identification

Monitoring and removal of weeds requires skill and training in plant identification. Training and field manuals with photographs of native desert plants and common weeds will be provided as necessary to field staff including Designated Biologist, Biological Monitors, weed abatement contractors, plant operators and staff, and construction workers. Online resources are available and include:

- The University of California digital library contains species information and an extensive photo collection (http://www.calflora.org/).
- The California Invasive Plant Council website contains an invasive plant database, plant profiles, and other information on invasive plants and control (http://www.cal-ipc.org).
- The U.S. Department of Agriculture (USDA) National Invasive Species Information Center (http://www.invasivespeciesinfo.gov/) has information on invasive species and links to the extensive USDA PLANTS database (http://plants.usda.gov/), with species profiles and photographs.
- The California Native Plant Society maintains information including a database on California vegetation including rare, threatened, and endangered plants (http://www.cnps.org/).
- BLM also maintains a website with useful information on noxious weeds, including management strategies for weeds in California (http://www.blm.gov/weeds/).
- The Center for Invasive Plant Management maintains a website with useful information and resources, including plant profiles (http://www.weedcenter.org/).
- Weeds of the West by Tom D. Whitson is also a valuable resource (available at many online book suppliers).

5.2 Surveys and Monitoring

Monitoring is the repeated collection and analysis of information to evaluate progress in meeting resource management objectives. Periodic observation of weeds being managed on the Project site is necessary to evaluate the effectiveness of a weed control program. If management objectives are not being met, weed control actions need to be modified. Monitoring will ensure timely detection and prompt eradication of weed infestations, which are essential to a long-term strategy for weed management.

5.2.1 Monitoring Methods

Surveys and monitoring will ensure timely detection and prompt eradication or suppression of weed infestations, which are essential to a long-term strategy for weed management.

Construction Areas

A Designated Biologist will oversee Biological Monitors who will be present during site clearing and construction activities. Biological Monitors will be responsible for inspecting construction areas, identifying the presence of weeds, and instructing designated construction personnel on inspection of entering vehicles, vehicle track out and equipment cleaning facilities for weed seed presence and removal. The Designated Biologist will be responsible for prescribing management activities consistent with this plan when weeds become established. Monitoring of construction areas and access routes will be conducted as necessary. This monitoring will consist of walking or driving slowly over construction areas and observing for seedlings of exotic species. This will continue until ground-disturbing construction activities are completed.

Revegetation Areas

As part of monitoring for revegetation of disturbed areas, the density and frequency of weed species will be quantitatively measured in selected sampling sites throughout the revegetation area and compared to control areas with the ultimate goal of re-establishing natural vegetation communities. Additional monitoring will occur as needed, especially during rainy seasons, and will occur every year during construction and for a minimum of three years following the completion of construction. Monitoring schedules will be sufficiently flexible to take advantage of variations in precipitation. Surveys will identify areas of significant weed invasion or establishment and the weed species involved.

General Operations Monitoring

General Project site monitoring of the operating solar facility will be conducted by operations personnel on an ongoing basis. Weed control will be conducted, as needed, by operations personnel or contracted personnel trained to identify invasive and noxious weeds and native plant species. Monitoring of all potential infestation areas will be conducted every other week for four weeks following storms of any intensity (including summer monsoons) and also every third week during March, April, and May if there has been any winter rain. This monitoring will consist of walking or driving slowly over construction areas and observing for seedlings of invasive and noxious weed species. This will continue for the life of the Project or until success criteria (as set forth in the separate Revegetation and Rehabilitation Plan) are met.

Known Infestation Areas

Where invasive and noxious weed infestation occurs and treatment is implemented, the treated area will be targeted for ongoing monitoring to ensure that treatments are effective and that the designated control objective (eradication or effective suppression) has been achieved. Visits to known infestation areas will continue until weeds in the area are controlled.

5.2.2 Database and Mapping

Locations of invasive and noxious weed occurrences, along with data on the weed species, detection date, growth stage, infestation extent, treatments implemented, results of treatment, and current status will be maintained during the construction and O&M phases of the Project. This will not be a requirement for the previously designated ubiquitous invasive plant species.

A geographic information system (GIS) will be used to map and store data. With the information stored in the GIS databases, the priority of infestation areas will be established based on species, vulnerability of the site to invasion, growth stage, and effectiveness of treatment(s). Also included will be areas mapped as vulnerable to weed invasions. Vulnerability will be assessed on the following:

- Availability of weed propagule sources, such as along roadsides;
- Disturbed areas, such as through land clearing and earthwork;
- Nearby areas with known prior or treated weed infestations or existing infestations that are out of the managed area.

6.0 WEED MANAGEMENT

6.1 Species Descriptions and Management Strategy

Descriptions of the more common or troublesome invasive and noxious weeds occurring or potentially occurring on the Project site and their management strategies are provided in Tables 1 and 2. Management strategies must encompass not only eradication, but also identify the means of eradication and the plant species to be eradicated.

Not all weed species can or should be eradicated. Certain ubiquitous invasive species (*e.g.,* ripgut brome, red brome, rat-tail fescue) will initially be monitored only because control of these aggressive colonizers is impractical, and it would likely slow site rehabilitation by slowing the rate of secondary succession and surface stabilization. In addition, these species can play a beneficial role in accelerating surface stabilization and, therefore, reduce soil erosion caused by sheet flow or high winds as well as providing important forage for special status species known to occur within the Project area, such as the giant kangaroo rat (*Dipodomys ingens*) (Williams 2006). Complete eradication of large areas where infestations are already established could adversely affect other pioneer species, and is likely to be impractical because the area could be re-invaded from adjacent lands in the absence of physical barriers that isolate the area. Any other non- ubiquitous invasive species ranking moderate or high as per the preconstruction weed assessment for the site will be monitored and controlled as necessary.

6.1.1 New Weeds

Weeds not identified in Tables 1 and 2 could also potentially colonize or invade the Project site, both during the construction phase as well during the operation and maintenance phase. During the construction phase, the Designated Biologist will be required to regularly update the list of potential weeds, and identify new potential threats. This will include developing a management strategy and management methods appropriate to the plant species and nature of the potential invasion. Similarly, the solar facility personnel or the appropriate designee during the operation and maintenance phase will be required to continually update the potential weed list and provide monitoring and management appropriate to new species.

6.2 Preventative Measures

General measures which may be implemented to prevent the spread of weed propagules and inhibit their establishment on the Project include the following:

- Conducting pre-construction surveys on the Project site prior to ground disturbance including, but not limited to, solar panel footing preparation and construction areas, assembly yards, access roads, and areas subject to grading for new or improved access roads. Weed populations that are rated High or Moderate for negative ecological impact in the California Invasive Plant Inventory Database (Cal-IPC, 2014); and/or are known to aid and promote the spread of wildfires shall be mapped and described according to density and area covered. Areas with identified weed infestations shall be treated prior to ground disturbance if deemed necessary by a Designated Biologist and treatment can be completed during the optimal control season for each weed species. The timing of weed control treatments shall be determined for each plant species with the goal of controlling populations before they start producing seeds.

- Limiting disturbance areas during construction to the minimal area required to perform work and limiting ingress and egress to designated routes.
- Maintaining vehicle track out devices and closely monitoring the types of materials brought onto the Project site to minimize the potential for weed introduction.
- Educating workers about invasive weeds potentially problematic at the Project and enlisting their help in preventing their introduction and spread.
- Reestablishing vegetation as quickly as practicable on disturbed sites as an effective long-term strategy to avoid weed invasions.
- From the time ground disturbance through operation of the Project, surveying for new invasive weed populations and the monitoring of identified and treated populations shall be required at all sites impacted by construction (array structures, staging areas, etc.), including access roads disturbed during the project. Surveying and monitoring for weed infestations shall occur annually. Treatment of all identified weed populations shall occur at a minimum of once annually. When no new seedlings or re-sprouts are observed at treated sites for three consecutive, normal rainfall years, the weed population can be considered eradicated and weed control efforts may cease for that infestation location.
- Weed control efforts shall be timed annually to reduce invasive/noxious weed seed production, by conducting activities when flowering has just started, but before seeds have been produced. All plant debris shall be disposed of in the proper manner and at a pre-approved location. Weed control efforts shall commence as early as February (early spring), as indicated annually by the PVS Designated Biologist.
- During Project pre-construction, construction and O&M, all seeds will be weed free, straw materials shall be made up of weed-free rice straw, and all gravel and fill material shall be certified weed free by the County Agriculture Commissioners' Office. Any deviation from this will have to be approved by the County of San Benito. All plant materials used during restoration shall be native, certified weed-free, and approved and documented by the Designated Biologist.
- All construction vehicles will be visually inspected before arrival onsite. Vehicles and equipment will be free of excess dirt or mud and inspected prior to access to the Project site by designated construction staff trained by a Biological Monitor. All on site construction equipment will be required to be washed prior to delivery to the site and washed (utilizing high pressure washers) prior to demobilizing. If vehicles or equipment contain dirt or mud, proper washing will take place prior to access onsite. Any vehicle or equipment observed not to have been properly cleaned will not be permitted to enter the Project site. A log shall be kept describing vehicle or equipment attempting to enter the site and results of the inspection. This log will be kept onsite and made available upon the request of the County.
- Construction traffic on site and between sections of the site will utilize track out devices prior to crossing paved roads. Track outs will be located at ingress/egress points on the site for this to be

achieved. Delivery vehicles (over road tractor trailers, concrete and aggregate trucks, and all other delivery vehicles) will be required to travel on established roadways and utilize established lay down areas at the Project site. The rumble pads and track out stone will be maintained and cleaned as necessary to remove any deposited materials.

- Vehicle traffic for employees will travel to established parking areas and enter and exit over the track out devices. Track out devices will be regularly maintained and all construction equipment entering the site will be inspected and any equipment observed not to have been washed will not be permitted to enter the Project site.
- Tools used for vegetation or weed control such as chainsaws, hand clippers, pruners, etc. shall be washed before entering all Project work areas.
- Vehicles, equipment, and tools used during removal of noxious weeds will be cleaned prior to exiting the area during vegetation and seedbed removal.
- During Project operation and maintenance activities, weeds found in assembly yards, array footprints, access roads, staging areas, and any other disturbance areas shall be cleared and disposed of in an approved method.
- Once the construction phase is completed, cleaning stations will be removed and treated for weed infestation if necessary.
- A Biological Monitor, under the direct supervision of a Designated Biologist shall be retained to ensure the compliance with the preventative measures and any other measures set forth in this Weed Control Plan.

All of these methods have been considered during preparation of this draft weed management plan and will be implemented during construction, operation and decommissioning of the project.

6.2.1 Construction

Worker Environmental Training

Mandatory site environmental training for contractors or related personnel entering the Project site during construction will include weed management awareness training. Personnel affected will include contractors, subcontractors, inspection personnel, construction managers, construction personnel, and individuals bringing vehicles or equipment onto the Project site. Training will include weed identification and training on the impacts of weeds on agriculture, livestock, wildlife, and fire hazard. Impacts of weeds on native vegetation, wildlife, and fire activity will be discussed including an explanation of how invasive grasses provide a fine fuel understory which can spread fire from shrub to shrub and how this has historically been absent in the native ecosystem. Proposed measures to prevent the spread of weeds in areas currently not infested, and controls on their proliferation when already present, will also be explained.

Track Out Stations

With the underlying principal of prevention being the most cost-effective way to deal with invasive plant species early, all vehicles entering the site will be free of mud and dirt, and track stations will be used to remove fine materials from construction vehicles and equipment. This will prevent the spread of weed seeds into new habitats as construction vehicles and equipment with mud and dirt containing seeds is one of the most common ways weed seeds are spread to new environments. Vehicles and equipment will be free of excess dirt or mud and inspected prior to access to the Project site by designated construction staff trained by a Biological Monitor. All on site construction equipment will be required to be washed prior to delivery to the site and washed (utilizing high pressure washers) prior to demobilizing. If vehicles or equipment contain dirt or mud, proper washing will take place prior to access onsite. All construction equipment entering the site will be inspected and any equipment observed not to have been properly cleaned will not be permitted to enter the Project site. A log shall be kept describing vehicle or equipment attempting to enter the site and results of the inspection. This log will be kept onsite and made available upon the request of the County.

Construction traffic on site and between sections of the Project site will utilize track out devices prior to crossing paved roads. Delivery vehicles (over road tractor trailers, concrete and aggregate trucks, and all other delivery vehicles) will be required to travel on established roadways and utilize established lay down areas at the Project site.

Track outs will be a minimum of 100 feet long or twice the length of the longest vehicle entering the site. Track out pads will be a combination of corrugated steel “rumble plates” at exits of track out pads and 6 inches thick of class 150 (4” minimum diameter) stone preceding rumble pads. Rumble pads and track out stone will be maintained and cleaned as necessary to remove any deposited materials. Vehicle traffic for employees will travel to established parking areas and enter and exit over the track out devices as previously described. Trackout devices will be regularly maintained.

Infestation Containment and Control

During construction, areas of concern will be identified and flagged in the field by Biological Monitors. The flagging will alert construction personnel that weeds are present and will prevent access into these areas until weed management control measures have been implemented. Contractors will avoid or minimize travel through these marked off weed-infested areas. Control measures will be implemented immediately as described in the sections below. The contractor will work in weed-free areas whenever feasible before operating in weed-infested areas with exception of known ubiquitous weed species areas. No construction activities will take place in these marked off weed-infested areas, until the Designated Biologist has verified completion of weed treatments within weed-infested areas.

Site Soil Management

The contractor will limit the size of ground disturbance to the absolute minimum necessary to perform the activity safely and as designed. The contractor will also avoid creating soil conditions that promote weed germination and establishment to the greatest extent practicable. Soil conditions that promote weed germination and establishment include soil excavation/disturbance, vegetation removal, soil compaction, loss or removal of topsoil and introduction of chemical compounds, including fertilizer, and soil stockpiling.

During grading or excavation activities, the contractor will minimize transporting soil within the Project site to limit the potential spread of weed seeds. In areas where weed infestations are identified, the contractor will stockpile cleared vegetation and salvaged topsoil adjacent to the area from which they are stripped to eliminate the transport of soil-borne weed seeds, roots, or rhizomes.

Weed-free Products

Straw or hay bales used for sediment barrier installations, gravel, mulch, and soil may carry weed seeds. The contractor will ensure that straw or hay bales used for sediment barrier installations are obtained from certified sources that are free of weed seeds and are made of weed-free rice straw. Additional products such as gravel, mulch, and soil, may also carry weed seeds. Such products should be obtained from suppliers who can provide weed-free certified materials. To the greatest extent feasible, mulch will be generated from native vegetation cleared from the site itself. Soil will not be imported onto the site except in instances where it can be ensured to be free of weeds that are not currently at the site, and also free of weed seeds in high concentrations.

Weed-free Seed

Seed purchased from commercial vendors for site revegetation will be labeled in compliance with the relevant provisions of the California Agriculture Code. In addition to having the correct label, the seed should be required to be free of weeds and the label should so state.

6.2.2 Operations

Facility Staff Training

Mandatory site training for maintenance personnel will include weed control management. Training will include weed identification and the impacts on agriculture, livestock, wildlife, and fire frequencies. Also explained will be the importance of preventing the spread of weeds in areas currently not infested, and controlling the proliferation of weeds already present.

Infestation Containment and Control

Areas of concern which contain concentrations or new occurrences of weeds will be identified and flagged by operations personnel or personnel designated by PVS. The flagging will alert personnel of weed are presence and will prevent access into these areas until weed management control measures have been implemented. Immediate control measures will be implemented as described below.

6.2.3 Site Closure

Site decommissioning or closure should include drafting and implementation of the site's Habitat Restoration and Revegetation Plan. This plan will include measures to avoid weed establishment throughout the Project site, and to implement long-term site rehabilitation and revegetation of decommissioned facilities. Control of weed establishment should be a central goal of long-term site rehabilitation, the long-term success of which will be enhanced by revegetation measures promoting surface stability and soil development.

6.3 Eradication and Control Methods

6.3.1 Unacceptable Weed Removal Methods

Tilling

Tilling is a weed-control practice used on agricultural lands that is inappropriate in this area for weed control purposes. Tilling is ineffective in this area and tilled weeds are likely to set seed, even after burial. In addition, tilling is likely to disturb native cover stock, and will also disrupt the natural structure and chemistry of the soil, allowing weed seeds to proliferate from soil disturbance. Fragmenting weeds resulting from tilling will also lead to more widespread growth of non-native plants.

Mowing

Mowing for weed control is sometimes used to reduce weed cover late in the growing season, typically after annuals have matured. This method merely cuts back the thatch that develops during the growing season and does not remove weeds. It is sometimes used as a fire control method, but will result in an aggravation of weed infestation problems rather than the removal/control of weeds. Mowing is problematic for the following reasons:

- Mowing would severely damage existing native plants, including small individuals that may or may not be visible at the time of mowing, but could be pushing their way through the canopy as they mature;
- Mowing, which is typically done late in the spring or early summer, would result in maturation of weed seed from existing weeds after they are cut and left to desiccate, increasing weed seed in the seed bank and ensuring a robust crop of weeds in subsequent years; and
- Native ground and shrub nesting birds could potentially use the site as a breeding ground between February and August. The federal Migratory Bird Treaty Act (16 U.S.C. 703-712; 50 Code of Federal Regulations 10) prohibits the “take” of migratory birds, and protects eggs, nests, and feathers, unless permitted. Take is defined in part as “pursue, hunt, take, capture, kill, or attempt to take, capture, or kill any migratory bird, any part, nest, or eggs of any such bird.” Hence, mowing activity during the breeding season would potentially violate this federal law.

6.3.2 Physical Removal of Weeds (Acceptable)

The type of physical control method employed will depend upon the size and extent of weed species targeted for removal as well as the root structures of these plants. Physical control methods range from manual hand pulling of weeds to the use of hand tools (e.g. shovel) to provide enough leverage to pull out the entire plant and associated root systems. Hand or power tools (e.g. chainsaw) can also be employed to uproot, girdle, or cut plants. This effort should be focused on weed species that have a single-root mass, facilitating easy removal. Hand removal by pulling is appropriate when the plants are large enough that they will not break and leave the roots structures behind to re-sprout. For localized weed control, this is the most effective method. Hand-pulling is less effective in large areas and with weed species that spread through an underground root system. Removed plant material should be bagged and disposed of properly to an approved landfill.

In small areas, hoeing and weed whipping can be employed to control weeds. However, care must be employed when using these methods adjacent to native plants to prevent damage to native plants. Hoeing or weed whipping must only be employed prior to a plant setting seed, otherwise this disturbance would only serve to further disperse and promote the establishment of the weed species. Pertinent considerations for hoeing and weed whipping include the following:

- Hoeing works best on patches of small weeds and with weeds that have a single-root mass. It is less effective on larger weeds that can regenerate from cut roots. It should not be used on weeds approaching maturity, as seeds can mature and be released on cut plants. Hoed plant material should be bagged and removed offsite.
- Weed whipping can be used for weed removal in limited upland areas with herbaceous plant covers; however, it should not be used on weeds approaching maturity, as seeds can mature and be released on cut plants, and care must be employed when weed whipping adjacent to native plants. Cut plant material should be bagged and removed offsite.

6.3.3 Chemical Methods for Weed Removal (Acceptable)

Herbicide application is a widely employed, effective control method for removing invasive weed species. One consideration is the possible inadvertent application of herbicide to adjacent native plants. Herbicide application can become a challenge when weeds are interspersed with native cover.

Permitting and Regulatory Requirements

Prior to application of herbicide, contractors will be required to obtain required permits from state and local authorities. Permits may contain additional terms and conditions that go beyond the scope of this plan. Only a State of California certified contractor will be permitted to perform herbicide applications. Herbicides will be applied in accordance with applicable laws, regulations, and permit stipulations. Only herbicides and adjuvants approved by the State of California will be used within or adjacent to the Project site. A BLM list of approved herbicides and adjuvants is available in Appendix B. The approved herbicides and adjuvants listed in this appendix are incorporated as requirements of this plan even though the Project does not fall within any BLM managed lands.

Types of Herbicides

Herbicides are characterized by the way in which they inhibit plant growth. Herbicides are characterized as pre-emergent, post-emergent, selective and nonselective. A pre-emergent herbicide controls ungerminated seeds by inhibiting germination while a post-emergent herbicide is lethal to emerged plants. Some herbicides have both pre- and post-emergent activity. A selective herbicide will be active on some species of plants and not others, usually distinguishing between grasses (monocots) and broadleaf plants (dicots). A non-selective herbicide is one that is lethal to any plant species to which it is applied.

Herbicides kill plants through either contact or systemic action. Contact herbicides are most effective against annual weeds and kill only the plant parts on which the chemical is deposited. Systemic herbicides are absorbed either by roots or foliar parts of a plant and are then translocated within the plant system to tissues that might be remote from the point of application. Although systemic herbicides can be effective against annual and perennial weeds, they are particularly effective against established perennial weeds.

Pre-emergent herbicides inhibit germination of annuals from seed, but generally do not control perennial plants that germinate from bulbs, corms, rhizomes, stolons, or other vegetative structures. Common pre-emergent herbicide classes include the following:

- Dinitroaniline Type**:** Examples of this class are pendimethalin (Weedgrass™), trifluralin (Treflan™), benefin (Balan™), and combinations of these. These herbicides provide for pre-emergence control of annual grasses and other annuals. They are mitotic (cell division) inhibitors and are primarily effective in inhibiting root growth of germinating seeds. Selectivity is physiological or chemical in nature. Some of these herbicides could be lost by volatilization, and should not be applied in temperatures above 90 degrees Fahrenheit (°F). These herbicides need to be watered into the soil for proper activation. Some can persist for several months.
- Dithiopyr (Dimension™) belongs to a new class of herbicide known as pyridines. It is a selective herbicide primarily used for pre-emergence annual grass control in established turfgrass. However, it can be used for post-emergence control of young grass seedlings. It inhibits cell division and cell growth of meristematic regions (growing points of roots and shoots). Dithiopyr is lost from soil by chemical and microbial degradation.

The most commonly used post-emergent, non-selective herbicides contain a family of chemicals called glyphosates (N-[phosphonomethyl] glycine). Glyphosate is a non-selective, systemic herbicide that is effective on many annual and perennial plants. It works by blocking an enzyme pathway that is important for plant protein synthesis, which is most effective if full coverage over the plants leaf is accomplished. However, because of systemic action, even partial coverage can result in plant mortality. The herbicide is typically used in conjunction with linseed oil or another surfactant, which aids in spreading an even layer across the surface of the leaves. Because glyphosate can also be lost to volatilization, they should not be applied when the temperature exceeds 90°F.

The United States Environmental Protection Agency (EPA 1993) has deemed glyphosate to have a relatively low degree of oral and dermal acute toxicity. It is considered to be immobile in soil and readily degraded by soil microbes to the metabolite aminomethyl phosphonic acid and then to carbon dioxide. EPA states that it is minimally toxic to birds, fish, aquatic invertebrates, and honeybees (EPA 1993).

Application and Handling

Herbicide application will be based on information gathered from the BLM. Before application of herbicide, PVS's Contractors will obtain any required permits from the local authorities. Permits may contain additional terms and conditions that go beyond the scope of this management plan. Only A State certified contractor will perform herbicide applications. All herbicide application will be applied in accordance with applicable laws and regulations and permit stipulations. Only herbicides and adjuvants approved by California will be used within or adjacent to the Project site. The following general precautions will be implemented for pesticide application:

- It is the responsibility of the pesticide user to observe the directions, restrictions, and precautions on pesticide labels.
- Store pesticides in original containers with labels intact and behind locked doors.
- Keep pesticides out of the reach of children.
- Use pesticides at correct label dosage and intervals to avoid injury to plants and animals.
- Use pesticides carefully to avoid drift or contamination of non-target areas.
- Surplus pesticides and containers should be disposed of in accordance with label instructions to prevent contamination of water and other hazards.
- Follow directions on the pesticide label regarding restrictions as required by state or federal laws and regulations.
- Avoid action that may threaten a rare, threatened, or endangered species or its habitat.
- Only the minimum amount of herbicides necessary to control noxious weeds will be used in order to prevent the contamination of ground water.

Limitations

All herbicide applications must follow United States Environmental Protection Agency label instructions. Application of herbicides will be suspended when any of the following conditions exists:

- Wind velocity exceeds 6 miles per hour (mph) during application of liquids or 15 mph during application of granular herbicides.
- Snow or ice covers the foliage of weeds.
- Precipitation is occurring or is imminent.
- Air temperatures exceed 90°F.

Transport and Mixing

During the construction phase, herbicides will be transported to the project site daily with the following provisions:

- Only the needed quantity for that day's work will be transported.

- Concentrate will be transported in approved containers only and in a manner that will prevent tipping or spilling, and in a location that is isolated from the vehicle's driving compartment, food, clothing, and safety equipment.
- Mixing will be done offsite, over a drip-catching device, and at a distance greater than 200 feet from open or flowing water, wetlands, or other sensitive resources. No herbicides will be applied at these areas unless authorized by appropriate regulatory agencies.
- Herbicide equipment and containers will be inspected for leaks daily. Disposal of spent containers will be in accordance with the herbicide label.
- During the operations phase of the Project, herbicides will be stored only in cabinets of approved design and will be under lock and key.

Worker Safety

The use of small quantities of chemical herbicides will be required at the project site. Site workers have the potential to come into contact with herbicides during application and during inverter servicing and solar array inspections in areas where herbicides have been used to control weeds.

The following Best Management Practices (BMPs) will be followed to ensure worker safety at the project site:

- The Project site will follow all appropriate California Department of Pesticide Regulation (DPR) requirements regarding the use of herbicides.
- Pesticide safety training for all workers including training on how to use application equipment and specific safety precautions for each herbicide being applied.
- Personal protective equipment will be supplied for every worker.
- Decontamination supplies will be available to all workers who face exposure to herbicides including showers, soap, towels and a change of clothing.
- Emergency information will be posted including the location of the nearest medical facility and instructions on what to do in the event of an medical emergency.
- Emergency transportation in the event of accidental exposure.
- Project site communication during and following herbicide application so that herbicides do not contact anyone through drift.
- Required application equipment checks.
- Observance of the recommended time before entering an area where herbicides have been applied so that trucks and workers inspecting solar arrays and inverters are not exposed to herbicides.

Herbicide Spills and Cleanup

Reasonable precautions will be taken to avoid herbicide spills. In the event of a spill, immediate cleanup will be initiated. Contractors will keep spill kits in their vehicles and in herbicide storage areas to allow for quick and effective response to spills.

The following items are to be included in the spill kit:

- Protective clothing and gloves
- Absorptive clay, "kitty litter," or other commercial adsorbent
- Plastic bags and bucket
- Shovel
- Fiber brush and screw-in handle
- Dust pan
- Caution tape
- Highway flares (use on established roads only)
- Detergent

Response to herbicide spills will vary with the size and location of the spill, but general procedures include the following:

- County notification
- Traffic control
- Dressing the cleanup team in protective clothing
- Stopping the leaks
- Containing the spilled material
- Cleaning up and removing the spilled herbicide or contaminated adsorptive material and soil
- Transporting the spilled pesticide and contaminated material to an authorized disposal site.

Spray Methods

Vehicle-mounted sprayers (*e.g.*, handgun, boom, and injector) will be used mainly in open areas that are readily accessible by vehicle. Hand application methods (*e.g.*, backpack spraying) that target individual plants will be used to treat small or scattered weed populations in rough terrain. Calibration checks of equipment will be conducted at the beginning of spraying and periodically throughout treatment to ensure that proper application rates are achieved.

Controlling Post-emergent Herbaceous Vegetation

To control herbaceous weedy vegetation, implement the following measures:

- Apply a foliar application of approved herbicide on each plant.
- Provide applications on a spray-to-wet basis with coverage uniform and complete.
- Avoid contact with established native shrub and grass species.
- Temporarily discontinue work in the event of gusty winds or winds in excess of 6 mph.
- Temporarily discontinue in the event of rainfall.
- Ensure applicators possess current pest control licenses valid in the State of California and wear appropriate personal protective equipment.

- Leave sprayed vegetation undisturbed for seven days or until visible effects of herbicide application are present consisting of wilted and brown foliage and disintegration of root material. The Designated Biologist will determine when adequate time has been allowed for this.
- Remove treated plant materials by appropriate means, and dispose of offsite at a suitable landfill.
- Cover loads while removing vegetation using a tarpaulin or equivalent cover.

Controlling Woody Vegetation

Woody vegetation should be controlled using the cut and paint method of removal. To control woody vegetation, implement the following measures:

- Cut sprouts or woody stems to a height of 12 inches or less above ground and remove aboveground debris for disposal at a suitable landfill.
- Apply approved herbicide at a 100 percent rate to the cut stem within two minutes of cutting the stem. If more than two minutes elapses, the cut stem should be re-cut a few inches below the original cut and herbicide can then be applied.
- Apply Rodeo™ (or equivalent) in areas that are in immediate contact with wetlands and/or other water bodies; Round-up™ (or equivalent) will be used elsewhere. The Designated Biologist will determine the appropriate herbicide to use at each location.
- Cover loads while removing vegetation using a tarpaulin or equivalent cover.
- Apply follow-up foliar applications to stem re-growth that occurs after initial control effort.
- Continue monitoring and treating cut stems for as long as necessary to ensure complete mortality.
- A Designated Biologist will determine if complete mortality has occurred in the treated areas.

Controlling Pre-emergent Vegetation

Generally, it is anticipated that there are few areas where pre-emergent vegetation control would be required. Pre-emergent herbicides work only on vegetation reproducing from seed, and are not effective on other types of propagules, such as resprouts from root crowns which have been cut, rhizomes, or other material. Use of pre-emergent herbicides might be appropriate in areas that have repeated weed problems with annual plants, with evidence of a robust weed seed crop in the seed bank. Such areas will be sprayed with pre-emergent herbicides during appropriate pre-germination periods.

Generally, pre-emergent herbicides would not be appropriate for revegetation areas or other native habitats because they are likely to inhibit the germination and growth of desirable native plant seed being used for restoration.

6.3.4 Competitive Vegetation

The use of native plants to out-compete invasive weed species is an effective, long-term weed control strategy incorporated for this Project site. Following BMP measures laid out for PVS, a seed mix of native plant species will be distributed within temporary disturbance areas and in other disturbed areas following completion of the Project. Establishment of these species has the potential to exclude weed invasion, and over time, weed control will require less effort.

7.0 REPORTING REQUIREMENTS

7.1 Report Content

Implementation of the WCP will include the following data collection and reporting guidelines applicable during construction and O&M phases of the Project.

7.1.1 Construction Reports

During the construction phase, ongoing reporting on weed management will be included in monitoring reports. Construction weed monitoring reports will include the following information:

- Survey findings on location, type, extent, and density of weeds. This data will include mapping and photographs, as appropriate, as well as textual and tabular data content to fully describe conditions on the Project.
- Management efforts, including date, location, type of treatment implemented, and results. Ongoing evaluation of success of treatment will be included.
- Information on implementation and success of preventative measures, including status of equipment track out facilities and summary data of use; data on the worker environmental training program, including participants.
- Summary description of restoration efforts undertaken, adaptive measures employed based on on-the-ground conditions, and the current status of the effort.

7.1.2 Long-Term Monitoring Reports

After implementation of site revegetation, long-term monitoring reports will be focused on success of weed management on the Project site. These reports will include:

- Survey findings on location, type, extent, and density of noxious weeds. These data will include mapping and photographs, newly identified species, submissions to herbaria, as appropriate, as well as textual and tabular data content to fully describe conditions on the Project site.
- Management efforts, including date of efforts, location, types of treatment implemented, and results. Ongoing evaluation of success of treatment will be included.
- The reports will also include a complete description of weed control efforts and status with regard to performance criteria.

7.2 Reporting Periods

7.2.1 Construction Period

The Designated Biologist, Biological Monitors and PVS personnel (mostly O&M phase) will maintain all monitoring records. These records will be summarized into monthly summary reports, where relevant, describing information relevant to weed management. All data will be included in annual reports.

A single post-construction report will be produced after each phase of construction is completed at the site, with a section summarizing the overall results of weed management and weed status at the site. Construction reports will be made available to the County and appropriate agency personnel.

7.2.2 Long-Term Monitoring Reports

Annual monitoring reports will be produced for the duration of the monitoring period. These reports will discuss the results of monitoring and weed control activities. Once success criteria are met, a final monitoring report will be produced to describe the outcome to date of proposed restoration, including status of weed management on the Project site. All annual monitoring reports will be made available to the County and appropriate agency personnel.

8.0 REFERENCES

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Tables

Table 1 - Observed and Potentially Occurring Weeds at the Panoche Solar Facility Project Site

Scientific Name	Common Names	Cal-IPC Overall Rating*	Habitat of Concern	Observed During Surveys and Anticipated Distribution in Project Area
Acroptilon repens	Russian knapweed	Moderate	Roadsides, railways, riverbanks, irrigation ditches, pastures, waste places, clearcuts, and croplands	Not observed
Ailanthus altissima	Tree-of-heaven	Moderate	Riparian areas, grasslands, oak woodland. Impacts highest in riparian areas.	Not observed
Asphodelus fistulosus	Onion weed	Moderate	Coastal dunes, prairie, grasslands. More invasive in Australia. High invasiveness but limited distribution in CA.	Not observed
Avena barbata	Slender oats	Moderate	Coastal scrub, grasslands, oak woodland, forest. Very widespread.	Observed
Avena fatua	Wild oats	Moderate	Coastal scrub, chaparral, grasslands, woodland, forest. Very widespread, but impacts more severe in desert regions.	Observed
Brachypodium sylvaticum	False-brome; slender false-brome	Moderate	Redwoods and mixed evergreen forest in Santa Cruz Mtns. Expanding range rapidly in OR, potentially very invasive.	Not observed
Brassica nigra	Black mustard	Moderate	Widespread. Primarily a weed of disturbed sites, but can be locally a more significant problem in wildlands.	Not observed
Brassica tournefortii	Sahara mustard	High	Desert dunes, desert and coastal scrub.	Not observed
Bromus diandrus	Ripgut brome	Moderate	Dunes, scrub, grassland, woodland, forest. Very widespread, but monotypic stands uncommon.	Observed
Bromus madritensis ssp. rubens	Red brome	High	Scrub, grassland, desert washes, woodlands.	Observed
Bromus tectorum	Downy brome	High	Interior scrub, woodlands, grasslands, pinon/Joshua tree woodland, chaparral.	Not observed
Cardaria chalepensis or Lepidium chalepensis	Lens-podded hoary cress	Moderate	Central Valley wetlands. Limited distribution in CA. May not be as invasive as *C. draba*.	Not observed
Cardaria draba or Lepidium draba	Hoary cress	Moderate	Roadsides, railways, riverbanks, irrigation ditches, pastures, waste places, clearcuts, and croplands	Observed
Carduus pycnocephalus	Italian thistle	Moderate	Forest, scrub, grasslands, woodland. Very widespread. Impacts may be variable regionally.	Observed
Centaurea calcitrapa	Purple starthistle	Moderate	Grasslands. Impacts regionally variable. Distribution relatively limited.	Possible
Centaurea melitensis	Tocalote	Moderate	Man-made or disturbed habitats, meadows and fields	Observed
Centaurea solstitialis	Yellow starthistle	High	Grasslands, woodlands, occasionally riparian	Possible
Cirsium vulgare	Bull thistle	Moderate	Open, disturbed sites, and is an important weed in clearcuts and conifer plantations	Not observed
Cotoneaster franchetii	Cotoneaster	Moderate	Thickets in rocky sunny mountain regions, open hillsides	Not observed

Scientific Name	Common Names	Cal-IPC Overall Rating	Habitat of Concern	Observed During Surveys and Anticipated Distribution in Project Area
Cynara cardunculus	Artichoke thistle	Moderate	Coastal grasslands. Impacts more severe in southern CA where monotypic stands are more common.	Not observed
Cynodon dactylon	Bermuda grass	Moderate	Riparian scrub in southern California. Common landscape weed, but can be very invasive in desert washes.	Observed
Cynosurus echinatus	Annual dogtail	Moderate	Man-made or disturbed habitats	Not observed
Dipsacus fullonum	Common teasel	Moderate	Grasslands, seep, riparian scrub. Impacts regionally variable, forms dense stands on occasion.	Not observed
Dittrichia graveolens	Stinkwort	Moderate	Grasslands, riparian scrub. Spreading rapidly, impacts may become more important in future.	Not observed
Foeniculum vulgare	Sweet fennel	High	Waste places, roadsides, riverbanks, and other non-agricultural situations	Not observed
Hirschfeldia incana	Short-pod mustard	Moderate	Scrub, grasslands, riparian areas. Impacts not well understood, but appear to be greater in southern CA.	Not observed
Hordeum marinum or Hordeum murinum	Foxtail barley	Moderate	Roadsides, grasslands, open hillsides, pastures, waste places, clearcuts, and croplands	Observed
Hypochaeris radicata	Rough cat's-ear	Moderate	Coastal dunes, scrub, and prairie; woodland, forest. Widespread. Impacts unknown or appear to be minor.	Observed
Lepidium latifolium	Perennial pepperweed	High	Coastal and inland marshes, riparian areas, wetlands, grasslands; potential to invade montane wetlands.	Not observed
Lolium multiflorum or *Festuca perennis*	Italian ryegrass	Moderate	Roadsides, grasslands, open hillsides, pastures, waste places, clearcuts, and croplands	Not observed
Nicotiana glauca	Tree tobacco	Moderate	Coastal scrub, grasslands, riparian woodland. Abiotic impacts unknown. Impacts vary locally. Rarely in dense stands.	Not observed
Onopordum acanthium	Scotch thistle	High	Natural areas, disturbed sites, roadsides, fields, and especially sites with fertile soils	Not observed
Rumex acetosella	Sheep sorrel	Moderate	Many habitats, riparian areas, forest, wetlands. Widespread. Abiotic impacts unknown. Impacts can vary locally.	Possible
Salsola soda	Opposite leaf Russian thistle	Moderate	Marine systems, estuaries, vernal pool, marsh and swamp	Not observed
Sisymbrium irio	London rocket	Moderate	Desert, upland, riparian ditches, and disturbed areas.	Not observed
Tamarix parviflora or *Tamarix ramosissima*	Tamarisk	High	Floodplains, riverbanks, ditches, marshes, upland waste areas and roadsides	Possible
Vulpia myuros	Rat-tail fescue	Moderate	man-made and disturbed habitats, meadows and fields	Observed

*Cal-IPC Overall Rating

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.

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.

Table 2 - Managing Strategies and Control Methods for Observed and Potentially Occurring Weeds at the Panoche Solar Facility Project Site

Scientific Name	Common Names	Management Strategy	Control Method
Acroptilon repens	Russian knapweed	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root and bag for disposal
Ailanthus altissima	Tree-of-heaven	Monitor for occurrence and eradicate if found	Mature Trees: Cut trees and apply 100 percent herbicide to cut stem, spray new shoots. Saplings: Pull out entire plant and root
Asphodelus fistulosus	Onion weed	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root and bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide
Avena barbata	Slender oats	No Action; allow colonization as pioneer species in revegetation areas.	No Action
Avena fatua	Wild oats	No Action; allow colonization as pioneer species in revegetation areas.	No Action
Brachypodium sylvaticum	False-brome; slender false-brome	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root or use shovel in moist soil. Once removed bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide
Brassica nigra	Black mustard	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root or use shovel in moist soil. Once removed bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide
Brassica tournefortii	Sahara mustard	Monitor for occurrence prior to seed set, and eradicate if found; continue to monitor occurrence sites to ensure complete eradication.	Individual Plants: Pull out entire plant and root before seeding and bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide. Triclopyr has been shown to be effective.
Bromus diandrus	Ripgut brome	Small occurrences - monitor for and eradicate if found. Large Stands - no action; ubiquitous species, allow colonization as pioneer species in revegetation areas.	Small occurrences - Spray with post-emergent, systemic, selective herbicide. Large stand - No Action
Bromus madritensis ssp. rubens	Red brome	No Action; allow colonization as pioneer species in revegetation areas.	No Action
Bromus tectorum	Downy brome	Small occurrences - monitor for and eradicate if found. Large Stands - no action; ubiquitous species, allow colonization as pioneer species in revegetation areas.	Small occurrences - Pull out entire plant and root and bag for disposal. Large stand - No Action
Cardaria chalepensis or Lepidium chalepensis	Lens-podded hoary cress	Monitor for occurrence prior to seed set, and eradicate if found; continue to monitor occurrence sites to ensure complete eradication.	Spray with post-emergent, systemic, selective herbicide.
Cardaria draba or Lepidium draba	Hoary cress	Survey for present occurrence and eradicate where found	Spray with post-emergent, systemic, selective herbicide. Chlorsuluron has been shown to be effective.
Carduus pycnocephalus	Italian thistle	Survey for present occurrence and eradicate where found	Individual Plants: Pull out entire plant and root before seeding and bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide. Aminopyralid has been shown to be effective.
Centaurea calcitrapa	Purple starthistle	Survey for present occurrence and eradicate where found	Individual Plants: Pull out entire plant and root or use digging in moist soil. Once removed bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide.

Scientific Name	Common Names	Management Strategy	Control Method
Centaurea melitensis	Tocalote	Survey for present occurrence and eradicate where found	Individual Plants: Pull out entire plant and root or use digging in moist soil. Once removed bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide.
Centaurea solstitialis	Yellow starthistle	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root or use digging in moist soil. Once removed bag for disposal. Stands - Spray both post-emergent and pre-emergent herbicides. Clopyralid has both pre-emergence and post-emergence effectiveness.
Cirsium vulgare	Bull thistle	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root before seeding and bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide.
Cotoneaster franchetii	Cotoneaster	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root before seeding and bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide. Triclopyr has been shown to be effective.
Cynara cardunculus	Artichoke thistle	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root before seeding and bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide.
Cynodon dactylon	Bermuda grass	Survey for present occurrence and eradicate where found	Small occurrences - Pull out entire plant and root and bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide.
Cynosurus echinatus	Annual dogtail	Monitor for occurrence and eradicate if found	Small occurrences - Pull out entire plant and root and bag for disposal. Stands - Spray in spring with post-emergent, systemic, selective herbicide.
Dipsacus fullonum	Common teasel	Monitor for occurrence and eradicate if found	Small occurrences - Dig or pull out entire plant and root and bag for disposal for multi years. Stands - Spray in spring with post-emergent, systemic, selective herbicide.
Dittrichia graveolens	Stinkwort	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root or use digging in moist soil. Once removed bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide.
Foeniculum vulgare	Sweet fennel	Monitor for occurrence and eradicate if found	Small occurrences - Hand chop before flowering and bag for disposal. Stands - Spray in spring with post-emergent, systemic, selective herbicide. Triclopyr has been shown to be effective.
Hirschfeldia incana	Short-pod mustard	Monitor for occurrence and eradicate if found	Individual Plants: Pull out entire plant and root or use shovel in moist soil. Once removed bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide
Hordeum marinum or Hordeum murinum	Foxtail barley	Small occurrences - monitor for and eradicate if found. Large Stands - no action; ubiquitous species, allow colonization as pioneer species in revegetation areas.	Small occurrences - Pull out or dig entire plant and root and bag for disposal or spray with post-emergent herbicide. Large stand - No Action
Hypochaeris radicata	Rough cat'��s-ear	Survey for present occurrence and eradicate where found	Dig entire plant and root and bag for disposal or spray with post-emergent herbicide.
Lepidium latifolium	Perennial pepperweed	Monitor for occurrence prior to seed set, and eradicate if found; continue to monitor occurrence sites to ensure complete eradication.	Individual Plants: Pull out entire plant and root or use shovel in moist soil. Once removed bag for disposal. Stands - Spray with post-emergent, systemic, selective herbicide

Scientific Name	Common Names	Management Strategy	Control Method
Lolium multiflorum or *Festuca perennis*	Italian ryegrass	Small Occurrences - monitor for and eradicate if found. Large Stands - no action; ubiquitous species, allow colonization as pioneer species in revegetation areas.	Small occurrences - Spray with post-emergent, systemic, selective herbicide. Large stand - No Action
Nicotiana glauca	Tree tobacco	Survey for present occurrence and eradicate where found	Dig entire plant and root and bag for disposal or spray with post-emergent herbicide.
Onopordum acanthium	Scotch thistle	Survey for present occurrence and eradicate where found	Dig entire plant and root and bag for disposal or spray with post-emergent herbicide.
Rumex acetosella	Sheep sorrel	Survey for present occurrence and eradicate where found	Spray with post-emergent, systemic, selective herbicide.
Salsola soda	Opposite-leaf Russian thistle	Monitor for occurrence and eradicate if found.	Individual Plants: Pull out entire plant and root and bag for disposal
Sisymbrium irio	London rocket	Monitor for occurrence and eradicate if found.	Select Occurrences: Pull out entire plant and root and bag for disposal. Monotypic Stands: Spray with post-emergent herbicide; after senescence.
Tamarix parviflora or *Tamarix ramosissima*	Tamarisk	Survey for present occurrence and eradicate where found.	Mature trees: cut trunk(s) above soil surface. Saplings and seedlings remove entire plant (stems, flowers and roots) by hand pulling place in appropriate containers and dispose of properly. Consider using chemical treatments
Vulpia myuros	Rat-tail fescue	Small Occurrences - monitor for and eradicate if found. Large Stands - no action; ubiquitous species, allow colonization as pioneer species in revegetation areas.	Small occurrences - Spray with post-emergent, systemic, selective herbicide. Large stand - No Action

Appendices

Appendix A - Herbicide Treatment Standard Operating Procedures

APPENDIX B

HERBICIDE TREATMENT STANDARD OPERATING PROCEDURES

APPENDIX B

HERBICIDE TREATMENT STANDARD OPERATING PROCEDURES

This section identifies standard operating procedures (SOPs) that will be followed by the U.S. Department of the Interior Bureau of Land Management (USDI BLM) under all alternatives to ensure that risks to human health and the environment from herbicide treatment actions will be kept to a minimum. Standard operating procedures are the management controls and performance standards required for vegetation management treatments. These practices are intended to protect and enhance natural resources that could be affected by future vegetation treatments.

Prevention of Weeds and Early Detection and Rapid Response

Once weed populations become established, infestations can increase and expand in size. Weeds colonize highly disturbed ground and invade plant communities that have been degraded, but are also capable of invading intact communities. Therefore, prevention, early detection, and rapid response are the most cost-effective methods of weed control. Prevention, early detection, and rapid response strategies that reduce the need for vegetative treatments for noxious weeds should lead to a reduction in the number of acres treated using herbicides in the future by reducing or preventing weed establishment.

As stated in the BLM's *Partners Against Weeds: An Action Plan for the BLM*, prevention and public education are the highest priority weed management activities. Priorities are as follows:

- Priority 1: Take actions to prevent or minimize the need for vegetation control when and where feasible, considering the management objectives of the site.
- Priority 2: Use effective nonchemical methods of vegetation control when and where feasible.
- Priority 3: Use herbicides after considering the effectiveness of all potential methods or in combination with other methods or controls.

Prevention is best accomplished by ensuring the seeds and vegetatively reproductive plant parts of new weed species are not introduced into new areas.

The BLM is required to develop a noxious weed risk assessment when it is determined that an action may introduce or spread noxious weeds or when known habitat exists. If the risk is moderate or high, the BLM may modify the project to reduce the likelihood of weeds infesting the site, and to identify control measures to be implemented if weeds do infest the site.

To prevent the spread of weeds, the BLM takes actions to minimize the amount of existing non-target vegetation that is disturbed or destroyed during project or vegetation treatment actions (Table B-1). During project planning, the following steps are taken:

- Incorporate measures to prevent introduction or spread of weeds into project layout, design, alternative evaluation, and project decisions.
- During environmental analysis for projects and maintenance programs, assess weed risks, analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices.
- Determine prevention and maintenance needs, to include the use of herbicides if needed, at the onset of project planning.
- Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

During project development, weed infestations are prioritized for treatment in project operating areas and along access routes. Weeds present on or near the site are identified, a risk assessment is completed, and weeds are controlled as necessary. Project staging areas are weed free, and travel through weed infested areas is avoided or minimized. Examples of prevention actions to be followed during project activities include cleaning all equipment and clothing before entering the project site; avoiding soil disturbance and the creation of other soil conditions that promote weed germination and establishment; and using weed-free seed, hay, mulch, gravel, soil, and mineral materials on public lands where there is a state or county program in place.

Conditions that enhance invasive species abundance should be addressed when developing mitigation and prevention plans for activities on public lands. These conditions include excessive disturbance associated with road maintenance, poor grazing management, and high levels of recreational use. If livestock grazing is managed to maintain the vigor of native perennial plants, particularly grasses, the chance of weeds invading rangeland is much less. By carefully managing recreational use and educating the public on the potential impacts of recreational activities on vegetation, the amount of damage to native vegetation and soil can be minimized at high use areas, such as campgrounds and off-highway vehicle (OHV) trails. Early detection in recreation areas is focused on roads and trails, where much of the weed spread occurs.

The BLM participates in the National Early Warning and Rapid Response System for Invasive Plants (Figure B-1). The goal of this System to minimize the establishment and spread of new invasive species through a coordinated framework of public and private processes by:

- Early detection and reporting of suspected new plant species to appropriate officials;
- Identification and vouchering of submitted specimens by designated specialists;
- Verification of suspected new state, regional, and national plant records;
- Archival of new records in designated regional and plant databases;
- Rapid assessment of confirmed new records; and
- Rapid response to verified new infestations that are determined to be invasive.

Herbicide Treatment Planning

BLM Manual 9011 (*Chemical Pest Control*) outlines the policies, and BLM Handbook H-9011-1 (*Chemical Pest Control*) outlines the procedures, for use of herbicides on public lands. As part of policy, the BLM is required to thoroughly evaluate the need for chemical treatments and their potential for impact on the environment. The BLM is required to use only U.S. Environmental Protection Agency (USEPA)-registered herbicides that have been properly evaluated under National Environmental Policy Act (NEPA), and to carefully follow label directions and additional BLM requirements.

An operational plan is developed and updated for each herbicide project. The plan includes information on project specifications, key personnel responsibilities, and communication, safety, spill response, and emergency procedures. For application of herbicides not approved for aquatic use, the plan should also specify minimum buffer widths between treatment areas and water bodies. Recommended widths are provided in BLM Handbook H-9011-1 (*Chemical Pest Control*), but actual buffers are site and herbicide active ingredient specific, and are determined based on a scientific analysis of environmental factors, such as climate, topography, vegetation, and weather; timing and method of application; and herbicide risks to humans and non-target species. Table B-2 summarizes important SOPs that should be used when applying herbicides to help protect resources of concern on public lands.

Revegetation

Disturbed areas may be reseeded or planted with desirable vegetation when the native plant community cannot recover and occupy the site sufficiently.

Determining the need for revegetation is an integral part of developing a vegetation treatment. The most important component of the process is determining whether active (seeding/planting) or passive (natural recovery) revegetation is appropriate.

U.S. Department of the Interior policy states, “Natural recovery by native plant species is preferable to planting or seeding, either of natives or non-natives. However, planting or seeding should be used only if necessary to prevent unacceptable erosion or resist competition from non-native invasive species” (620 Departmental Memorandum 3 2004). This policy is reiterated in the USDI *Burned Area Emergency Stabilization and Rehabilitation* Manual, the BLM *Burned Area Emergency Stabilization and Rehabilitation* Manual (BLM H-1742-1), and the *Interagency Burned Area Rehabilitation Guidebook*.

TABLE B-1
Prevention Measures

BLM Activity	Prevention Measure
Project Planning	• Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds. • Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning. • Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes. • Remove sources of weed seed and propagules to prevent the spread of existing weeds and new weed infestations. • Pre-treat high-risk sites for weed establishment and spread before implementing projects. • Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks. • Coordinate project activities with nearby herbicide applications to maximize the cost-effectiveness of weed treatments.
Project Development	• Minimize soil disturbance to the extent practical, consistent with project objectives. • Avoid creating soil conditions that promote weed germination and establishment. • To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives. • Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagules is least likely. • Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material. • Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material. • Survey the area where material from treated weed-infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled. • Prevent weed establishment by not driving through weed-infested areas. • Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent weed spread within the project area. • Avoid acquiring water for dust abatement where access to the water is through weed-infested sites. • Identify sites where equipment can be cleaned. Clean equipment before entering public lands. • Clean all equipment before leaving the project site if operating in areas infested with weeds. • Inspect and treat weeds that establish at equipment cleaning sites. • Ensure that rental equipment is free of weed seed. • Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.
Revegetation	• Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans. • Retain bonds until reclamation requirements, including weed treatments, are completed, based on inspection and documentation. • To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques. • Maintain stockpiled, uninfested material in a weed-free condition.

TABLE B-1 (Cont.)
Prevention Measures

BLM Activity	Prevention Measure
Revegetation (Cont.)	• Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover revegetation. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary. • Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings). • Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules. • Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least 3 growing seasons following completion of the project. • Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. • Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines). • Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way (ROW), and other areas of disturbed soils.

In addition to these handbooks and policy, use of native and non-native seed in revegetation and restoration is guided by BLM Manual 1745 (*Introduction, Transplant, Augmentation and Reestablishment of Fish, Wildlife and Plants)*. This manual states that native species shall be used, unless it is determined through the NEPA process that: 1) suitable native species are not available; 2) the natural biological diversity of the proposed management area will not be diminished; 3) exotic and naturalized species can be confined within the proposed management area; 4) analysis of ecological site inventory information indicates that a site will not support reestablishment of a species that historically was part of the natural environment; or 5) resource management objectives cannot be met with native species.

When natural recovery is not feasible, revegetation can be used to stabilize and restore vegetation on disturbed sites and to eliminate or reduce the conditions that favor invasive species. Reseeding or replanting may be required when there is insufficient vegetation or seed stores to naturally revegetate the site.

To ensure revegetation success, there must be adequate soil for root development and moisture storage, which provides moisture to support the new plants. Chances for revegetation success are improved by selecting seed with high purity and percentage germination; selecting native species or cultivars adapted to the area; planting at proper depth, seeding rate, and time of the year for the region; choosing the appropriate planting method; and, where feasible, removing competing vegetation. Planting mixtures are adapted for the treatment area and site uses. A combination of forbs, perennial grasses, and shrubs is typically used on rangeland sites, while shrubs and trees might be favored for riparian and forestland sites. A mixture of several native plant species and types or functional groups enhances the value of the site for fish and wildlife and improves the health and aesthetic character of the site. Mixtures can better take advantage of variable soil, terrain, and climatic conditions, and thus are more likely to withstand insect infestations and survive adverse climatic conditions.

The USDI BLM Native Seed program was developed in response to Congressional direction to supply native plant material for emergency stabilization and longer-term rehabilitation and restoration efforts. The focus of the program is to increase the number of native plant species for which seed is available and the total amount of native seed available for these efforts. To date, the program has focused on native plant material needs of emergency stabilization and burned area rehabilitation in the Great Basin, but is expanding to focus on areas such as western Oregon, the Colorado Plateau, and most recently the Mojave Desert. The Wildland Fire Management Program funds and manages the effort.

The National Seed Warehouse is a storage facility for the native seed supply. Through a Memorandum of

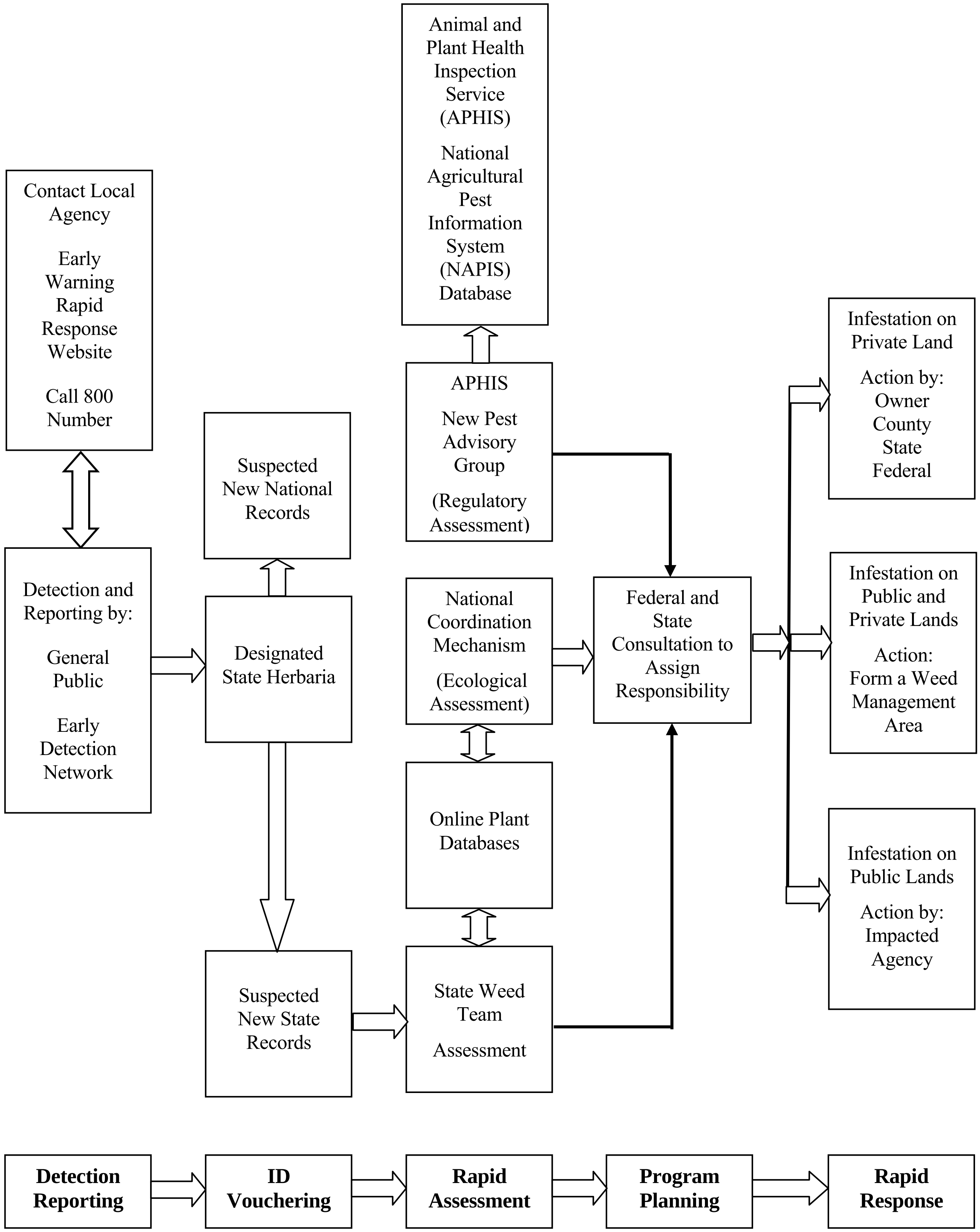

Figure B-1. National Early Warning and Rapid Response System for Invasive Plants.

Understanding with the BLM Idaho State Director, each state (Idaho, Oregon, Nevada, Utah and Colorado) can reserve an annual seed supply for purchase based on a reasonable projection of annual acreage to be stabilized or rehabilitated over a 5-year period.

The Great Basin Restoration Initiative (GBRI) grew out of concern for the health of the Great Basin after the wildfires of 1999. The goal of GBRI is to implement treatments and strategies to maintain functioning ecosystems and to proactively restore degraded ones at strategic locations. Native plants are emphasized in restoration projects where their use is practical and the potential for success is satisfactory. Monitoring is recommended to measure treatment success. To increase the availability of native plants, especially native forbs, the GBRI has established a collaborative native plant project, the Great Basin Native Plant Selection and Increase Project, to increase native plant availability and the technology to successfully establish these plants. This project is supported by funding from the BLM's Native Plant Initiative.

The BLM will follow the following SOPs when revegetating sites:

- Cultivate previously disturbed sites to reduce the amount of weed seeds in the soil seedbank.
- Revegetate sites once work is completed or soon after a disturbance.
- When available, use native seed of known origin as labeled by state seed certification programs.
- Use seed of non-native cultivars and species only when locally adapted native seed is not available or when it is unlikely to establish quickly enough to prevent soil erosion or weed establishment.
- Use seed that is free of noxious and invasive weeds, as determined and documented by a seed inspection test by a certified seed laboratory.
- Limit nitrogen fertilizer applications that favor annual grass growth over forb growth in newly seeded areas, especially where downy brome (cheatgrass) and other invasive annuals are establishing.
- Use clean equipment, free of plants and plant parts, on revegetation projects to prevent the inadvertent introduction of weeds into the site.
- Where important pollinator resources exist, include native nectar and pollen producing plants in the seed mixes used in restoration and reclamation projects. Include non-forage plant species in seed mixes for their pollinator/host relationships as foraging, nesting, or shelter species. Choose native plant species over manipulated cultivars, especially of forbs and shrubs, since natives tend to have more valuable pollen and nectar resources than cultivars. Ensure that bloom times for the flowers of the species chosen match the activity times for the pollinators. Maintain sufficient litter on the soil surfaces of native plant communities for ground-nesting bees.
- Where feasible, avoid grazing by domestic and wild animals on treatment sites until vegetation is well established. Where total rest from grazing is not feasible, efforts should be made to modify the amount and/or season of grazing to promote vegetation recovery within the treatment area. Reductions in grazing animal numbers, permanent or temporary fencing, changes in grazing rotation, and identification of alternative forage sources are examples of methods that could be used to remove, reduce or modify grazing impacts during vegetation recovery.

Special Precautions

Special Status Species

Federal policies and procedures for protecting federally-listed threatened and endangered plant and animal species, and species proposed for listing, were established by the Endangered Species Act of 1973 and regulations issued pursuant to the Act. The purposes of the Act are to provide mechanisms for the conservation of threatened and endangered species and their habitats. Under the Act, the Secretary of the Interior is required to determine which species are threatened or endangered and to issue recovery plans for those species.

Section 7 of the Act specifically requires all federal agencies to use their authorities in furtherance of the Act to carry out programs for the conservation of listed species, and to ensure that no agency action is likely to jeopardize the continued existence of a listed species or adversely modify critical habitat. Policy and guidance (BLM Manual 6840; *Special Status Species*) also stipulates that species proposed for listing must be managed at the same level of protection as listed species.

The BLM state directors may designate special status in cooperation with their respective state. These special status species must receive, at a minimum, the same level of protection as federal candidate species. The BLM will also carry out management for the conservation of state-listed species, and state laws protecting these species will apply to all BLM programs and actions to the extent that they are consistent with Federal Land Policy and Management Act (FLPMA) and other federal laws.

The BLM consulted with the U.S. Fish and Wildlife Service (UFWS) and National Marine Fisheries Service (NMFS) during development of the *Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) as required under Section 7 of the Endangered Species Act. As part of this process, the BLM prepared a formal consultation package that included a description of the program; species listed as threatened or endangered, species proposed for listing, and critical habitats that could be affected by the program; and a Biological Assessment (BA) that evaluated the likely impacts to listed species, species proposed for listing, and critical habitats from the proposed vegetation treatment program. Over 300 species were evaluated in the BA. The BA also provides broad guidance at a programmatic level for actions that will be taken by the BLM to avoid adversely impacting species or critical habitat.

Before any vegetation treatment or ground disturbance occurs, BLM policy requires a survey of the project site for species listed or proposed for listing, or special status species. This is done by a qualified biologist and/or botanist who consults the state and local databases and visits the site at the appropriate season. If a proposed project may affect a proposed or listed species or its critical habitat, the BLM consults with the USFWS and/or NMFS. A project with a "may affect, likely to adversely affect" determination requires formal consultation and receives a Biological Opinion from the USFWS and/or NMFS. A project with a "may affect, not likely to adversely affect" determination requires informal consultation and receives a concurrence letter from USFWS and/or NMFS, unless that action is implemented under the authorities of the alternative consultation agreement pursuant to counterpart regulations established for *National Fire Plan* projects.

Wilderness Areas

Wilderness areas, which are designated by Congress, are defined by the Wilderness Act of 1964 as places "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." The BLM manages 175 Wilderness Areas encompassing over 7.2 million acres.

Activities allowed in wilderness areas are identified in wilderness management plans prepared by the BLM. The BLM does not ordinarily treat vegetation in wilderness areas, but will control invasive and noxious weeds when they threaten lands outside wilderness area or are spreading within the wilderness and can be controlled without serious adverse impacts to wilderness values.

Management of vegetation in a wilderness area is directed toward retaining the natural character of the environment. Tree and shrub removal is usually not allowed, except for fire, insect, or disease control. Reforestation is generally prohibited except to repair damage caused by humans in areas where natural reforestation is unlikely. Only native species and primitive methods, such as hand planting, are allowed for reforestation.

Tools and equipment may be used for vegetation management when they are the minimum amount necessary for the protection of the wilderness resource. Motorized tools may only be used in special or emergency cases involving the health and safety of wilderness visitors, or the protection of wilderness values.

Habitat manipulation using mechanical or chemical means may be allowed to protect threatened and endangered species and to correct unnatural conditions, such as weed infestations, resulting from human influence.

The BLM also manages a total of 610 Wilderness Study Areas (WSAs) encompassing nearly 14.3 million acres. These are areas that have been determined to have wilderness characteristics worthy of consideration for wilderness designation. The BLM's primary goals in WSAs are to manage them so as to not impair their wilderness values and to maintain their suitability for preservation as wilderness until Congress makes a determination on their future.

In WSAs, the BLM must foster a natural distribution of native species of plants and animals by ensuring that ecosystems and processes continue to function naturally.

Cultural Resources

The effects of BLM actions on cultural resources are addressed through compliance with the National Historic Preservation Act, as implemented through a national Programmatic Agreement (*Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*) and state-specific protocol agreements with State Historic Preservation Officers (SHPOs). The BLM's responsibilities under these authorities are addressed as early in the vegetation management project planning process as possible.

The BLM meets its responsibilities for consultation and government-to-government relationships with Native American tribes by consulting with appropriate tribal representatives prior to taking actions that affect tribal interests. The BLM's tribal consultation policies are detailed in BLM Manual 8120 (*Tribal Consultation Under Cultural Resource Authorities)* and Handbook H-8120-1 (*Guidelines for Conducting Tribal Consultation).* The BLM consulted with Native American tribes and Alaska Native groups during development of the PEIS. Information gathered on important tribal resources and potential impacts to these resources from herbicide treatments is presented in the analysis of impacts.

When conducting vegetation treatments, field office personnel consult with relevant parties (including tribes, native groups, and SHPOs), assess the potential of the proposed treatment to affect cultural and subsistence resources, and devise inventory and protection strategies suitable to the types of resources present and the potential impacts to them.

Herbicide treatments, for example, are unlikely to affect buried cultural resources, but might have a negative effect on traditional cultural properties comprised of plant foods or materials significant to local tribes and native groups. These treatments require inventory and protection strategies that reflect the different potential of each treatment to affect various types of cultural resources.

Impacts to significant cultural resources are avoided through project redesign or are mitigated through data recovery, recordation, monitoring, or other appropriate measures. When cultural resources are discovered during vegetation treatment, appropriate actions are taken to protect these resources.

TABLE B-2
Standard Operating Procedures for Applying Herbicides

Resource Element	Standard Operating Procedure
Guidance Documents	BLM Handbook H-9011-1 (*Chemical Pest Control*); and manuals 1112 (*Safety*), 9011 (*Chemical Pest Control*), 9012 (*Expenditure of Rangeland Insect Pest Control Funds*), 9015 (*Integrated Weed Management)*, and 9220 (*Integrated Pest Management*).
General	• Prepare operational and spill contingency plan in advance of treatment. • Conduct a pretreatment survey before applying herbicides. • Select herbicide that is least damaging to the environment while providing the desired results. • Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, inert ingredients, and tank mixtures. • Apply the least amount of herbicide needed to achieve the desired result. • Follow herbicide product label for use and storage. • Have licensed applicators apply herbicides. • Use only USEPA-approved herbicides and follow product label directions and "advisory" statements. • Review, understand, and conform to the "Environmental Hazards" section on the herbicide product label. This section warns of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or to the environment. • Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas. • Minimize the size of application area, when feasible. • Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/landowners. • Post treated areas and specify reentry or rest times, if appropriate. • Notify adjacent landowners prior to treatment. • Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are available for review at http://www.cdms.net/. • Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location. • Avoid accidental direct spray and spill conditions to minimize risks to resources. • Consider surrounding land uses before aerial spraying. • Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence). • Make helicopter applications at a target airspeed of 40 to 50 miles per hour (mph), and at about 30 to 45 feet above ground. • Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent. • Use drift control agents and low volatile formulations. • Conduct pre-treatment surveys for sensitive habitat and special status species within or adjacent to proposed treatment areas. • Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation. • Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species. • Turn off applied treatments at the completion of spray runs and during turns to start another spray run. • Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Clean OHVs to remove seeds.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Air Quality See Manual 7000 (*Soil, Water, and Air Management*)	• Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks. • Apply herbicides in favorable weather conditions to minimize drift. For example, do not treat when winds exceed 10 mph (>6 mph for aerial applications) or rainfall is imminent. • Use drift reduction agents, as appropriate, to reduce the drift hazard. • Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]). • Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).
Soil See Manual 7000 (*Soil, Water, and Air Management*)	• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected. • Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility. • Do not apply granular herbicides on slopes of more than 15% where there is the possibility of runoff carrying the granules into non-target areas.
Water Resources See Manual 7000 (*Soil, Water, and Air Management*)	• Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs. • Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments. • Use local historical weather data to choose the month of treatment. Considering the phenology of the target species, schedule treatments based on the condition of the water body and existing water quality conditions. • Plan to treat between weather fronts (calms) and at appropriate time of day to avoid high winds that increase water movements, and to avoid potential stormwater runoff and water turbidity. • Review hydrogeologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination. • Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body. • Do not rinse spray tanks in or near water bodies. Do not broadcast pellets where there is danger of contaminating water supplies. • Maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide- and site-specific criteria to minimize impacts to water bodies. • Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment.
Wetlands and Riparian Areas	• Use a selective herbicide and a wick or backpack sprayer. • Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
Vegetation See Handbook H-4410-1 (*National Range Handbook*), and manuals 5000 (*Forest Management*) and 9015 (*Integrated Weed Management*)	• Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Use native or sterile species for revegetation and restoration projects to compete with invasive species until desired vegetation establishes. • Use weed-free feed for horses and pack animals. Use weed-free straw and mulch for revegetation and other activities. • Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit, to maintain desirable vegetation on the treatment site.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Pollinators	• Complete vegetation treatments seasonally before pollinator foraging plants bloom. • Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily. • Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment. • Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources. • Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources. • Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula. • Make special note of pollinators that have single host plant species, and minimize herbicide spraying on those plants (if invasive species) and in their habitats.
Fish and Other Aquatic Organisms See manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use appropriate buffer zones based on label and risk assessment guidance. • Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments. • Use appropriate application equipment/method near water bodies if the potential for off-site drift exists. • For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to achieve acceptable vegetation management, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
Wildlife See manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use herbicides of low toxicity to wildlife, where feasible. • Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area. • Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
Threatened, Endangered, and Sensitive Species See Manual 6840 (*Special Status Species*)	• Survey for special status species before treating an area. Consider effects to special status species when designing herbicide treatment programs. • Use a selective herbicide and a wick or backpack sprayer to minimize risks to special status plants. • Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for special status species in area to be treated.
Livestock See Handbook H-4120-1 (*Grazing Management*)	• Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible. • As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable. • Use herbicides of low toxicity to livestock, where feasible. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources. • Avoid use of diquat in riparian pasture while pasture is being used by livestock. • Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary. • Provide alternative forage sites for livestock, if possible.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Wild Horses and Burros	• Minimize using herbicides in areas grazed by wild horses and burros. • Use herbicides of low toxicity to wild horses and burros, where feasible. • Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
Cultural Resources and Paleontological Resources See handbooks H-8120-1 (*Guidelines for Conducting Tribal Consultation*) and H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*), and manuals 8100 (*The Foundations for Managing Cultural Resources*), 8120 (*Tribal Consultation Under Cultural Resource Authorities*), and 8270 (*Paleontological Resource Management*) See also: *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*	• Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act* and state protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested tribes. • Follow BLM Handbook H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts. • Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments. • Work with tribes to minimize impacts to these resources. • Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.
Visual Resources See handbooks H-8410-1 (*Visual Resource Inventory*) and H-8431-1 (*Visual Resource Contrast Rating*), and manual 8400 (*Visual Resource Management*)	• Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation. • Consider the surrounding land use before assigning aerial spraying as an application method. • Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area. • If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II). • Lessen visual impacts by: 1) designing projects to blend in with topographic forms; 2) leaving some low-growing trees or planting some low-growing tree seedlings adjacent to the treatment area to screen short-term effects; and 3) revegetating the site following treatment. • When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established Visual Resource Management (VRM) objectives.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Wilderness and Other Special Areas See handbooks H-8550-1 (*Management of Wilderness Study Areas (WSAs)*), and H-8560-1 (*Management of Designated Wilderness Study Areas*), and Manual 8351 (*Wild and Scenic Rivers*)	• Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a wilderness area. • Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation. • Revegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration. • Provide educational materials at trailheads and other wilderness entry points to educate the public on the need to prevent the spread of weeds. • Use the "minimum tool" to treat noxious and invasive vegetation, relying primarily on the use of ground-based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock. • Use chemicals only when they are the minimum method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness. • Give preference to herbicides that have the least impact on non-target species and the wilderness environment. • Implement herbicide treatments during periods of low human use, where feasible. • Address wilderness and special areas in management plans. • Maintain adequate buffers for Wild and Scenic Rivers (¼ mile on either side of river, ½ mile in Alaska).
Recreation See Handbook H-1601-1 (*Land Use Planning Handbook, Appendix C*)	• Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species. • Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas. • Adhere to entry restrictions identified on the herbicide product label for public and worker access. • Post signs noting exclusion areas and the duration of exclusion, if necessary. • Use herbicides during periods of low human use, where feasible.
Social and Economic Values	• Consider surrounding land use before selecting aerial spraying as a method, and avoid aerial spraying near agricultural or densely-populated areas. • Post treated areas and specify reentry or rest times, if appropriate. • Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions. • Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Control public access until potential treatment hazards no longer exist, per herbicide product label instructions. • Observe restricted entry intervals specified by the herbicide product label. • Notify local emergency personnel of proposed treatments. • Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating non-target food and water sources, especially vegetation over areas larger than the treatment area. • Consult with Native American tribes and Alaska Native groups to locate any areas of vegetation that are of significance to the tribes and Native groups and that might be affected by herbicide treatments. • To the degree possible within the law, hire local contractors and workers to assist with herbicide application projects and purchase materials and supplies, including chemicals, for herbicide treatment projects through local suppliers. • To minimize fears based on lack of information, provide public educational information on the need for vegetation treatments and the use of herbicides in an integrated pest management program for projects proposing local use of herbicides.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Rights-of-way	• Coordinate vegetation management activities where joint or multiple use of a ROW exists. • Notify other public land users within or adjacent to the ROW proposed for treatment. • Use only herbicides that are approved for use in ROW areas.
Human Health and Safety	• Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted. • Use protective equipment as directed by the herbicide product label. • Post treated areas with appropriate signs at common public access areas. • Observe restricted entry intervals specified by the herbicide product label. • Provide public notification in newspapers or other media where the potential exists for public exposure. • Have a copy of MSDSs at work site. • Notify local emergency personnel of proposed treatments. • Contain and clean up spills and request help as needed. • Secure containers during transport. • Follow label directions for use and storage. • Dispose of unwanted herbicides promptly and correctly.

Appendix B – Herbicides Approved for Use on BLM Lands

*Herbicides Approved for Use on BLM Lands in Accordance with the 17 Western States PEIS ROD and Oregon EIS ROD**

Update September 25, 2012

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Bromacil	AK, AZ, CA, CO, ID, MT, ND,	Bromacil 80DF	Alligare, LLC	81927-4	Y
	NE, NM, NV, OK, OR-East, SD,	Hyvar X	DuPont Crop Protection	352-287	Y
	TX, UT, WA, WY	Hyvar XL	DuPont Crop Protection	352-346	Y
Bromacil + Diuron	AK, AZ, CA, CO, ID, MT, ND,	Bromacil/Diuron 40/40	Alligare, LLC	81927-3	Y
	NE, NM, NV, OK, OR-East, SD,	Krovar I DF	DuPont Crop Protection	352-505	Y
	TX, UT, WA, WY	Weed Blast Res. Weed Cont.	Loveland Products Inc.	34704-576	N
		DiBro 2+2	Nufarm Americas Inc.	228-227	Y
		DiBro 4+4	Nufarm Americas Inc.	228-235	N
		DiBro 4+2	Nufarm Americas Inc.	228-386	N
		Weed Blast 4G	SSI Maxim	34913-19	N
Chlorsulfuron	AK, AZ, CA, CO, ID, MT, ND,	Alligare Chlorsulfuron	Alligare, LLC	81927-43	N
	NE, NM, NV, OK, OR-East, SD,	Telar DF	DuPont Crop Protection	352-522	Y
	TX, UT, WA, WY	Telar XP	DuPont Crop Protection	352-654	Y
		Nufarm Chlorsulf SPC 75 WDG Herbicide	Nufarm Americas Inc.	228-672	N
		Chlorsulfuron E-Pro 75 WDG	Nufarm Americas Inc.	79676-72	N
Clopyralid	AK, AZ, CA, CO, ID, MT, ND,	Spur	Albaugh, Inc.	42750-89	Y
	NE, NM, NV, OK, OR, SD, TX,	Pyramid R&P	Albaugh, Inc.	42750-94	N
	UT, WA, WY	Clopyralid 3	Alligare, LLC	42750-94-81927	Y
		Cody Herbicide	Alligare, LLC	81927-28	Y
		Reclaim	Dow AgroSciences	62719-83	N
		Stinger	Dow AgroSciences	62719-73	Y
		Transline	Dow AgroSciences	62719-259	Y
		CleanSlate	Nufarm Americas Inc.	228-491	Y

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Clopyralid +	AK, AZ, CA, CO, ID, MT, ND,	Commando	Albaugh, Inc.	42750-92	N
2,4-D	NE, NM, NV, OK, OR, SD, TX,	Curtail	Dow AgroSciences	62719-48	N
	UT, WA, WY	Cutback	Nufarm Americas Inc.	71368-72	N
2,4-D	AK, AZ, CA, CO, ID, MT, ND,	Agrisolution 2,4-D LV6	Agriliance, L.L.C.	1381-101	N
	NE, NM, NV, OK, OR, SD, TX,	Agrisolution 2,4-D Amine 4	Agriliance, L.L.C.	1381-103	N
	UT, WA, WY	Agrisolution 2,4-D LV4	Agriliance, L.L.C.	1381-102	N
		2,4-D Amine 4	Albaugh, Inc./Agri Star	42750-19	Y
		2,4-D LV 4	Albaugh, Inc./Agri Star	42750-15	Y
		Solve 2,4-D	Albaugh, Inc./Agri Star	42750-22	Y
		2,4-D LV 6	Albaugh, Inc./Agri Star	42750-20	N
		Five Star	Albaugh, Inc./Agri Star	42750-49	N
		D-638	Albaugh, Inc./Agri Star	42750-36	N
		Alligare 2,4-D Amine	Alligare, LLC	81927-38	N
		2,4-D LV6	Helena Chemical Company	4275-20-5905	N
		2,4-D Amine	Helena Chemical Company	5905-72	N
		2,4-D Amine 4	Helena Chemical Company	42750-19-5905	N
		Opti-Amine	Helena Chemical Company	5905-501	N
		Barrage HF	Helena Chemical Company	5905-529	N
		HardBall	Helena Chemical Company	5905-549	N
		Unison	Helena Chemical Company	5905-542	N
		Clean Amine	Loveland Products Inc.	34704-120	N
		Low Vol 4 Ester Weed Killer	Loveland Products Inc.	34704-124	N
		Low Vol 6 Ester Weed Killer	Loveland Products Inc.	34704-125	N
		Saber	Loveland Products Inc.	34704-803	N
		Salvo	Loveland Products Inc.	34704-609	N
		Savage DS	Loveland Products Inc.	34704-606	Y
		Aqua-Kleen	Nufarm Americas Inc.	71368-4	N
		Aqua-Kleen	Nufarm Americas Inc.	228-378	N
		Esteron 99C	Nufarm Americas Inc.	62719-9-71368	N
		Weedar 64	Nufarm Americas Inc.	71368-1	Y
		Weedone LV-4	Nufarm Americas Inc.	228-139-71368	Y
		Weedone LV-4 Solventless	Nufarm Americas Inc.	71368-14	Y

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
2,4-D - cont.	AK, AZ, CA, CO, ID, MT, ND,	Weedone LV-6	Nufarm Americas Inc.	71368-11	Y
	NE, NM, NV, OK, OR, SD, TX,	Formula 40	Nufarm Americas Inc.	228-357	Y
	UT, WA, WY	2,4-D LV 6 Ester	Nufarm Americas Inc.	228-95	Y
		Platoon	Nufarm Americas Inc.	228-145	N
		WEEDstroy AM-40	Nufarm Americas Inc.	228-145	Y
		Hi-Dep	PBI Gordon Corp.	2217-703	N
		2,4-D Amine	Setre (Helena)	5905-72	N
		Barrage LV Ester	Setre (Helena)	5905-504	N
		2,4-D LV4	Setre (Helena)	5905-90	N
		2,4-D LV6	Setre (Helena)	5905-93	N
		Clean Crop Amine 4	UAP-Platte Chem. Co.	34704-5 CA	Y
		Clean Crop Low Vol 6 Ester	UAP-Platte Chem. Co.	34704-125	N
		Salvo LV Ester	UAP-Platte Chem. Co.	34704-609	N
		2,4-D 4# Amine Weed Killer	UAP-Platte Chem. Co.	34704-120	N
		Clean Crop LV-4 ES	UAP-Platte Chem. Co.	34704-124	N
		Savage DS	UAP-Platte Chem. Co.	34704-606	Y
		Cornbelt 4 lb. Amine	Van Diest Supply Co.	11773-2	N
		Cornbelt 4# LoVol Ester	Van Diest Supply Co.	11773-3	N
		Cornbelt 6# LoVol Ester	Van Diest Supply Co.	11773-4	N
		Amine 4	Wilbur-Ellis Co.	2935-512	N
		Lo Vol-4	Wilbur-Ellis Co.	228-139-2935	N
		Lo Vol-6 Ester	Wilbur-Ellis Co.	228-95-2935	N
		Base Camp Amine 4	Wilbur-Ellis Co.	71368-1-2935	N
		Base Camp LV6	Wilbur-Ellis Co.	2935-553	N
		Broadrange 55	Wilbur-Ellis Co.	2217-813-2935	N
		Agrisolution 2,4-D LV6	Winflied Solutions, LLC	1381-101	N
		Agrisolution 2,4-D Amine 4	Winfield Solutions, LLC	1381-103	N
		Agrisolution 2,4-D LV4	Winfield Solutions, LLC	1381-102	N
		Phenoxy 088	Winfield Solutions, LLC	42750-36-9779	N
		Rugged	Winfield Solutions, LLC	1381-247	N
		Shredder E-99	Winfield Solutions, LLC	1381-195	N

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Dicamba	AK, AZ, CA, CO, ID, MT, ND,	Dicamba DMA	Albaugh, Inc./Agri Star	42750-40	N
	NE, NM, NV, OK, OR, SD, TX,	Vision	Albaugh, Inc.	42750-98	N
	UT, WA, WY	Cruise Control	Alligare, LLC	42750-40-81927	N
		Banvel	Arysta LifeScience N.A. Corp.	66330-276	Y
		Clarity	BASF Corporation	7969-137	Y
		Vision	Helena Chemical Company	5905-576	Y
		Rifle	Loveland Products Inc.	34704-861	Y
		Banvel	Micro Flo Company	51036-289	Y
		Diablo	Nufarm Americas Inc.	228-379	Y
		Vanquish Herbicide	Nufarm Americas Inc.	228-397	Y
		Vanquish	Syngenta	100-884	N
		Sterling Blue	Winfield Solutions, LLC	7969-137-1381	Y
Dicamba +	AK, AZ, CA, CO, ID, MT, ND,	Range Star	Albaugh, Inc./Agri Star	42750-55	N
2,4-D	NE, NM, NV, OK, OR, SD, TX,	Weedmaster	BASF Ag. Products	7969-133	Y
	UT, WA, WY	Brush-Rhap	Helena Chemical Company	5905-568	N
		Latigo	Helena Chemical Company	5905-564	N
		Outlaw	Helena Chemical Company	5905-574	N
		Rifle-D	Loveland Products Inc.	34704-869	N
		KambaMaster	Nufarm Americas Inc.	71368-34	N
		Veteran 720	Nufarm Americas Inc.	228-295	Y
		Weedmaster	Nufarm Americas Inc.	71368-34	Y
		Brash	Winfield Solutions, LLC	1381-202	N
Dicamba +	AZ, CO, ID, MT, ND, NE, NM,	Distinct	BASF Corporation	7969-150	Y
Diflufenzopyr	NV, OK, OR, SD, TX, UT,	Overdrive	BASF Corporation	7969-150	N
	WA, WY				

NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide is prohibited.

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Diquat	AK, AZ, CA, CO, ID, MT, ND,	Alligare Diquat	Alligare, LLC	81927-35	Y
	NE, NM, NV, OK, SD, TX, UT,	NuFarm Diquat SPC 2 L Herbicide	Nufarm Americas Inc.	228-675	N
	WA, WY	Diquat SPC 2 L Herbicide	Nufarm Americas Inc.	79676-75	Y
		Diquat E-Ag 2L	Nufarm Americas Inc.	79676-75	Y
		Reward	Syngena Professional Products	100-1091	Y
Diuron	AK, AZ, CA, CO, ID, MT, ND,	Diuron 80DF	Agriliance, L.L.C.	9779-318	N
	NE, NM, NV, OK, OR, SD, TX,	Diuron 80DF	Alligare, LLC	81927-12	Y
	UT, WA, WY	Karmex DF	DuPont Crop Protection	352-692	Y
		Karmex XP	DuPont Crop Protection	352-692	Y
		Karmex IWC	DuPont Crop Protection	352-692	Y
		Direx 4L	DuPont Crop Protection	352-678	Y
		Direx 80DF	Griffin Company	1812-362	Y
		Direx 4L	Griffin Company	1812-257	Y
		Diuron 4L	Loveland Products Inc.	34704-854	Y
		Diuron 80 WDG	Loveland Products Inc.	34704-648	N
		Diuron 4L	Makteshim Agan of N.A.	66222-54	N
		Diuron 80WDG	UAP-Platte Chem. Co.	34704-648	N
		Vegetation Man. Diuron 80 DF	Vegetation Man., LLC	66222-51-74477	N
		Diuron-DF	Wilbur-Ellis	00352-00-508-02935	N
		Diuron 80DF	Winfield Solutions, LLC	9779-318	N
Fluridone	AK, AZ, CA, CO, ID, MT, ND,	Avast!	SePRO	67690-30	Y
	NE, NM, NV, OK, OR, SD, TX,	Sonar AS	SePRO	67690-4	Y
	UT, WA, WY	Sonar Precision Release	SePRO	67690-12	Y
		Sonar Q	SePRO	67690-3	Y
		Sonar SRP	SePRO	67690-3	Y
Glyphosate	AK, AZ, CA, CO, ID, MT, ND,	Aqua Star	Albaugh, Inc./Agri Star	42750-59	Y
	NE, NM, NV, OK, OR, SD, TX,	Forest Star	Albaugh, Inc./Agri Star	42570-61	Y
	UT, WA, WY	GlyStar Gold	Albaugh, Inc./Agri Star	42750-61	Y
		Gly Star Original	Albaugh, Inc./Agri Star	42750-60	Y
		Gly Star Plus	Albaugh, Inc./Agri Star	42750-61	Y
		Gly Star Pro	Albaugh, Inc./Agri Star	42750-61	Y

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Glyphosate - cont.	AK, AZ, CA, CO, ID, MT, ND,	Glyphosate 4 PLUS	Alligare, LLC	81927-9	Y
	NE, NM, NV, OK, OR, SD, TX,	Glyphosate 5.4	Alligare, LLC	81927-8	Y
	UT, WA, WY	Glyfos	Cheminova	4787-31	Y
		Glyfos PRO	Cheminova	67760-57	Y
		Glyfos Aquatic	Cheminova	4787-34	Y
		ClearOut 41 Plus	Chem. Prod. Tech., LLC	70829-3	N
		Accord Concentrate	Dow AgroSciences	62719-324	Y
		Accord SP	Dow AgroSciences	62719-322	Y
		Accord XRT	Dow AgroSciences	62719-517	Y
		Accord XRT II	Dow AgroSciences	62719-556	Y
		Glypro	Dow AgroSciences	62719-324	Y
		Glypro Plus	Dow AgroSciences	62719-322	Y
		Rodeo	Dow AgroSciences	62719-324	Y
		Showdown	Helena Chemical Company	71368-25-5905	Y
		Mirage	Loveland Products Inc.	34704-889	Y
		Mirage Plus	Loveland Products Inc.	34704-890	Y
		Aquamaster	Monsanto	524-343	Y
		Roundup Original	Monsanto	524-445	Y
		Roundup Original II	Monsanto	524-454	Y
		Roundup Original II CA	Monsanto	524-475	Y
		Honcho	Monsanto	524-445	Y
		Honcho Plus	Monsanto	524-454	Y
		Roundup PRO	Monsanto	524-475	Y
		Roundup PRO Concentrate	Monsanto	524-529	Y
		Roundup PRO Dry	Monsanto	524-505	Y
		Roundup PROMAX	Monsanto	524-579	Y
		Aqua Neat	Nufarm Americas Inc.	228-365	Y
		Credit Xtreme	Nufarm Americas Inc.	71368-81	Y
		Foresters	Nufarm Americas Inc.	228-381	Y
		Razor	Nufarm Americas Inc.	228-366	Y
		Razor Pro	Nufarm Americas Inc.	228-366	Y
		GlyphoMate 41	PBI/Gordon Corporation	2217-847	Y
		AquaPro Aquatic Herbicide	SePRO Corporation	62719-324-67690	Y
		Rattler	Setre (Helena)	524-445-5905	Y

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Glyphosate - cont.	AK, AZ, CA, CO, ID, MT, ND,	Buccaneer	Tenkoz	55467-10	Y
	NE, NM, NV, OK, OR, SD, TX,	Buccaneer Plus	Tenkoz	55467-9	Y
	UT, WA, WY	Mirage Herbicide	UAP-Platte Chem. Co.	524-445-34704	Y
		Mirage Plus Herbicide	UAP-Platte Chem. Co.	524-454-34704	Y
		Gly-4 Plus	Universal Crop Protection Alliance, LLC	72693-1	Y
		Gly-4 Plus	Universal Crop Protection Alliance, LLC	42750-61-72693	Y
		Gly-4	Universal Crop Protection Alliance, LLC	42750-60-72693	Y
		Glyphosate 4	Vegetation Man., LLC	73220-6-74477	Y
		Agrisolutions Cornerstone	Winfield Solutions, LLC	1381-191	Y
		Agrisolutions Cornerstone Plus	Winfield Solutions, LLC	1381-192	Y
		Agrisolutions Rascal	Winfield Solutions, LLC	1381-191	N
		Agrisolutions Rascal Plus	Winfield Solutions, LLC	1381-192	N
		Cornerstone 5 Plus	Winfield Solutions, LLC	1381-241	Y
Glyphosate +	AK, AZ, CA, CO, ID, MT, ND,	Landmaster BW	Albaugh, Inc./Agri Star	42570-62	N
2,4-D	NE, NM, NV, OK, OR, SD, TX,	Campaign	Monsanto	524-351	N
	UT, WA, WY	Landmaster BW	Monsanto	524-351	N
Hexazinone	AK, AZ, CA, CO, ID, MT, ND,	Velpar ULW	DuPont Crop Protection	352-450	N
	NE, NM, NV, OK, OR, SD, TX,	Velpar L	DuPont Crop Protection	352-392	Y
	UT, WA, WY	Velpar DF	DuPont Crop Protection	352-581	Y
		Velossa	Helena Chemical Company	5905-579	Y
		Pronone MG	Pro-Serve	33560-21	N
		Pronone 10G	Pro-Serve	33560-21	Y
		Pronone 25G	Pro-Serve	33560-45	N
Hexazinone +	AK, AZ, CA, CO, ID, MT, ND, NE,	Westar	DuPont Crop Protection	352-626	Y
Sulfometuron methyl	NM, NV, OK, OR, SD, TX, UT,	Oustar	DuPont Crop Protection	352-603	Y
	WA, WY				
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide (sulfometuron methyl) is prohibited.					

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Imazapic	AZ, CO, ID, MT, ND, NE, NM,	Panoramic 2SL	Alligare, LLC	66222-141-81927	N
	NV, OK, OR, SD, TX, UT, WA,	Plateau	BASF	241-365	N
	WY	Nufarm Imazapic 2SL	Nufarm Americas Inc.	71368-99	N
Imazapic + Glyphosate	AZ, CO, ID, MT, ND, NE, NM,	Journey	BASF	241-417	N
	NV, OK, OR, SD, TX, UT, WA,				
	WY				
Imazapyr	AK, AZ, CA, CO, ID, MT, ND,	Imazapyr 2SL	Alligare, LLC	81927-23	N
	OR, NE, NM, NV, OK, SD, TX,	Imazapyr 4SL	Alligare, LLC	81927-24	N
	UT, WA, WY	Ecomazapyr 2SL	Alligare, LLC	81927-22	N
		Arsenal Railroad Herbicide	BASF	241-273	N
		Chopper	BASF	241-296	Y
		Arsenal Applicators Conc.	BASF	241-299	N
		Arsenal	BASF	241-346	N
		Arsenal PowerLine	BASF	241-431	N
		Stalker	BASF	241-398	N
		Habitat	BASF	241-426	Y
		Polaris	Nufarm Americas Inc.	228-534	Y
		Polaris AC	Nufarm Americas Inc.	241-299-228	Y
		Polaris AC	Nufarm Americas Inc.	228-480	Y
		Polaris AC Complete	Nufarm Americas Inc.	228-570	Y
		Polaris AQ	Nufarm Americas Inc.	241-426-228	Y
		Polaris RR	Nufarm Americas Inc.	241-273-228	N
		Polaris SP	Nufarm Americas Inc.	228-536	Y
		Polaris SP	Nufarm Americas Inc.	241-296-228	Y
		Polaris Herbicide	Nufarm Americas Inc.	241-346-228	N
		Habitat Herbicide	SePRO	241-426-67690	Y
		SSI Maxim Arsenal 0.5G	SSI Maxim Co., Inc.	34913-23	N
		Ecomazapyr 2 SL	Vegetation Man., LLC	74477-6	N
		Imazapyr 2 SL	Vegetation Man., LLC	74477-4	N
		Imazapyr 4 SL	Vegetation Man., LLC	74477-5	N

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Imazapyr +	AK, AZ, CA, CO, ID, MT, ND,	Mojave 70 EG	Alligare, LLC	74477-9-81927	N
Diuron	OR, NE, NM, NV, OK, SD, TX,	Sahara DG	BASF	241-372	N
	UT, WA, WY	Imazuron E-Pro	Etigra, LLC	79676-54	N
		SSI Maxim Topsite 2.5G	SSI Maxim Co., Inc.	34913-22	N
Imazapyr +	AK, AZ, CA, CO, ID, MT, ND,	Lineage Clearstand	DuPont Crop Protection	352-766	N
Metsulfuron methyl	OR, NE, NM, NV, OK, SD, TX,				
	UT, WA, WY				
Imazapyr +	AK, AZ, CA, CO, ID, MT, ND,	Lineage HWC	DuPont Crop Protection	352-765	N
Sulfometuron methyl +	OR, NE, NM, NV, OK, SD, TX,	Lineage Prep	DuPont Crop Protection	352-767	N
Metsulfuron methyl	UT, WA, WY				
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide (sulfometuron methyl) is prohibited.					
Metsulfuron methyl	AK, AZ, CO, ID, MT, ND, OR,	MSM 60	Alligare, LLC	81927-7	N
	NE, NM, NV, OK, SD, TX, UT,	AmTide MSM 60DF Herbicide	AmTide, LLC	83851-3	N
	WA, WY	Escort DF	DuPont Crop Protection	352-439	N
		Escort XP	DuPont Crop Protection	352-439	N
		MSM E-Pro 60 EG Herbicide	Etigra, LLC	81959-14	N
		MSM E-AG 60 EG Herbicide	Etigra, LLC	81959-14	N
		Patriot	Nufarm Americas Inc.	228-391	N
		PureStand	Nufarm Americas Inc.	71368-38	N
		Metsulfuron Methyl DF	Vegetation Man., L.L.C.	74477-2	N
Metsulfuron methyl +	AK, AZ, CO, ID, MT, ND,	Cimarron X-tra	DuPont Crop Protection	352-669	N
Chlorsulfuron	NE, NM, NV, OK, OR-East, SD,	Cimarron Plus	DuPont Crop Protection	352-670	N
	TX, UT, WA, WY				

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Metsulfuron methyl +	AK, AZ, CO, ID, MT, ND,	Cimarron MAX	DuPont Crop Protection	352-615	N
Dicamba + 2,4-D	NE, NM, NV, OK, OR, SD, TX,				
	UT, WA, WY				
Picloram	AZ, CO, ID, MT, ND, NE, NM,	Triumph K	Albaugh, Inc.	42750-81	N
	NV, OK, OR, SD, TX, UT, WA,	Triumph 22K	Albaugh, Inc.	42750-79	N
	WY	Picloram K	Alligare, LLC	42750-81-81927	N
		Picloram K	Alligare, LLC	81927-17	N
		Picloram 22K	Alligare, LLC	42750-79-81927	N
		Picloram 22K	Alligare, LLC	81927-18	N
		Grazon PC	Dow AgroSciences	62719-181	N
		OutPost 22K	Dow AgroSciences	62719-6	N
		Tordon K	Dow AgroSciences	62719-17	N
		Tordon 22K	Dow AgroSciences	62719-6	N
		Trooper 22K	Nufarm Americas Inc.	228-535	N
Picloram +	AZ, CO, ID, MT, ND, NE, NM,	GunSlinger	Albaugh, Inc.	42750-80	N
2,4-D	NV, OK, OR, SD, TX, UT, WA,	Picloram + D	Alligare, LLC	42750-80-81927	N
	WY	Picloram + D	Alligare, LLC	81927-16	N
		Tordon 101M	Dow AgroSciences	62719-5	N
		Tordon 101 R Forestry	Dow AgroSciences	62719-31	N
		Tordon RTU	Dow AgroSciences	62719-31	N
		Grazon P+D	Dow AgroSciences	62719-182	N
		HiredHand P+D	Dow AgroSciences	62719-182	N
		Pathway	Dow AgroSciences	62719-31	N
		Trooper 101	Nufarm Americas Inc.	228-561	N
		Trooper P + D	Nufarm Americas Inc.	228-530	N
Picloram +	AZ, CO, ID, MT, ND, NE, NM,	Trooper Extra	Nufarm Americas Inc.	228-586	N
2,4-D +	NV, OK, OR, SD, TX, UT, WA,				
Dicamba	WY				

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Sulfometuron methyl	AK, AZ, CA, CO, ID, MT, ND,	SFM 75	Alligare, LLC	81927-26	Y
	OR, NE, NM, NV, OK, SD, TX,	Oust DF	DuPont Crop Protection	352-401	N
	UT, WA, WY	Oust XP	DuPont Crop Protection	352-601	Y
		SFM E-Pro 75EG	Etigra, LLC	79676-16	Y
		Spyder	Nufarm Americas Inc.	228-408	Y
		SFM 75	Vegetation Man., L.L.C.	72167-11-74477	Y
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide (sulfometuron methyl) is prohibited.					
Sulfometuron methyl + Chlorsulfuron	AK, AZ, CA, CO, ID, MT, ND,	Landmark XP	DuPont Crop Protection	352-645	Y
	NE, NM, NV, OK, OR-East, SD,				
	TX, UT, WA, WY				
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide (sulfometuron methyl) is prohibited.					
Sulfometuron methyl + Metsulfuron methyl	AK, AZ, CA, CO, ID, MT, ND,	Oust Extra	DuPont Crop Protection	352-622	N
	OR, NE, NM, NV, OK, SD, TX,				
	UT, WA, WY				
NOTE: In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS), the aerial application of this herbicide (sulfometuron methyl) is prohibited.					
Tebuthiuron	AZ, CA, CO, ID, MT, ND, NE,	Alligare Tebuthiuron 80 WG	Alligare, LLC	81927-37	Y
	NM, NV, OK, OR-East, SD, TX,	Alligare Tebuthiuron 20 P	Alligare, LLC	81927-41	Y
	UT, WA, WY	Spike 20P	Dow AgroSciences	62719-121	Y
		Spike 80DF	Dow AgroSciences	62719-107	Y
		SpraKil S-5 Granules	SSI Maxim Co., Inc.	34913-10	Y
Tebuthiuron + Diuron	AZ, CA, CO, ID, MT, ND, NE,	SpraKil SK-13 Granular	SSI Maxim Co., Inc.	34913-15	Y
	NM, NV, OK, OR-East, SD, TX,	SpraKil SK-26 Granular	SSI Maxim Co., Inc.	34913-16	Y
	UT, WA, WY				

ACTIVE INGREDIENT	STATES WITH APPROVAL BASED UPON CURRENT EIS/ROD	TRADE NAME	MANUFACTURER	EPA REG. NUMBER	CA REG. **
Triclopyr	AK, AZ, CA, CO, ID, MT, ND,	Triclopyr 4EC	Alligare, LLC	72167-53-74477	Y
	OR, NE, NM, NV, OK, SD, TX,	Triclopyr 3	Alligare, LLC	81927-13	Y
	UT, WA, WY	Triclopry 4	Alligare, LLC	81927-11	Y
		Element 3A	Dow AgroSciences	62719-37	Y
		Element 4	Dow AgroSciences	62719-40	Y
		Forestry Garlon XRT	Dow AgroSciences	62719-553	Y
		Garlon 3A	Dow AgroSciences	62719-37	Y
		Garlon 4	Dow AgroSciences	62719-40	Y
		Garlon 4 Ultra	Dow AgroSciences	62719-527	Y
		Remedy	Dow AgroSciences	62719-70	Y
		Remedy Ultra	Dow AgroSciences	62719-552	Y
		Pathfinder II	Dow AgroSciences	62719-176	Y
		Trycera	Helena Chemical Company	5905-580	Y
		Relegate	Nufarm Americas Inc.	228-521	Y
		Relegate RTU	Nufarm Americas Inc.	228-522	Y
		Tahoe 3A	Nufarm Americas Inc.	228-384	Y
		Tahoe 3A	Nufarm Americas Inc.	228-518	Y
		Tahoe 3A	Nufarm Americas Inc.	228-520	Y
		Tahoe 4E	Nufarm Americas Inc.	228-385	Y
		Tahoe 4E Herbicide	Nufarm Americas Inc.	228-517	Y
		Renovate 3	SePRO Corporation	62719-37-67690	Y
		Renovate OTF	SePRO Corporation	67690-42	Y
		Ecotriclopyr 3 SL	Vegetation Man., LLC	72167-49-74477	N
		Triclopyr 3 SL	Vegetation Man., LLC	72167-53-74477	N
Triclopyr +	AK, AZ, CA, CO, ID, MT, ND,	Everett	Alligare, LLC	81927-29	Y
2,4-D	OR, NE, NM, NV, OK, SD, TX,	Crossbow	Dow AgroSciences	62719-260	Y
	UT, WA, WY	Candor	Nufarm Americas Inc.	228-565	Y
		Aquasweep	Nufarm Americas Inc.	228-316	N
Triclopyr +	AK, AZ, CA, CO, ID, MT, ND,	Prescott Herbicide	Alligare, LLC	81927-30	Y
Clopyralid	OR, NE, NM, NV, OK, SD, TX,	Redeem R&P	Dow AgroSciences	62719-337	Y
	UT, WA, WY	Brazen	Nufarm Americas Inc.	228-564	Y

Wetlands Mitigation and Monitoring Plan for Impacts to Waters and Habitats

Panoche Valley Solar Facility Project

San Benito County, California

September 2015

Prepared for:
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September 2015

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Acronyms and Definitions

AC	alternating current
AMSL	above mean sea level
Applicant	Panoche Valley Solar, LLC (also PVS)
BLM	Bureau of Land Management
BMP	best management practice
BNLL	blunt-nosed leopard lizard
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CMP	Conservation Management Plan
CNLM	Center for National Lands Management
CNPS	California Native Plant Society
CTS	California tiger salamander
CWA	Clean Water Act
DEIR	Draft Environmental Impact Report
FEIR	Final Environmental Impact Report
FT^2	square feet
GIS	Geographical Information System
GKR	giant kangaroo rat
HMP	Habitat Management Plan
LF	linear foot/feet
LSAA	Lake and Streambed Alteration Agreement
M	meters
MUN	Municipal and Domestic Supply
MW	megawatt
NRCS	National Resource Conservation Service
OHWM	ordinary high water mark
PAR	Property Analysis Record
PCSW	Panoche/Silver Creek Watershed
PJD	preliminary jurisdictional determination
PV	photovoltaic
PVS	Panoche Valley Solar, LLC (also Applicant)
CVRWQCB	Central Valley Regional Water Quality Control Board
SCRCL	Silver Creek Ranch Conservation Lands
SJKF	San Joaquin kit fox
U.S.	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands
WMMP	Wetland Mitigation and Management Plan
WRCC	Western Regional Climate Center

1 INTRODUCTION AND PURPOSE

Panoche Valley Solar, LLC (PVS or Applicant) proposes to construct and operate a utility-scale, approximately 247 megawatt (MW), solar photovoltaic (PV) energy generating facility, known as the Panoche Valley Solar Facility (the Project or Project Footprint), on private lands in San Benito County (County), California (**Appendix A, Figure 1**). Construction of the Project will result in impacts to aquatic resource areas under the jurisdiction of the U.S. Army Corps of Engineers (USACE), the Central Valley Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW) (**Appendix A, Figure 2**). State and Federal regulations require mitigation for impacts to waters of the United States (U.S.), also referred to as Federal waters, and waters of the State (State waters).

Mitigation for permanent impacts to waters of the U.S., State waters, and associated habitat is being accomplished through enhancement of wetlands and streams, and preservation of waters within three tracts of conservation land (the Valley Floor Conservation Lands [VFCL], Valadeao Ranch Conservation Lands [VRCL], and Silver Creek Ranch Conservation Lands [SCRCL]), collectively "Conservation Lands," described herein. This Wetland Mitigation and Monitoring (WMMP or Plan) describes detailed mitigation activities, performance criteria to measure success, initial monitoring and management actions, long-term management activities, and estimated costs for the above mentioned Conservation Lands for unavoidable impacts to State and Federal waters.

This WMMP has been prepared to meet permit conditions of the USACE (Clean Water Act Section 404), the RWQCB (Clean Water Act Section 401; Waste Discharge Requirements), and the CDFW (Lake and Streambed Alteration Agreement 1602).

1.1 Responsible Parties and Mitigation-related Roles

PVS is responsible for implementing mitigation for the Project. Energy Renewal Partners, LLC (Energy Renewal) and Burns & McDonnell Engineering Co., Inc. (Burns & McDonnell) are the Applicant's authorized agents and preparers of this WMMP which seeks mitigation to offset impacts to Federal and State waters. Primary contact information for these parties is below:

Project Applicant:	Panoche Valley Solar, LLC 845 Oak Grove Ave., Suite 202 Menlo Park, California 94025 Contact: Eric Cherniss Contact Phone: (408) 460-8200 Email: eric@pv2energy.com
Authorized Agent:	Energy Renewal Partners, LLC 305 Camp Craft Road, Suite 575 West Lake Hills, Texas 78746 Contact: Trisha Elizondo Contact Phone: (512) 222-1125 Email: telizondo@energyrenewalpartners.com

Authorized Agent: Burns & McDonnell Engineering Co., Inc.
4225 Executive Square Drive, Suite 500
La Jolla, California 92037
Contact: Jennifer Kaminsky
Contact Phone: 858-320-2941
Email: jkaminsky@burnsmcd.com

Other roles related to mitigation for this Project include: implementation of enhancement activities, holding a conservation easement over the Conservation Lands, managing the Conservation Lands in perpetuity, and managing an endowment for Conservation Land stewardship.

Implementation of enhancement activities: The enhancement activities, described in Section 7.0 (Mitigation Work Plan) will be contracted by PVS to qualified consultants, or may be conducted directly (or indirectly through contracts) by the Perpetual Land Manager.

Biological monitoring during performance period: PVS will contract a qualified consultant to conduct the mitigation and enhancements as described within this WMMP.

Perpetual Land Management: PVS or the Center for Natural Lands Management (CNLM), as the Perpetual Land Manager, would conduct activities for this role. This work is detailed in Section 4.0 (Long-term Site Protection) of this document. Management activities include all biological monitoring, protection (e.g., such as fencing), reporting, grazing management, and other appropriate stewardship activities to maintain the conservation functions and values of the Conservation Lands in perpetuity.

Conservation Easement Role: Upon recordation of the Conservation Easement Deed, PVS, as the grantor, will provide a conservation easement deed to CNLM, as the grantee. CNLM will be the conservation easement holder and will protect and maintain the natural open space condition of the Conservation Lands in perpetuity per the Habitat Management Plan (HMP) and this WMMP. The grantee of the Conservation Easement(s) will be responsible in perpetuity for monitoring the Conservation Lands for compliance with terms of the Conservation Easement(s), defending and enforcing the Conservation Easement(s), and providing annual reports. The USACE, RWQCB, U.S. Fish and Wildlife Service (USFWS), the County, and CDFW are anticipated third-party beneficiaries of the Conservation Easement(s). It is anticipated that the easement holder would also hold the endowment funding for the perpetual management of the Conservation Lands. The amount of the endowment will be calculated using a Property Analysis record (PAR) and the terms of the endowment will be provided for in an Endowment Management Agreement.

The description of the long-term management and the restrictions for these Conservations Lands are summarized in Section 9.0 (Long-term Management).

1.2 Document Overview and Purpose

As stated above, this WMMP describes enhancement activities, performance criteria to measure success of enhancement activities, initial monitoring and management actions, and long-term management activities for unavoidable impacts to State and Federal waters resulting from construction and operation of the Project. This WMMP will focus on enhancement to aquatic resources (e.g., creeks, drainages, and swales), whereas a separate HMP will describe and define the management and monitoring activities that will occur on the upland habitats (grasslands and shrublands) within the Conservation Lands, which provides the strategy elements and standards proposed for protecting, maintaining, and enhancing Conservation Lands for Federal and State-listed species and their associated habitats. This WMMP provides information related to the function-based assessment of the impact and mitigation sites using appropriate assessment methods.

The mitigation, monitoring, and management activities described in this WMMP are intended to meet the regulatory and permit requirements of the USACE, CDFW, and RWQCB, as well as the USACE regulatory requirements for preparation of mitigation plans set forth in 33 Code of Federal Regulations (CFR) 332.4(c).

The regulatory requirements contained in 33 CFR 332.4(c), as issued by the USACE in 2008, generally encompass the requirements of mitigation and monitoring plans for all of the resource agencies (USACE 2008). The 2008 regulations require a WMMP to include:

- Mitigation Objectives, including resource type, amounts, and methods of compensation (see Section 2.0 of this document)
- Site Selection, including key factors for providing mitigation at a site (see Section 3.0 of this document)
- Site Protection Instrument (see Section 4.0 of this document)
- Baseline Information, including ecological characteristics of impacted and mitigation sites (see Section 5.0 of this document)
- Determination of Credits, including a description of how the mitigation will provide compensatory mitigation for impacts (see Section 6.0 of this document)
- Mitigation Work Plan, including detailed descriptions of the work to be performed in implementing mitigation (see Section 7.0 of this document)
- Mitigation for Impacts to Federal Waters, organized in accordance with the USACE South Pacific Division's Final 2015 Regional Compensatory Mitigation and Monitoring Guidelines (**See Sections 8.3, 8.4, and 8.5 of this document**).
- Maintenance Plan, including maintenance activities to continue viability of the mitigation sites (see Section 8.0 of this document)
- Ecologically Based Performance Standards (see Section 8.0 of this document)
- Monitoring Requirements and Methods (see Section 8.0 of this document)
- Long-term Management Plan (see Section 9.0 of this document)
- Adaptive Management Plan (see Section 10.0 of this document)
- Financial Assurance (See Section 11.0 of this document)

Impacts to Federal and state waters are also described in the Section 404(b)(1) Alternatives Information Study prepared by the Applicant for the USACE, the Lake and Streambed Alteration Agreement (LSAA) Notification Package prepared for the CDFW, the report on Waste Discharge Requirements and Section 401 Water Quality Certification Application prepared for the RWQCB. All permit application documents contain a complete project description and detailed impacts to Federal and State waters.

Appendix C contains the USACE Performance Standards Worksheets for Compensatory Mitigation.

2 MITIGATION GOALS AND OBJECTIVES FOR THE CONSERVATION LANDS

2.1 Overall Goals

The goal and purpose of this WMMP is to mitigate impacts from Project construction and provide the Perpetual Land Manager with guidelines for the protection of waters on the Conservation Lands. This WMMP seeks to:

- Preserve and manage aquatic resources in perpetuity as a "watershed" approach to mitigation.
- Preserve and enhance stream, ephemeral drainage, and wetland functions.

Overall mitigation activities for impacts to waters include the total preservation of approximately 716,852 linear feet (LF) (approximately 136 miles) of stream/creek, ephemeral drainage, and wetland habitat within a total of approximately 24,176 acres of land (Conservation Lands), to be protected in perpetuity (**Appendix A, Figure 3a and 3b)**. This information was gathered and compiled using information provided in the United Stated Geological Survey National Hydrography Dataset. Additional details of the Conservation Lands can be found in Section 2.3 (Resource Functions of the Mitigation Project).

The mitigation activities will also include the enhancement/creation of approximately **12.01** acres of drainages by trash removal (0.40 acre), creation of three California tiger salamander (CTS; *Ambystoma californiense*) pond habitats (0.40 acre) for the Federal- and State-threatened CTS, pool enhancement to offset vernal pool impact (0.05 acre), and grazing exclusion from portions of Panoche Creek (11.16 acres) (**Appendix A, Figure 4**). Mitigation approaches for the Project are defined as follows:

- <u>Preservation:</u> The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. Preservation includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms.
- <u>Enhancement:</u> The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s).
- <u>Establishment (creation)</u>: The manipulations of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

2.2 Mitigation for Impacts to Waters of the U.S.

The activities proposed to mitigate for impacts to waters of the U.S. specifically include the removal of debris from waters (0.40 acre), creation of three California tiger salamander (CTS; *Ambystoma californiense*) pond habitats (0.40 acre), and excluding grazing within portions of Panoche Creek (11.16 acres). Preservation of waters on the conservation lands is not required to compensate for impacts to federal waters as a result of construction of the Project. **See Sections 8.3, 8.4, and 8.5.**

2.3 Resource Functions of the Mitigation Project

The Conservation Lands support a large amount of ephemeral and intermittent streams along with federally jurisdictional creeks (portions of Panoche and Las Aguilas Creeks), which have perennial sections with riparian and wetland habitat (**Appendix A, Figures 3a-3b**). The Conservation Lands were selected to provide local mitigation for impacts to special-status species and Federal and State waters, to preserve self-sustaining populations of special-status species, and to protect permanent movement corridors between adjacent Bureau of Land Management (BLM) controlled lands. Special status species is a broad term to refer to all the animal taxa tracked by the CDFW's California Natural Diversity Database. The CDFW considers taxa on this list to be those of greatest conservation need in California.

It is acknowledged that these preservation and enhancement activities will be conducted within a landscape context with other special-status and sensitive species and habitats. As expansion or enhancement of certain natural resources and habitat types may be at the expense of others, this WMMP is focused on appropriate protection and enhancement of waters, wetlands, and associated species with attention to minimizing adverse impacts to other conservation values.

More specifically, the following special-status species are found on the Conservation Lands, the San Joaquin kit fox (SJKF; *Vulpes macrotis mutica*), giant kangaroo rat (GKR; *Dipodomys ingens*), blunt-nosed leopard lizard (BNLL; *Gambelia silus*), and San Joaquin antelope squirrel (*Ammospermophilus nelsoni*). The Panoche Valley area is the northern-most area where viable populations of these species occur, and it is within a rainfall zone that is considerably higher than at least one core area for these species (i.e. western Kern County). These desert animals have persisted in the Panoche Valley area at relatively high densities in association with heavy grazing by livestock. It is plausible and even likely that these desert species have persisted in the Panoche Valley because of livestock grazing and associated desertification of the habitat. Therefore, large-scale changes to the current grazing management could have unintended negative effects to species that thrive in open, sparsely vegetated sites. Although grazing exclusion will likely have positive effects for some riparian species and for watershed function, the use of this tool will be restricted to relatively small sites and areas so that potential negative effects to special-status species are minimized.

The Conservation Lands are made up of three large tracts of land located in Panoche Valley, San Benito, and Fresno Counties, California, within the following sections of Federal Townships:

Valley Floor Conservation Land (VFCL) – San Benito County

- Sections 4, 8-10, 13-16, and 19 of Township 15 south, Range 10 east.

Valadeao Ranch Conservation Land (VRCL) – San Benito and Fresno Counties

- Sections 19, 30, and 31 of Township 14 south, Range 11 east;
- Sections 21-27 and 32-36 of Township 14 south, Range 10 east;
- Sections 1-8 and 10-14 of Township 15 south, Range 10 east; and
- Sections 6, 7, 19, and 20 of Township 15 south, Range 11 east.

Silver Creek Ranch Conservation Land (SCRCL) – San Benito and Fresno Counties

- Sections 20-21 and 26-36 of Township 15 south, Range 11 east; and
- Sections 1-6 and 8-12 of Township 16 south, Range 11 east.

Each of these three tracts of Conservation Lands is discussed in more detail in the following sections.

2.3.1 Valley Floor Conservation Lands

The VFCL are approximately 2,514 acres in size and will be protected in perpetuity to avoid detrimental effects to Panoche and Las Aguilas Creeks and special-status species, particularly BNLL, GKR, SJKF, and their associated habitats. PVS adjusted and reduced the previously proposed Project Footprint by greater than 60 percent to avoid a significant amount of impacts to Federal and State waters and habitat for the above stated special-status species. PVS will permanently preserve the highly suitable habitat as the VFCL. The VFCL is contiguous with the Project Footprint and the VRCL. The VFCL is primarily California annual grassland habitat, some seasonal vernal and ephemeral pools, as well as segments of the seasonally dry Panoche and Las Aguilas Creeks. The VFCL also includes the entire 100-year floodplain on the valley floor as well as a SJKF movement corridor, GKR avoidance areas, and BNLL avoidance buffers. The VFCL is currently grazed by livestock, which may enhance the habitat for some special-status species (Germano et al., 2012), and these lands will continue to be grazed under adaptive management in the future (**Appendix A, Figure 3a**).

2.3.2 Valadeao Ranch Conservation Lands

Based upon initial biological surveys of the Project Footprint and discussions with CDFW and USFWS, PVS identified and acquired rights to permanently preserve and manage the adjacent Valadeao Ranch property (approximately 10,772 acres), which is located north, east, and west of the Project Footprint (**Appendix A, Figure 3a**).

These lands are also contiguous with the VFCL and SCRCL. The VRCL includes several seasonal drainages and is dominated by California annual grasslands (approximately 6,700 acres) and ephedra shrubland (approximately 2,700 acres), with smaller components of *Atriplex* shrubland and juniper and oak woodlands. Soils on this site are complex and range from sandy and clay loams to badlands (NRCS 2015). The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent (preferred slopes for several of the special-status species discussed in this document). Elevations on the VRCL range from approximately 1,400 feet to 2,100 feet above mean sea level (amsl). These lands are currently grazed, which may enhance the habitat for the special-status species, and this property will continue to be grazed under adaptive management in the future.

Special-status species observed (either directly or by their signs) on the VRCL include CTS, GKR, and SJKF. Portions of the VRCL were found to be suitable for BNLL, GKR, CTS, and SJKF in differing acreage amounts. The VRCL also supports one known CTS breeding pool and estivation habitat. The breeding pool and estivation habitat will be preserved in perpetuity and will increase the mitigation value for CTS.

2.3.3 Silver Creek Ranch Conservation Lands

During the 2010 Draft Environmental Impact Report (DEIR) public comment period, the Applicant consulted with the County, CDFW, USFWS, and various experts on the special-status species regarding additional possible mitigation for unavoidable impacts to sensitive biological resources. PVS then identified and secured the rights to permanently preserve and manage additional conservation lands in the Panoche Valley, known as the SCRCL.

The SCRCL is approximately 10,890 acres located southeast of the Project Footprint (**Appendix A, Figures 3a and 3b**). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. California annual grasslands compose the majority of ground cover on the site (approximately 8,400 acres) which can be dominated by non-native species in some years. The site also supports ephedra shrubland (approximately 2,260 acres), riparian areas, seeps, springs, and barrens. Tamarisk shrubland occurs along Silver Creek and around other small areas of the perennial flowing creek. Field visits have indicated there are also emergent wetlands and marshes occurring along Panoche Creek. These lands include several seasonal drainages and upland habitat.

2.4 Potential Future Use of Conservation Lands for Mitigation

The Conservation Lands described herein contain vast natural resources. This WMMP is directly enhancing only a portion of the aquatic features on these lands (approximately **12.01** acres) and preserving over 700,000 linear feet of existing stream channels and over 24,000 acres of land. Additional areas of these conservation lands could be enhanced as part of future mitigation of other development projects or by other organizations to continue the recovery of threatened and endangers species, vegetation communities, aquatic resources, or habitat. Upon coordination with the Land Owner and Manager and with guidance and approval from CDFW, USFWS, USACE, and RWQCB, as appropriate; other entities may utilize the Conservation Lands as long as these efforts do not conflict with this WMMP and the Project's HMP.

For instance, both wetland and stream mitigation are used to compensate for adverse impacts generally occurring within a specified service area, or designated watershed. Permittees needing to compensate for project-related unavoidable adverse impacts to streams or upland habitat may execute an agreement with the appropriate parties to compensate for those impacts within the Conservation Lands (excluding the **12.01** acres that will be directly enhanced by this WMMP). This will allow the opportunity for future private or public entities to enhance, create, or establish aquatic or upland features that will further increase the value of natural resources within the Conservation Lands.

Adherence to all local, state, and federal regulations shall apply to the entity interested in utilizing the Conservation Lands as mitigation requirements. Coordination with the Land Owner and Manager will be a condition precedent to soliciting input from regulatory agencies.

3 SITE SELECTION

As stated in Section 2.1 above, the protection of the Conservation Lands ensures the preservation of a large portion of the local watershed(s). The Conservation Lands were selected based on the presence of a large intact watershed area—the Panoche/Silver Creek Watershed containing ephemeral, intermittent, and perennial streams along with some wetlands supporting emergent vegetation. The purchase and protection of these Conservation Lands would create a contiguous area of protected lands, connecting with each other and adjacent BLM land. The Conservation Lands are important to watershed health as they contain the headwaters of several streams and drainages. Improving hydrological conditions within the Conservation Lands will enhance the overall health of the entire watershed. As stated previously, these Conservation Lands also support a diverse number of State and Federal special-status species and associated habitats. Provisions for perpetual management will ensure protection of the upper watershed, including large expanses of California annual grassland, numerous ephemeral streams and drainages, including the wetland areas and perennial portions of Panoche Creek, as well as the surrounding riparian areas for Panoche Creek and Silver Creek.

3.1 Watershed Setting and Context

The Conservation Lands occur within the Panoche/Silver Creek Watershed (Watershed) and are surrounded by a rural landscape. The Watershed is located in Fresno and San Benito Counties and lies on the western edge of the San Joaquin Valley in the Diablo Range. The Watershed lies within a semi-arid region, with precipitation occurring primarily between October and March. The Watershed is characterized by a wide range of geologic, soil, climatic, vegetative, and flood-related conditions and phenomena. While land use throughout the Watershed is primarily characterized as range land, there are also some irrigated croplands just north of the Interstate-5 freeway. Panoche Creek and Silver Creek are the two major streams which drain the Watershed. Silver Creek drains the southern portion of the Watershed, and Panoche Creek drains the central, western, and northern portions of the Watershed. Approximately two-thirds of the Watershed is drained by Panoche Creek, and the other one-third by Silver Creek. Silver Creek joins Panoche Creek approximately 4 to 5 miles upstream of the Interstate-5 freeway (PCSW 1998).

Implementation of the proposed mitigation activities through implementation of this WMMP would protect and enhance the headwaters within the Watershed, as well as ensure the hydrological and ecological connectivity of the site with its surrounding rural landscape.

3.2 Beneficial Uses Provided

Water quality control plans, or basin plans, contain California's administrative policies and procedures for protecting state waters. Basin plans are required by the Porter-Cologne Water Quality Control Act (California Water Code Section 13240). Each of California's nine regional water quality control boards must formulate and adopt a basin plan for all waters within its region. Basin plans consist of designated beneficial uses to be protected, water quality objectives to protect those uses, and a program of implementation needed for achieving the objectives {California Water Code, Section 13050(j)}.

Panoche Valley is located in the southeastern portion of San Benito County, within the Central Valley Planning Area and under the jurisdiction of the Central Valley RWQCB. The Project is located in the northwestern portion of the Tulare Lake Basin, which is made up of the drainage area of the San Joaquin Valley south of the San Joaquin River, and is subject to management direction provided by the Water Quality Control Plan for the Tulare Lake Basin.

Surface water hydrologic units within the Tulare Lake Basin have been defined and numbered by the Department of Water Resources. All surface waters in hydrologic units 556 and 559 and portions of 541 and 542 are classified as Westside streams.

The Project is located in the Coast Range Hydrologic Unit 559.11, and therefore all surface waters in the Project area would be classified as Westside streams. The beneficial uses of Westside streams include agricultural supply, industrial service and process supply, water contact recreation, non-water contact recreation, warm freshwater habitat, wildlife habitat, rare, threatened or endangered species habitat, and groundwater recharge. In some cases a beneficial use may not be applicable and regional water board judgment will be applied.

The RWQCB has determined that beneficial uses of agricultural supply, industrial service and process supply, water contact recreation, and non-water contact recreation would not be applicable to surface waters in the Project area as discussed below:

- *Agricultural supply*
  The surface water on the Revised Project site does not provide sufficient water to meet the criteria necessary to be considered as a beneficial use (supply a single well capable of producing an average, sustained yield of 200 gallons per day). Therefore, Agriculture Supply (AGR) is not considered a beneficial use of the surface waters of the Revised Project site.

- *Industrial Service and Process Supply*
  The surface water on the Revised Project site does not provide sufficient water to meet the criteria necessary to be considered as a beneficial use (supply a single well capable of producing an average, sustained yield of 200 gallons per day). Therefore, Industrial Service and Process Supply (IND or PRO) is not considered a beneficial use of the surface waters of the Revised Project site.

- *Water Contact Recreation*
  There are not currently any water contact recreational opportunities for surface waters within the Revised Project area. This is not a beneficial use of the surface waters of the Revised Project site.

- *Non-Water Contact Recreation*
  Non-water contact recreational opportunities involve uses near water, but no body contact with water. These uses include sightseeing, hiking, or bird watching, etc. However, the project site does not afford these recreational opportunities to the public because it is currently privately-owned land and not open to public. Therefore, the project's surface waters are not considered to provide Non-Contact Water Recreation (REC-2) Beneficial Uses.

The remaining beneficial uses of Westside streams are discussed below and will be protected through permit conditions and requirements set forth in the Waste Discharge Requirements (WDRs) adopted by the RWQCB.

- *Warm Freshwater Habitat, Wildlife Habitat, and Rare, Threatened or Endangered Species Habitat*
  An analysis of habitat (freshwater, wildlife habitat, and habitat for various special-status species) has been addressed in the 2015 Final SEIR, Section C.6. Biological Resources. Extensive surveys, including full protocol surveys for BNLL, were completed for the Project. Mitigation for impacts to species, including BNLL was set forth in Section C.6.3.4. Additionally, impacts to special-status species will be subject to conditions of the Incidental Take Permits from the USFWS and CDFW.

- *Groundwater Recharge*
  Groundwater recharge is addressed in the 2015 Final SEIR Section C.15 Water Resources. The Project is not significantly altering or impounding flows in a way that would restrict current groundwater recharge.

While permitted discharges will cause some degradation to wetlands and waters under the jurisdiction of the Clean Water Act and California Resources Code, the filling of these waters will be mitigated by enhancement, creation, and preservation on Conservation Lands as described in this WMMP. The beneficial uses of aquatic resources will be protected through required construction and post-construction measures and plans. The permitted discharges will not cause violations of water quality objectives within any surface waters or groundwater under the Basin Plan, will not unreasonably affect surface waters beneficial uses, and will be to the maximum benefit of the people of the State.

The Project is underlain by the Panoche Valley Groundwater Basin, which is also within the Central Valley Planning Area and subject to management direction of the Water Quality Control Plan for the Tulare Lake Basin. The Panoche Valley Groundwater Basin's designated beneficial uses are listed as "Municipal and Domestic Supply" or "MUN" in the Basin Plan. In accordance with the MUN designation, as defined by the Tulare Lake Basin Plan, "…uses of water for community, military, or individual water supply systems, including but not limited to drinking water supply" are permitted uses (FEIR 2010).

It is not anticipated that the Project will impact groundwater or adversely affect the beneficial use designation of surface or groundwater. Beneficial use of waters of the State within the Conservation Lands will be preserved and managed through mitigation and monitoring of this Plan.

4 LONG-TERM SITE PROTECTION

Upon approval of appropriate agencies (in accordance with Project's Biological Assessment and applicable permits), the Applicant anticipates that CLNM will be the easement and endowment holder of the Conservation Lands. The Applicant will contract a long term management agreement of the Conservation Lands to an approved management entity (anticipated to be CNLM). Details regarding long-term site protection are detailed below:

- Prior to commencement of construction, Conservation Lands shall be placed under a conservation easement to be preserved in perpetuity.
- The management entity shall implement all approved plans for managing and monitoring the Conservation Lands in perpetuity to maintain conservation values in accordance with the conservation easement.
- Long-term management tasks shall be funded through the endowment fund[1]. The management entity (if the Perpetual Land Manager and Conservation Easement Grantee are the same entity) shall be responsible for providing an annual report to the Implementation Group (Applicant and permitting agencies [CDFW, USFWS, RWCQB, and San Benito County], or others, as required by permitting agencies) that provides details on the management, biological monitoring, and Conservation Easement monitoring.
- Any and all enhancement, management, and/or maintenance activities undertaken by the Perpetual Land Manager or its representatives must be in accordance with all approved monitoring plans and implementing and legal documents, or must obtain separate approval and/or permits from the applicable Permitting Agencies prior to the activity.

[1] The initial endowment costs for management and conservation easement activities will be presented in a Property Analysis Record (PAR) report.

- Develop a PAR3© (Property Analysis Record) for the cost of perpetual management for all 24,176 acres of Conservation Lands, upon approval of management plans by appropriate agencies. The Applicant will provide payment in full for the endowment that will accompany the Conservation Lands. The most recent draft of the PAR has been included in **Appendix D**.

Additional information and responsibility pertaining to the long-term management of the Conservation Lands can be found in Section 9 (Long-term Management).

5 BASELINE INFORMATION

5.1 Soils

Soils within the Conservation Lands reflect the underlying alluvial sediments, variability of source area, the extent of weathering, the degree of slope, and the degree of human modification. The Conservation Lands are underlain by seven main soil units identified by the National Resource Conservation Service (NRCS 2015). The soil units include the Panhill loam and Panoche loam formed on the alluvial fan surfaces at the base of the Panoche Hills; the Panoche sandy loam and Panoche loam in the central Panoche Valley; and the Yolo gravelly loam and Yolo loam formed on the fan deposits derived from Las Aguilas Mountains. Additional soils noted within the Conservation Lands include: Gaviota rocky loam, 15 to 50 percent slopes, eroded and somewhat excessively drained; Los Banos clay loam, 9 to 50 percent slopes, eroded and well drained; Vallecitos rocky loam with 15 to 50 percent slopes, eroded and well drained; Kettleman loam, 5 to 50 percent slopes and well drained.

The Fresno County General Plan indicates stream systems in Western Fresno County are prone to high flows and flood as they drain a very large watershed. The soils in the Coast Range are therefore subject to erosion. As a result, stormwater runoff typically carries large volumes of sediment and naturally occurring minerals, such as selenium, arsenic, boron, and asbestos. Western Fresno County contains five major stream systems: Little Panoche Creek, Panoche Creek, Tumey Gulch and Arroyo Ciervo, Cantua Creek, and Arroyo Pasajero. In particular, Panoche Creek is known to carry high levels of selenium and arsenic (Fresno County 2000). The Panoche Creek flows through the portions of Conservation Lands and deposits soils in alluvial fans during moderate and high flood events. Analysis of the arsenic dataset conducted in the San Joaquin Valley suggested that the dominant mechanisms resulting in elevated concentrations of arsenic were related to high pH and reducing conditions. Arsenic is commonly associated with iron hydroxides that coat grain surfaces in the sediments under oxidized conditions. Arsenic adsorbed onto iron hydroxides can be released by high-pH conditions or by reductive dissolution. In the context of the regional flow system, areas having high concentrations of arsenic that result from high pH generally are at the distal ends of the alluvial fans adjacent to the flood basin deposits in the axis of the San Joaquin Valley (USGS 2004).

Given the Site’s proximity to San Joaquin Valley and the previous reports of arsenic laden flows within Panoche Creek, it is expected the arsenic levels in the soils within Panoche Valley are naturally occurring.

5.2 Vegetation

Amount and timing of rainfall during the current and past growing seasons likely influences herbaceous species composition and cover on the Conservation Lands. In some years, non-native grasses are dominant species whereas in other years, native and non-native forb species are the most abundant class of vegetation. Species present in California Annual Grassland include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus rubens* ssp. *madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. The native perennial grass (*Poa secunda*) is also locally common within portions of the Conservation Lands. Native species that maintain a presence must be generally tolerant of grazing and saline clay-rich soils. Areas which have not been previously disturbed by historic cultivation or been subject to heavy grazing also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitatum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

Grasslands dominate the lower slopes and valley bottoms in continuous stands that are interrupted only by a few larger washes. Some grassland patches were entirely comprised of non-native species, though these areas were uncommon. One California Native Plant Society (CNPS) List 4 species, serpentine leptosiphon (*Leptosiphon ambiguous*), was identified in this alliance.

In addition to the grasslands there are Ephedra shrublands. Plant associations that were noted to occur within the Ephedra Shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub.

An example location of Ephedra Shrublands occurs in Las Aguilas Creek, an arroyo-like wash at the southwestern edge of VRCL, the Ephedra Shrublands occur in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, along ephemeral drainages, and steep rocky and thin-soiled south-facing slopes. Most shrub species in this alliance are widespread at low frequencies in areas beyond the extent of the assemblage where they dominate. In the understory layer, introduced annual grasses generally attain overwhelming dominance. The understory assemblage is often sparse, and non-diverse cover is typical of all study area shrubland associations that occupy xeric, steep slopes with southern aspects, although some associations in this alliance had dense understory. Other notable plants found within this alliance include introduced grasses, coyote brush (*Baccharis pilularis*), silver lupine (*Lupinus albifrons*), narrow leaf milkweed (*Asclepias fascicularis*), Sandberg bluegrass (*Poa secunda*), crinkled onion (*Allium crispum*), white fiestaflower (*Pholistoma membranaceum*), foothill larkspur (*Delphinium hesperium* ssp. *pallescens*), and wild oats (*Avena* sp.). Native perennial species were generally sparse in this alliance. Two CNPS were observed within this alliance: naked buckwheat (*Eriogonum nudum* var. *indictum*) and Santa Clara thorn mint (*Acanthomintha lanceolata*). The transition zone between the Ephedra alliance of hillsides and the Introduced Annual Grassland alliance typical of lowlands was observed to be extensive and broad.

Other shrubland association canopy dominants are present in this zone at very low frequencies or in small, highly grazed patches. It is likely the position of this transition is maintained by long-standing patterns of range cattle grazing. Mature *E. californica* are apparently among the least palatable shrubs available to cattle, but recruitment of this species was seen only rarely where the populations occupied lowland areas mapped as California annual grassland s. In contrast, diversity is much greater (especially among native species) where California annual grasslands occupy shrubland canopy gaps on the more remote, upper slopes of the VRCL.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. The California ephedra, typically 3 to 15 foot tall shrub, rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to California annual grasslands.

The Ephedra alliance is more prevalent east of Little Panoche Road. There is evidence that it was more widespread on the western face of the Panoche Hills prior to a widespread fire that affected this area within the last decade, leaving many large *E. californica* stumps. Otherwise, all associations that were mapped in this alliance exhibit relatively undisturbed canopy development, have not been recently burned, and due to landscape ruggedness have not received heavy grazing pressure.

The barrens habitat found within the Conservation Lands is along ridgelines and south- or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity is very low, and nearly all species are relatively short-lived annuals. Shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt California annual grasslands where the transition was often observed to occur over the space of several feet. Barrens that interrupt shrublands alliance vegetation are less common, but were found to support occurrences of rare plant populations more often than any other mapped association. Botanical surveys conducted in the Panoche Valley and Panoche Hills suggest that barrens habitats, while comparatively lacking in total cover, can support assemblages with greater native character, and can include rare species.

Two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia microstachys*. Total cover in barrens rarely exceeds 1 percent. Members of the relatively sparse barrens assemblage are adapted to some of the harshest habitat available within the study area. Low cover may result at least in part from low soil moisture retention and from erosion and use by rodents. Plants occurring in barrens include the introduced annual herb *E. cicutarium*, and native *P. erecta*, *Blepharizonia laxa*, *Monolopia* spp., *Phacelia tanacetifolia*, *Salvia columbariae*, and *Camissonia boothii*. Two CNPS List 4 species, naked buckwheat (*Eriogonum nudum* var. *indictum*) and benitoa (*Benitoa occidentalis*), and one CNPS List 2 species, California groundsel (*Senecio aphanactis*) were also identified in this alliance.

Saltbush shrublands are also found in the Conservation Lands, and they consist of nearly pure to mixed stands of saltbush (*Atriplex polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road, to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest *A. polycarpa* cover is southern. This 2 to 3 foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two associations within this alliance exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages 5 to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *E. fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens that are often present on adjacent slopes of similar aspect. Native character is thus relatively high, and undisturbed habitat (i.e., ungrazed) is available for potentially occurring rare plant species that are associated with saline soil. *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa* occurs in the channel bottoms of ephemerally watered washes and very narrowly along the adjacent slope bases. All channels in which this association occurs also hold one or more ephemeral or seasonal springs that exhibit saline character and exhibit sandy soils that are somewhat atypical of the clay-dominated hill and valley soils of the study area. Shrub canopies are confined to wash edges due to trampling by range cattle, and average cover rarely exceeds 10 percent. The riparian corridor is thus normally rather indistinct in structure relative to the surrounding scrub, but the shift in species is consistent and sharply bounded. It is likely that this association was once and would become more widespread in ephemeral wash habitat in the absence of cattle use. But *A. polycarpa* appears to be highly palatable, and use by livestock in this steep and xeric landscape is concentrated in wash habitats.

Woodlands, including juniper woodlands and oak woodlands, occur only on north-facing slopes of moderate steepness. Rocky outcrops and talus, which are commonly prominent in the study area's shrublands alliances, are absent from woodlands habitat. Finally, the area's woodlands are rather sparsely treed and share a common understory assemblage with shrublands (mainly introduced annual grasses), yet are noticeably devoid of a significant shrub layer.

The ecotones with adjacent shrub associations are often visually distinct, appearing as a sudden loss of the tree canopy. Individual *J. californica* rarely exceed 15 feet in height. Girths of up to 20 inches diameter at breast height suggest that most of the trees in all occurrences have aged enough to be called "mature." The tree population structure, furthermore, appears to be skewed toward older trees, and recruitment was not apparent. It is possible recruitment has been excluded by grazing cattle, as the gentler slopes occupied by this association do not exclude cattle use for grazing and shading. It is apparent from old stumps that trees of narrower girth have been harvested. Both occurrences east of Little Panoche Road were clearly larger in extent prior to harvest, and the older fence posts in these areas appear to be rough juniper.

The juniper woodlands alliance is not common within the Conservation Lands. All occurrences are fewer than 16 acres individually. Two associations within this alliance occur on the Conservation Lands: *Juniperus californica - Ephedra californica* and *Juniperus californica - Ericameria linearifolia*. The *Juniperus californica - Ephedra californica* association occupies middle elevations of north-facing slopes. *J. californicus* canopy cover ranges from 5 to 20 percent. The shrub layer is sparse and is composed of mainly *E. californica*. Subdominant shrubs include *Ericameria linearifolia*, *Gutierrezia californica*, *Eriogonum fasciculatum*, and *Artemisia californica*. The herbaceous layer is not dense. It is composed mainly of introduced annual grasses, the same assemblage as found within the shrublands associations that dominate the surrounding landscape. The contrast in the shrub and herbaceous layers of adjacent shrublands and woodland associations is likely due to the presence of the trees. *J. californicus* patches are the only significant provider of shade across much of the study area, and so are gathering places for range cattle during much or all of the year. As such, trampling and intensified herbivory appear to be important limiting factors for plants that have not reached escape height. Roosting habitat for birds is provided, and evidence was seen of use by other large mammals such as coyote (evidence of deer was not observed anywhere within the study area). It is likely that, in the absence of grazing, the association would provide habitats for native plant species that require additional shading. The *Juniperus californica* - *Ericameria linearifolia* association occupies middle to upper elevations of north-facing slopes. On average, canopy closure does not exceed 10 percent. Both diversity and abundance of the shrub and understory assemblages are increased noticeably relative to the closely similar *Juniperus californica* – *Ephedra californica* association. In all occurrences, *E. linearifolia* achieves higher abundance and cover than other shrubs, including *Ephedra californica*. Greater understory development may be related to the higher elevation, along with relatively steep slopes occupied by this association, which would tend to limit use by range cattle.

The oak woodlands occupy lower slopes and wash edges with northern aspects. They transition upslope to *Juniperus californica* woodlands. The oak woodlands were found in the hills west of Little Panoche Road, only. These oak woodlands can be associated with acorn-processing cultural resource sites. The terrain within the oak woodlands can be very rough. Steeply banked, tree-shaded gullies were observed to support a higher diversity of native annual and perennial herbs than any other habitat available in the woodlands, shrublands, or grasslands associations. This greater diversity likely results from cattle exclusion through rough terrain and fencing. The dependable seasonal shading that is provided by dense canopies of *Quercus douglasii* (a winter-deciduous oak) creates additional microhabitats not available elsewhere, and generates considerably greater soil organic matter accumulation. The presence of trees enhance productivity and nutrient cycling functions, support diversity (including wildlife), and arrest ground creep (talus, gullies, and slides are common in shrublands).

This woodlands association likely represents the region’s most xeric and lowest elevation plant community in which *Q. douglasii* is dominant in this area. One CNPS List 4 species, Salinas milkvetch (*Astragalus macrodon*), was identified in this alliance.

Stands associated with seasonally or perennially moist substrates, including seeps and springs, appear to be very rare and unevenly distributed within the area. Riparian habitats occur along the Panoche and Silver Creeks. It should be noted that the SCRCL was not surveyed during the wet season; therefore, seasonal seeps and vernal pools onsite may not have been identified during the reconnaissance surveys.

Habitats at springs and seeps would typically support plant species that are dependent on a reliable availability of shallow groundwater to survive the annual drought (May-October), and the vegetation extent would be expected to narrowly adhere to the wetted zone. Plant associations adjacent to these resources, however, would also be subject to heavy grazing and trampling, given the historical and ongoing use of SCRCL for raising livestock. No flowing springs were found in an upland setting. Evidence of seep zones that provide ephemeral flows and sustained root zone moisture in an upland setting were found only within one relatively deeply incised canyon near the southern survey edge. At the floor of this canyon, a small area of well-developed episalic crust was found at a clear shift from shrublands to dominance by saltgrass (*Distichlis spicata*). Although not all incised features could be viewed in the available time, areas outside the Silver Creek and Panoche Creek riparian zones appeared to convey little runoff during the 2010 wet season.

The Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor contains invasive tamarisk (*Tamarix* sp.) and is classified as Tamarix semi-Natural shrubland. Tamarisk has developed semi-open to impassable stands in a 30- to 100-foot wide corridor. The population extends well offsite both upstream and downstream. In this area, saltgrass appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of tamarisk infestation and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek gains reach as it crosses through the SCRCL. The streambed upstream of the site for at least 3 miles was observed to be completely dry and largely devoid of plants. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (*Typha* Herbaceous Alliance) centrally, *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge. All riparian zonal alliances within the survey area are patchy, with one or two species at most attaining dominance. Co-occurring with species such as *Frankenia salina* and *Juncus mexicanus*, dominants in these three alliances indicate a somewhat saline and possibly alkaline soil and shallow groundwater environment. Trees are largely absent, as are species adapted to a floating or submerged habitat. A marsh environment that developed in response to springs with excellent water quality would be expected to support a more diverse assemblage within each alliance, even with pressure from livestock use.

The small area of riparian woodland located south of Panoche Road is, like the *Distichlis* meadow, confined to the first terrace outside the saturated zone. The woodland canopy, classified as a degraded *Populus fremontii* Forest Alliance, reaches about 30 percent closure and includes a significant presence of red willow (*Salix laevigata*) where it is most dense. The stand currently exhibits many mature and dead trees, but essentially no recruitment and no understory due to intense livestock use. It is possible that this occurrence, and the marsh and meadow vegetation associated with the Panoche Creek riparian corridor on the SCRCL, are dependent upon annual inputs of relatively fresh water that originate in the upper Griswold Creek and Panoche Creek drainages and serve to flush salts and toxins that accumulate in the topsoil and the plants as evapotranspiration consumes the perennial spring flows.

5.3 Hydrology

Average precipitation values range from 9 inches for the majority of the valley to 13 inches at the western margin. Data collected by the Western Regional Climate Center (WRCC) show annual average precipitation of 9.75 inches at the Panoche 2 West Co-op Station, in the Project area. Most precipitation occurs between October and March.

Rainfall events in the Panoche/Silver Creek Watershed tend to yield erosion and sediment transport. High concentrations of selenium are contained within this sediment which, during rain events with greater than a 5-year return period, can contribute to San Joaquin River exceeding its water quality objectives. The Panoche alluvial fan is the principal source of selenium from the Panoche/Silver Creek Watershed to the downstream Grasslands Watershed and the San Joaquin River.

The Conservation Lands are entirely contained within the Tulare Lake Basin, which is essentially a closed basin, as surface water drains north into the San Joaquin River only in years of extreme rainfall. Surface water in the area is generally ephemeral, present only in response to precipitation events.

The Conservation Lands have up to approximately 716,852 linear feet (LF) (approximately 136 miles) of stream/creek, ephemeral drainage, and wetland habitat (**Appendix A, Figure 3a and 3b)**. This information was gathered and compiled using information provided in the United Stated Geological Survey National Hydrography Dataset.

6 DETERMINATION OF MITIGATION

6.1 Potential Impact to Waters

6.1.1 Waters of the U.S.

A preliminary jurisdictional determination (PJD) of the extent of Federal waters within the Project Footprint was approved by the USACE on June 24, 2015. It is anticipated that construction of the Project will result in impacts to four Federal jurisdictional drainages totaling approximately 0.121 acre. This includes 0.001 acre of impacts to Las Aguilas Creek and 0.12 acre of impacts to three additional unnamed unvegetated streambeds. The impacts to Federal waters resulting from construction of the Project are summarized in **Table A** below. The bridge crossing over Las Aguilas Creek is necessary for construction of the project perimeter road that will allow for emergency access.

On July 28, 2015 biological staff from McCormick Biological Inc. conducted a site visit to determine if the proposed mitigation efforts (i.e. debris removal, CTS pond creation, vernal pool enhancement, and cattle exclusion) could potentially impact waters of the U.S. Results from the site visit indicated the following mitigation efforts may potentially impact waters of the U.S. and are subject to USACE jurisdiction:

- Debris Removal Area 1b (0.003 acre area)
- Debris Removal Area 4 (0.093 acre area)

Although no impacts to waters of the U.S. are anticipated from debris removal, because debris is situated within a portion of the Federal channel, potential impacts to waters of the U.S. from Debris Removal Areas 1b and 4 could result in up to 0.096 acre of impacts (**Figure 4a, 6a, and 9a in Appendix A**).

All other mitigation efforts (CTS pond creation, vernal pool enhancement and cattle exclusion) would not result in impacts to waters of the U.S.

6.1.2 Waters of the State

There are 30 planned Drainage Impact Projects that will impact waters of the State due to construction of the Project. Total impacts to waters of the State under CDFW jurisdiction will be approximately 8.30[2] acres from construction of Project.

In addition to the planned impacts to waters of the State from the 30 planned Drainage Impact Projects, construction of the Project will also impact 0.107 acre of ephemeral pool and 0.051 acre to potential

[2] This impact total includes 0.051 impacts to potential vernal pools as the pools overlap with Drainage Impact Project #27 and have been included in the total impact.

vernal pool habitat within the Project Footprint. These impacts were described in the Final EIR and Final SEIR and are subject to the Central Valley RWQCB Waste Discharge Requirement (WDR) program.

The site visit conducted on July 28, 2015 indicated the following mitigation efforts could potentially result in impacts to waters of the State:

- All seven proposed Debris Removal Areas (0.40 acres)
- CTS pond creation, Pond 1 (0.011 acres) and Pond 3 (0.003 acres)

Although no impacts to waters of the State are anticipated from debris removal, because debris is situated within a State channel, potential impacts to waters of the State could result in 0.40 acres of impacts waters of the State. Creation of two of the three proposed CTS ponds will also result in 0.014 acres of impacts to waters of the State.

All other mitigation efforts (vernal pool enhancement and cattle exclusion) would not result in impacts to waters of the State.

The total amount of impacts to waters of the U.S. and waters of the State for both the Project construction and compensatory mitigation are described below in **Table A**. Please see **Figures 4a through 15, Appendix A** for potential impacts to waters from compensatory mitigation.

Table A: Approximate Impact to Waters from Project Construction and Proposed Mitigation

	Proposed Construction Impacts to Waters (acres)	Potential Impacts to Waters from Compensatory Mitigation Activities (acres)
Waters of the U.S.	0.121	0.093
Waters of the State	8.407*	0.414
Total Approximate Impacts to Waters of the State	8.821 acres	

*This includes 0.107 acres of impacts to ephemeral pools within the Project Footprint.

6.2 Proposed Mitigation for Impacts to Waters

The enhancement areas of the Panoche Creek (cattle exclusion), the debris removal, the establishment of three CTS ponds, vernal pool enhancement, and preservation will contribute to the total mitigation acreage needed to offset the impacts to waters incurred from Project construction.

The Conservation Lands will provide 100 percent of the total mitigation acreage from Project impacts to waters of the U.S. and waters of the State. A summary of mitigation acres to be preserved or enhanced in each of the Conservation Lands is presented in **Table B**.

Table B: Summary of Aquatic Resource Mitigation within Conservation Lands

Conservation Land	Resource Type	Mitigation Area (approx. acres and linear feet [LF] for streams)	
		Preservation	**Enhancement**
VFCL	Intermittent and ephemeral streams	43.9 acres (81,957 LF)	0.05 acres
VRCL	Intermittent and ephemeral streams and creation of CTS ponds	76.4 acres (326,519 LF)	0.55 acres (425 LF)
SCRCL	Intermittent and ephemeral streams	85.6 acres (308,377 LF)	11.41 acres (2,093 LF)
Total		205.9 acres (716,852 LF)[1,2]	12.01 acres[3] (2,518 LF)

[1] LF = Linear Feet within the designated State stream channel or pool. Sum may not equal the total due to rounding.
[2] Formal delineation of ephemeral pool habitats has not been conducted on the VRCL or SCRCL.
[3] Total acreage includes three CTS pond creation and vernal pool enhancement. These are not included in the total linear feet calculation.

7 MITIGATION WORK PLAN

This section of the WMMP is divided into two parts. The first part provides a description of activities planned within the Conservation Lands, with maps and tables showing acreages and locations of proposed mitigation. The second part describes implementation methods for general mitigation activities for all proposed mitigation sites. All work within the mitigation areas will be conducted in accordance with the California General Construction Permit and Storm Water Pollution Prevention Plan requirements.

7.1 Activities Planned on the Conservation Lands to Offset Impact to Waters

As shown in **Table B**, a total of approximately 716,852 linear feet of ephemeral stream channel habitat exists within the Conservation Lands that will be preserved through this mitigation action. The total acreage and linear feet of waters was calculated using a combination of aerial imagery, U.S. Geological Survey data, and field observations. Photographs and a corresponding mapbook, which depict the field efforts to verify streams, creeks, and drainages that will be preserved, are included as **Appendix B**. That acreage also includes a significant amount of Federal waters (known federal portions of Panoche and Las Aguilas); although no formal jurisdictional delineation was conducted on the Conservation Lands. Land use restrictions and long-term financing mechanisms will make certain these waters and their surrounding habitats are preserved in perpetuity.

Enhancement and creation activities which will take place within the VFCL, VRCL, and SCRCL. As shown in **Table B** above, a total of approximately **12.01** acres of ephemeral/intermittent/perennial stream channel and wetland (non-federal and Federal waters) habitats within the Conservation Lands will be directly enhanced or created through this WMMP.

Mitigation activities proposed to offset impacts to waters of the U.S. on the Conservation Lands include:

- Stream enhancement through debris removal at seven debris dump sites on VRCL & SCRCL
- Creation of three CTS breeding pools on VRCL
- Riparian restoration through the livestock exclusion on Panoche Creek on SCRCL.

Mitigation efforts to offset impacts to waters of the U.S are described in Sections 8.3, 8.4, and 8.5.

In addition to the above-referenced activities the following mitigation activities are also proposed to offset Project impacts to waters of the State:

- Enhancement of vernal pool habitat
- Preservation of streams

Additional mitigation efforts to offset impacts to waters of the State are described in Sections 8.1, 8.2, 8.3, 8.4, and 8.5.

Initial construction and implementation of compensatory mitigation for discharge of fill to waters of the U.S. and State will be initiated within the six months of Project construction. In general, the debris removal and creation of the three CTS breeding pools will be conducted outside the rainy season.

Potential reseeding will take place as determined by a qualified biologist for the seven areas noted above as debris dump areas and the vernal pool enhancement areas.

7.2 General Mitigation Implementation

All mitigation activities will implement measures to minimize and avoid impacts to nesting birds and special-status species. The Land Manager or PVS will provide and/or contract all equipment and personnel necessary to maintain/construct fencing, access, operations, and other management activities on the Conservation Lands. The mitigation activities, may be contracted by the Project Applicant to qualified consultants, or may be conducted directly (or indirectly through contracts) by the Perpetual Land Manager.

8 PROPOSED MITIGATION TO OFFSET IMPACTS TO WATERS

8.1 Preservation

The Conservation Lands support a large amount of ephemeral and intermittent streams along with federally jurisdictional creeks (portions of Panoche and Las Aguilas Creeks), which have perennial sections with riparian and wetland habitat (**Appendix A, Figures 3a-3b**). The Conservation Lands were selected to provide local mitigation for impacts to special-status species and Federal and State waters, to preserve self-sustaining populations of special-status species, and to protect permanent movement corridors between adjacent Bureau of Land Management (BLM) controlled lands.

PVS will preserve approximately 716,852 linear feet (LF) (approximately 136 miles) of stream/creek, ephemeral drainage, and wetland habitat within a total of approximately 24,176 acres of land (Conservation Lands), to be protected in perpetuity (**Appendix A, Figure 3a and 3b)**. This information was gathered and compiled using information provided in the United Stated Geological Survey National Hydrography Dataset. Additional details of the Conservation Lands can be found in Section 2.3 (Resource Functions of the Mitigation Project).

8.2 Vernal Pool Enhancement

The Applicant will enhance approximately 0.05 acre of vernal pools within the VFCL to offset the impacts to two vernal pools (0.05 acre) from the Project construction. Enhancement of vernal pools will consist of reseeding existing pools within the VFCL. The seed mix will be locally sourced to mimic the existing flora of the pools on the VFCL. A minimum of two pools (each with an enhancement area of approximately 0.025 acre [1,089 ft^2]) will be enhanced to offset impacts to vernal pools within the Project Footprint. Enhancement activities will be conducted on pools that have been degraded by livestock grazing, rangeland activity, and environmental causes.

Prior to the pool enhancement, a qualified biologist will estimate absolute vegetation cover and relative vegetation cover using transects with point intercepts and photo-documentation on no less than two and up to four existing reference pools in the VFCL. Additionally, the biologist will determine if vernal pool indicator plant species are present per identified reference pool. Soil type, presence/absence of sensitive species and indicator species, pool complex size, depth, and watershed hydrology will also be documented to determine biological viability for the enhanced vernal pools. This data will be documented and recorded during the reference pools investigations. The data will provide baseline comparative tools to determine the success of the pool enhancements.

There will be no impacts to waters of the U.S. or State as a result of the proposed vernal pool enhancements. These pools will be preserved and managed in perpetuity. Total vernal pool enhancement will be at least 0.05 acre.

8.3 Debris Removal for Stream Enhancement

PVS has identified seven areas on the Conservation Lands where debris (trash) dumping has occurred. Debris in these areas includes scrap metal, tires, appliances, farming equipment, and other large debris. As part of the WMMP, the Applicant will remove debris from these areas allowing the natural environment to stabilize.

8.3.1 Debris Removal Location and Setting

Debris Removal Areas #1a and 1b (Figure 6 & 6a) are located on the VRCL east of the Project Footprint and are comprised of two smaller areas of landfilling at 36°38'54.98"North and 120°49'43.47"West. The Applicant will remove the debris and enhance approximately 591 ft^2 (0.013 acre) of land. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 62 linear feet of stream channel.

Debris Removal Area #2 (Figure 7 & 7a) is located on the SCRCL southeast of the Project Footprint at 36°33'50.93"North and 120°45'10.83"West. This debris pile is comprised of an old metal water tank that has been discarded within an ephemeral drainage and appears to be blocking the natural flow. The Applicant will remove debris and enhance approximately 365 ft^2 (0.008 acre) of land. Removal of this debris pile coupled with bank stabilization, if necessary, will enhance the health and integrity of drainage downstream of the debris pile. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 23 linear feet of stream channel.

Debris Removal Area #3 (Figure 8 & 8a) is located on the VRCL east of the Project Footprint at 36°39'12.66"North and 120°49'24.39"West. This debris pile is located directly within an ephemeral drainage and is comprised of discarded water tanks. The applicant will remove debris and enhance approximately 67 ft^2 (0.002 acre) of the drainage. Removal of the debris within the drainage will enhance the health and integrity of the drainage. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 17 linear feet of stream channel.

Debris Removal Area #4 (Figure 9 & 9a) is located on the SCRCL southeast of the Project Footprint. This large debris pile sits directly south and adjacent to Panoche Creek at 36°35'7.57"North and 120°47'12.04"West. This debris pile is comprised of old tires, appliances, household debris, abandoned automobiles, etc. The Applicant will remove debris and enhance approximately 10,088 ft^2 (0.23 acre) of land. Removal of this debris pile coupled with bank stabilization will enhance the health and integrity of Panoche Creek both upstream and downstream of the debris pile. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 323 linear feet of stream channel.

Debris Removal Area #5 (Figure 10 & 10a) is located on the VRCL north/northeast of the Project Footprint at 36°40'55.64"North and 120°51'23.55"West. This debris pile is comprised of old tires and other ranch-related debris and is located within an ephemeral drainage. Removal of the debris will enhance approximately 5,064 ft^2 (0.12 acre) of the ephemeral drainage. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 159 linear feet of stream channel.

Debris Removal Area #6a (Figure 11& 11a) is located on the VRCL southeast of the Project Footprint at 36°36'30.11" North and 120°48'12.97" West. This debris pile is comprised of old tires, appliances, household debris, etc. The Applicant will remove debris and enhance approximately 734 ft^2 (0.017 acre) of land. Removal of this debris pile coupled with bank stabilization will enhance the health and integrity of the ephemeral channel both upstream and downstream of the debris pile. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 41 linear feet of the stream channel.

Debris Removal Area #6b (Figure 11 & 11a) is located approximately north/northeast if Debris Removal Area #6a on the VRCL southeast of the Project Footprint at 36°36'31.09" North and 120°48'11.94" West. This debris pile is comprised of old household appliances, fencing material debris, metal scraps, old water troughs, etc. The Applicant will remove debris and enhance approximately 136 ft^2 (0.003 acre) of land. Removal of this debris pile coupled with bank stabilization will enhance the health and integrity of ephemeral channel both upstream and downstream of the debris pile. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 13 linear feet of stream channel.

Debris Removal Area #7 (Figure 12 & 12a) is located on the VRCL north-northeast of the Project Footprint at36°36'51.76" North and 120°48'18.91" West. This debris pile is comprised of old tires and other ranch related debris and is located within an ephemeral drainage. Removal of the debris will enhance approximately 128 ft^2 (0.003 acre) of the ephemeral drainage. This debris dumpsite is located within an incised stream channel. Removal of this debris will enhance approximately 8 linear feet of stream channel.

8.3.2 Current Conditions

The seven areas identified for debris removal are laden with scrap metal, tires, appliances, and other large debris. Once the debris from these areas is removed and if practicable and/or necessary the area will be reseeded with native plants sourced locally as deemed necessary by a qualified biologist. Reseeding will promote stability of the soil and promote erosion control and further enhance the drainages and channels downstream. Reseeding will also enhance native plant populations and habitat for native animal species. Removal of the debris and reseeding when necessary will enhance approximately 0.40 acres of aquatic habitat.

8.3.3 Installation Details/Methods

All debris will be removed by hand or by mechanical equipment (e.g. track hoe) to a truck mounted container using pre-existing roadways. Once removed, the debris will be disposed of according to Federal, State, and local regulations and taken to an approved permitted landfill or recycling center. Any debris deemed potentially hazardous will be dealt with in an approved manner so as not to further harm the environment. Any heavy equipment (e.g. backhoe, crane) utilized to remove the debris will be located outside the top of banks to preserve bank stability and decrease erosion potential. During implementation if it is determined by a qualified geomorphologist (or equivalent professional) that removing the debris would cause instability in the drainage, the debris material will be left in place. While complete removal may not be feasible, any removal of potentially harmful debris material from these areas will be an overall benefit for the identified stream channels and to the wildlife which occupy these areas.

8.3.4 Performance Standards

A biologist will indicate all debris has been removed (unless specifically left in the creek channel to maintain stability). Annual qualitative assessments will be conducted to determine whether the erosion potential is similar to other areas within the channel. This qualitative assessment will also determine whether the post-removal contours, elevations, and the slope and the stability of the stream channel(s) are consistent with the areas directly upstream and downstream of the debris removal areas. The final portion of the assessment will confirm that no significant post-removal contours exist that could potentially obstruct stream flow.

Additional performance standards for the debris removal areas include:

- The acreage of ephemeral drainages enhanced will equal 0.39 acres (17,173 ft^2);
- The elevation of the streambed of the ephemeral drainages where the debris is removed must be lower than the upstream streambed and must be higher than the downstream streambed such that when water is flowing there is no obvious impediment to or obstruction of the flowing water;
- All debris shall be removed from within the enhanced federally jurisdictional ephemeral drainages, unless the USACE provides written approval that some debris may be retained to maintain stability of the drainage.
- The performance standards for absolute cover of vegetation in the debris removal areas are:

    1. By year 3, the enhanced ephemeral drainages will have an absolute cover of plant species equal to a minimum of 50% of the absolute cover of an established reference site. Reference sites will be within or adjacent to the same ephemeral drainage as the enhancement area and will have the same general characteristics as the debris removal site.

    2. By year 5, the enhanced ephemeral drainages will have an absolute cover of plant species equal to a minimum of 85% of reference site for the enhanced area. The number and relative cover of invasive plants, which are not considered common and abundant by a Qualified Biologist, in the enhanced ephemeral drainages, must be equal to or less than the number and relative cover of invasive plants in the reference site for the enhanced area.

- The number and relative cover of hydrophytic plants (i.e. FAC, FACW, OBL) in the enhancement areas must meet or exceed the number and relative cover in the reference site for the enhancement area.

8.3.5 Maintenance, Monitoring and Reporting

Prior to the removal of the debris, photo points will be established to provide baseline conditions. During the removal process, a monitor will observe the process to document all debris that is removed. Once the debris is removed, the Land Manager will reseed with a native seed mix in the debris removal area as deemed necessary by a qualified biologist, with native plants locally sourced to prevent erosion. At that time, additional baseline photographs will be taken from the previously identified photo points to be included in the annual report. Each of the debris areas will be monitored by use of photo points, which will indicate an erosion and revegetation success. If significant erosion is observed and/or no revegetation is observed, additional seeding or other stabilization methods (e.g., non-toxic chemical stabilizers, straw mulch) may be employed as deemed necessary by the qualified biologist in coordination with USFWS, CDFW, and USACE. In addition, during the photo point assessments, any observations of non-native, invasive plant species in the enhancement areas will be noted and mapped for inclusion in the annual report.

These debris dumpsites will be monitored within one week after large rain events (precipitation greater than 0.5 inch in a 24-hour period) for the first 2 years, then annually during the wet season for years 3 to 5 to document any changes to bank stability (i.e., erosion concerns). Observations from monitoring shall be provided to the Land Manager and CDFW in the annual report. It will be at the discretion of the Land Manager, CDFW, and USACE if additional bank stability control measures should be implemented.

8.3.6 Management

Young shrubs will be monitored for signs of disease, insect, and/or herbivory damage, and treated as necessary. Badly damaged plants will be pruned to prevent spreading of the disease/pestilence, or replaced in kind if removed. Excessive foraging by herbivorous animals may necessitate protective screening around plants.

8.4 Creation of Three CTS Ponds

Impacts to upland CTS habitat as a result of construction of the Project shall be mitigated by providing habitat preservation, creation, and management in perpetuity. PVS will create three new CTS ponds on the Conservation Lands (primarily VRCL) to offset potential impacts to CTS habitat during Project construction.

8.4.1 Mitigation Location and Setting

Proposed CTS Pond 1 is located on the VRCL (N 36°39'14.95", W 120°54'5.52") approximately 2,300 feet west-northwest of a known CTS breeding pond (referred to as Pond 12) (Figure 13).

Proposed CTS Pond 2 (N36°38'48.72", W120°53'49.96") is located on the VRCL approximately 2,000 feet south-southwest of Pond 12 (Figure 14).

Proposed CTS Pond 3 is located on the VRCL (N36°38'59.90", W120°53'42.79") approximately 890 feet from breeding Pond 12 (Figure 15).

NRCS soil mapping has indicated that all of the three Proposed CTS Ponds are located in Yolo Gravelly Loam.

8.4.2 Current Conditions

In order for the CTS Ponds to become viable breeding habitats it is necessary they be created in a location that is accessible and within the migration radius of observed populations of CTS. CDFW has specified a buffer distance of up to 2,100 meter from known occupied breeding ponds as an appropriate maximum estivation migration distance. The ponds have been designed in accordance with CDFW guidance and were strategically located within a 2,100 meter (6,890-foot) radius of observed CTS breeding Pond 12. CTS Pond 1 is within 700 meters of Pond 12, CTS Pond 2 is within 615 meters of Pond 12, and CTS Pond 3 is within 270 meters of Pond 12. The locations and designs of the CTS ponds will help to create a network of breeding ponds that can support the local CTS population.

8.4.3 Installation Details/Methods

Objectives of each potential mitigation pond design are listed below:

- Mitigation ponds will be ephemeral, filling in late fall, winter, and spring, and drying out by early June. Critical months of inundation are March to May.
- Mitigation ponds will be no more than 3 feet deep.
- Mitigation ponds will be designed to be inundated 5 out of every 10 years, with a minimum of 3 out of every 10 years. Depth and inundation of pond(s) will be heavily dependent on annual extent of rainfall.

The CTS mitigation ponds will capture sheet flow to allow the ponds to remain inundated for a sufficient length of time.

The proposed design for CTS Pond 1 is 8,726 (0.20 acre) square feet at the maximum high water inundation and 4,898 square feet at the pond floor (0.10 acre). The proposed design for CTS Pond 2 and Pond 3 is 4,361 square feet (0.10 acre) at the maximum high water inundation and 2,225 square feet at the pond bed (0.05 acres). In total, the three CTS ponds will create approximately 0.40 acre of CTS breeding habitat.

8.4.4 Performance Standards

The construction of the three CTS breeding ponds will capture sufficient surface water runoff to fill the constructed ponds to approximately 3 feet (36 inches) during the wet season and will have continuous inundation for sufficient time for CTS larval development and metamorphosis (at least 10 weeks) for a minimum of 3 years of the 10 year monitoring period. Information regarding the duration and depth of inundation shall be documented with data loggers or continuous monitoring.

Additional performance standards for the construction of the CTS breeding ponds include:

- The depth of the constructed ponds shall be designed such that the ponds are inundated no more than 3 feet and will naturally dry-down no later than June of each year to preclude bullfrogs from colonizing the ponds and to successfully recruit metamorphs.
- Under average rainfall conditions the ponds will be inundated a minimum of 3 out of every 10 years. If inundation is achieved for three years prior to the end of the ten year monitoring period, monitoring of the water levels of the ponds may cease after a minimum of five years.
- For all years in which ponds are not inundated for at least 10 weeks, average depth and duration of water in the mitigation ponds must be within the range of the reference breeding Pond 12. Information regarding the duration and depth of inundation shall be documented with data loggers or continuous monitoring.
- Hydrologically, the performance standards are designed so that the three constructed breeding ponds will replicate the conditions observed in the reference Pond 12. The approximate volume of the reference Pond 12 will be estimated when dry or inundated depending upon the amount of annual rainfall for the study year and used a reference volume against the three created mitigation ponds. Success of the mitigation pond will be found sufficiently inundated if water volume and depth in created ponds is within 10-30% of the volume to size ratio for Pond 12 or within 10-20% of the of the planned 3 feet of planned inundation depth.
- Qualitative assessments will also be performed to determine whether the vegetation communities of the constructed ponds match those of the reference pond on the Conservation Lands. This includes percent cover of vegetation as well as species composition in terms of the distribution of native and invasive species within 30 meters of the reference pond.
- The performance standard for the vegetation of the constructed CTS also includes that:

1. By year 3, the constructed ponds will have an absolute cover of plant species equal to a minimum of 50% of the absolute cover of reference Pond 12;
2. By year 7, the ponds will have an absolute cover of plant species equal to a minimum of 75% of the absolute cover of the reference pond;
3. By year 10, the ponds will have an absolute cover of plant species equal to a minimum of 95% of the absolute cover of the reference pond.

- If the created pond achieves 95% absolute cover of the reference pond prior to year ten, monitoring and reporting on cover may cease after a minimum of five years.
- The number and relative cover of invasive plants, which are not considered common and abundant by a Qualified Biologist, in the constructed ponds must be equal to or less than the number and relative cover of invasive plants in reference Pond 12.
- The total number and relative cover of hydrophytic plants (i.e. FAC, FACW, OBL) in the constructed CTS breeding ponds must meet or exceed the number and relative cover in reference Pond 12.
- The constructed CTS breeding ponds shall meet the requirements of a wetland or other water as identified by the USACE in the 1987 Wetland Delineation Manual, Regional Supplement. A delineation of waters of the U.S. shall be completed by a qualified biologist and submitted to the USACE in year 5 and the final monitoring year if performance standards are achieved prior to year 10. The acreage of wetlands or other waters shall equal 0.40 acre, as required in this mitigation plan.

8.4.5 Maintenance, Monitoring and Reporting

The CTS ponds will be monitored twice a year for the first two years to determine inundation, depth, and remove potentially harmful plants and wildlife (i.e., non-native invasive plant species and bullfrogs; non-native naturalized grasses would not be removed) and annually after year two for a minimum of five years and up to ten years, unless the performance standards described above are achieved earlier. Timing of removal or potentially harmful plants and wildlife will be outside of the CTS breeding season and at the discretion of the qualified biologist.

The methods for monitoring the constructed CTS breeding ponds include:

- Monitoring the structural components of the pool and associated structures. Due to the presence of livestock, which will be allowed to graze in the area of the pool, there is a possibility that the livestock could damage the pool which could affect the effectiveness of the pool to retain water. Temporary fencing to exclude livestock from grazing may be used to protect the pool. Any damage will have to be repaired outside the rainy season and avoid impacts to CTS, including adult individuals that may have moved to adjacent burrows.
- The tracking of rainfall during the rainy season (October through March) within the Project area to determine the rainfall amount for the 10-year monitoring period and how this compares to the long-term average.
- Establishing photo points preferably at a distance of approximately 30 meter (or as determined by Qualified Biologist) from the pond edge and take photographs during the rainy season and at the end of the rainy season to document proper seasonal inundation and dry-down of the pond. The purpose of photo points would be to assess observable qualitative and quantitative changes.
- Following-up with repeat surveys during a typical rainfall year to assess the pond's ability to hold water for at least 10 weeks, which is the minimum amount of time to successfully

recruit metamorphs from the ponds. In addition, a survey during the dry season to document if the pond will be ephemeral, filling in late fall, winter, and spring, and drying out by early June to determine adequate dry-down to confirm no colonization by bullfrogs (a predator of CTS) could occur.

- Sample for the presence of CTS larvae.

8.4.6 Management

These ponds will be preserved and managed in perpetuity. Total CTS pond creation for the three ponds will be 0.40 acre. The CTS ponds will utilize a general assessment of the conditions of the breeding pond structure and the pond's ability to provide the necessary consistent features for successful breeding and metamorphosis. Monitoring at the ponds will occur for a maximum 10-year period unless performance standards are met sooner. Monitoring would be conducted twice a year (wet/dry season) and continue on an annual basis after year two, until the site has met all performance criteria and all regulatory agencies have agreed in writing that the site has met performance criteria and is ready for transfer to the long-term manager.

Proposed engineering designs for each of the CTS ponds are located in **Appendix E.**

8.5 Livestock Exclusion for Riparian Restoration

Certain areas along creeks and drainages within the Conservation Lands are experiencing erosion due to heavy livestock grazing, which is adding to the siltation of these features and vegetation degradation. Vegetation within these grazed areas has been reduced to remnants of riparian habitat with little understory development. The removal of grazing pressure could lead to an increase in vegetative density and cover.

There will be no impacts to waters of the U.S. or State from cattle exclusion.

8.5.1 Mitigation Setting and Location

PVS will erect approximately 0.35 mile of fencing in addition to the existing 0.47 mile of fence to exclude cattle for a majority of the year from grazing in approximately 11.16 acres of waters of the State (including approximately 5.81 acres of federally jurisdictional waters). Livestock exclusion will allow for revegetation of riparian vegetation along the banks and slopes while also decreasing erosion and siltation. This exclusion of livestock will ultimately improve the health and integrity of Panoche Creek and downstream functions and values and directly enhance approximately 1,748 linear feet within the stream channel. The fence will allow smaller animals to enter the area but keep cattle out.

8.5.2 Current Conditions

Certain areas along creeks and drainages within the Conservation Lands are experiencing erosion due to heavy livestock grazing, which is adding to the siltation of these features. Vegetation within these grazed areas has been reduced to remnants of riparian habitat with little understory development.

A baseline assessment of current conditions within and near the proposed exclusion area will be performed within the SCRCL along Panoche Creek. The baseline conditions assessment will quantify the existing conditions of the streams, wetlands, and riparian areas within an ecologically healthy section of the creek where riparian habitat has not been affected by grazing and within the enhancement area. The baseline assessments on the SCRCL Panoche Creek site will be conducted no later than six months after the start of construction.

The baseline assessments will measure either woody stem density or the cover of woody species within 15 meter (m) belt transects. During the transect survey, woody stems will be counted or percent cover will be estimated within the area covered by the belt transect. In addition to the transect assessment, photo points will be established at 100 m intervals from both sides of the streambed, preferably at a distance of approximately 30 m from the creek edge. A set number of photo points will be established on both the grazed and exclusion areas. The purpose of photo points will be to assess observable qualitative changes within the enhancement and control areas. The data will be analyzed and developed into a report so that the existing conditions can be compared to future assessments.

8.5.3 Installation Details/Methods

PVS will erect approximately 0.35 mile of fencing to keep out large animals that are contributing to degradation of portions of Panoche Creek.

8.5.4 Performance Standards

A reference site for the livestock exclusion area that is within the vicinity of the exclusion area (4 mile radius) would be located by a Qualified Biologist. Once a reference site is located, the woody stem, shrub and tree species will be assessed for the number of species from each group. Please note that if an appropriate reference site cannot be located or accessed (due to landowner permission or safety concerns), the performance standard for the livestock exclusion area will seek to increase woody stem species, including Populus fremontii, Salix sp., Baccharis salicifolia, Atriplex lentiformis, and other shrubs and trees found in the Panoche Creek riparian area within Silver Creek Ranch by at least 10% cover over existing conditions. The exclusion area must equal 11.16 acres, as required by the mitigation plan, and populated with the species available within the Panoche Creek riparian area within Silver Creek Ranch.

Woody stem species including *Populus fremontii, Salix sp., Baccharis salicifolia, Atriplex lentiformis*, and other shrubs and trees found in the Panoche Creek riparian area within Silver Creek Ranch shall be increased by at least 10% cover over existing conditions. Non-native, invasive plant species populations will be managed per the Weed Control Plan so they do not impact the enhancement process of the exclusion area. Aerial cover estimates for trees and shrubs provide a reasonable gauge of plant community development five to 10 years after initial plant establishment. There will be a quantitative assessment to indicate that woody cover has exceeded 10 percent by the end of the five to 10 year time period.

8.5.5 Maintenance, Monitoring and Reporting

The methods for the monitoring the livestock exclusion area on a portion of Panoche Creek in the SCRCL includes:

- Measuring either woody stem density or cover of woody species within 15-m belt transect(s) on both sides of the stream, measuring from the outer edge of the cattails out onto the lower bench of the wash (where the cut bank is closer than 15 m, only include the area up to the bottom of the bank).
- Counting either woody stems (to obtain density within the belt) or estimate cover within the area covered by the belt in year 1 (advisable to compile both density and cover).
- Establishing photo points within the grazing exclusion area and in the grazed area adjacent to the exclusion area (either upstream or downstream in riparian habitat with similar existing structure) at 100 m intervals from both sides of the streambed, preferably at a distance of approximately 30 m from the stream edge. The same number of photo points

should be established on both the grazed and exclusion areas. The purpose of photo points would be to assess observable qualitative changes.

- Following-up with repeat of 10-m belt transects in years 2 through 5.
- If the standard has not been met by year 3, conduct a qualitative assessment to determine whether there are variables that are preventing the desired rate of establishment (e.g., hydrologic conditions, invasive plant abundance, slower than expected growth and establishment of woody plant species). If by year 5, the standard has not been met, and the cover measurements are not increasing across years, consider other options such as active restoration by planting cuttings of woody species (*Salix* sp., *Populus fremontii*, *Baccharis salicifolia*, *Atriplex lentiformis*, etc.) collected from within Panoche Creek on Silver Creek Ranch using a planting plan prepared by a qualified botanist, restoration ecologist, or wetland specialist. A plan for implementation of remedial measures would be provided in the annual report.
- At the discretion of the specialist who prepares the planting plan, the width of the belt may be increased to accommodate a more extensive restoration area.
- During the belt surveys and the photo point assessments, any observations of non-native, invasive plant species in the enhancement area will be noted and mapped for inclusion in the annual report.
- Monitoring of the grazing exclusion area will be once a year for 10 years, however, if it is found that the performance standards are meet after year 5 then the qualified biologist monitoring will work in coordination with appropriate agencies to see if monitoring could be suspended.

8.5.6 Management

Through a management program, grazing livestock (cattle, sheep, and horses) and feral animals (e.g., feral pigs) will be strategically kept out of these areas for the majority of the year. Transect assessments will be conducted to evaluate the success of the livestock exclusion. If the results of the transect assessments do not meet success criteria, locally sourced native vegetation will be planted to enhance these natural features, increasing the biotic value for local species. Livestock will be allowed to graze on the remainder of the Conservation Lands outside the exclusion area, but will be managed and monitored in order to maximize benefits to the special-status species that inhabit the Conservation Lands.

9 LONG-TERM MANAGEMENT

Long-term management activities for the Conservation Lands mitigation sites are to be funded by a long-term endowment based on a PAR3© (**Appendix D)**. The Conservation Easement and endowment will likely be under CNLM responsibility, pending proper agency approval.

9.1 Parties Responsible for Long-term Management

CNLM or PVS will be designated as the Land Manager for the Conservation Lands. Final determination of Land Management will be submitted to the resource agencies for approval prior to the start of construction.

9.2 Activities Included in Long-term Management

PVS will be responsible for implementing the mitigation efforts and annual reporting described in this WMMP. Long-term management activities are similar to maintenance activities described herein and will be the responsibility of CNLM. Complete descriptions of each activity for the success of the mitigation sites are detailed below:

- Access to the Panoche Creek enhancement area and CTS pond creation sites will be controlled through the installation of barriers, gates, signs, and/or fencing. These will be maintained and replaced as needed. Additional barriers or access controls may be installed should the Land Manager deem necessary. Fencing will only be installed in areas where sensitive resources or hazards are identified and will be of a design that does not interfere with any native wildlife movement.
- With the exception of widespread common and abundant species (e.g., red brome, farmer's foxtail, filaree), non-native, invasive plant species will be controlled by identifying the exact location and extent of the targeted species, determining the threat posed to sensitive vegetation communities within the mitigation sites, establishing and prioritizing remediation actions based on the severity of the threat and infestation, implementing effective methods for control, and scheduling of management actions. This will occur on an annual basis.
- Conservational Lands will be monitored for any signs of illegal dumping. Trash found within the parcels will be collected and disposed of as-needed.
- Annual inspections of the sites will be conducted to assess the overall conditions. These inspections will document any stresses or threats to habitats and species and allow for the Land Manager to identify priority areas where preventative and remedial measures are needed. Furthermore, the potential occurrence for special-status species will be assessed.
- A Geographical Information System (GIS) database will be maintained for the property by the Land Manager.
- Annual reports containing information on management activities, expenditures, and the status of the endowment will be prepared and submitted to all interested parties.

The USACE shall be notified by the Land Manager prior to any work or activities that may occur with waters of the U.S. Appropriate coordination and approval must be given by USACE before any work or activities, other than what is described in this WMMP, is proposed.

10 ADAPTIVE MANAGEMENT

Specific maintenance and management activities will be identified based on the results of each annual monitoring visit for at least 5 years. If performance criteria for enhancement areas are not met at the end of the 5-year monitoring period, the monitoring period will be extended up to an additional 5 years. As part of each annual monitoring report, maintenance and management activities implemented during the previous year will be described and the results will be evaluated under the framework of adaptive management. If management and maintenance methods are not successful in addressing negative environmental stressors identified as part of annual monitoring reports, the methods will be examined and altered to increase the potential for success based on best professional judgment and management methods that are shown to be successful based on scientific research. This will be done in consultation with CDFW and San Benito County. In some cases, success of management and maintenance activities may not be evident over the course of only 1 year. This will be accounted for in annual monitoring reports through evaluation of whether or not management actions are contributing to progress towards the ultimate goal through the use of control plots or other approved method. In these cases, it may be necessary to wait 2 years or more before altering methods as part of an adaptive management strategy. Each annual monitoring report will contain a section dedicated to evaluation of management and maintenance actions as part of the adaptive management strategy. Any proposed adaptive management activities will be reviewed and approved by the UACE prior to implementation.

10.1 Natural Occurrences

Contingencies will be included in the conservation easement and funding agreement for costs of management activities to be carried out in the event that a fire, flood, or other natural disaster should have a negative impact on preserved, enhanced, and/or restored habitat during the initial monitoring period. The 5-year habitat management work program, which prioritizes biological resource and land stewardship tasks and includes 5-year staffing and materials budget, includes a fire management component developed in cooperation with the responsible fire agencies and in compliance with applicable State and local policies and regulations. In addition, the fire management component of the long-term management plan will be updated every 5 years. Remedial actions will be carried out during the initial monitoring period if habitat quality is reduced due to the occurrence of fire and/or other natural disasters. Remedial actions will also be carried out during long-term management if habitat quality is reduced due to management activities.

10.2 Potential Remedial Actions

Enhancement area habitat remediation consists of minor restoration of habitat from the effects of erosion, unauthorized access, or removal of exotics; it is not considered ecological habitat restoration or creation. This task may include seeding with native seeds or weed removal. Habitat remediation is included during the initial monitoring (start-up) period for the mitigation sites and is also an integral part of the enhancement area habitat management in perpetuity.

11 FINANICAL ASSURANCES

PVS currently holds options to purchase the Conservation Lands. The purchase price paid for the property will be determined by standard appraisal methods that require analysis of comparable properties in the region.

11.1.1 Plan Implementation

The costs for construction and implementation of the enhancement activities within this WMMP are provided in Table C. Costs provided in Table C include mobilization, removal of trash and debris, removal of non-native invasive plant species, enhancement of riparian and wetland vegetation, and creation of three CTS ponds. Also included in Table C is the estimated cost for maintenance, monitoring, and reporting as required by this WMMP for five to 10 years

Table C: Estimated Cost of Construction, Implementation, Maintenance, Monitoring, and Reporting of Proposed Mitigation

Task	Revised Cost
1. CTS Pond Creation	
Finalize Plans	$8,250
Biological Pre-Construction Survey	$1,800
Cultural Resource Compliance	$2,640
BMP Installation	$2,170
Pond Construction	$28,960
Construction Oversight	$3,600
10-year Maintenance	$25,000
10-year Monitoring	$164,000
Sub-total	***$236, 420***
2. Vernal Pool Enhancement	
Pool Selection	$1,800
Baseline Monitoring	$3,600
Seed Collection/Procurement	$15,500
Seed Installation	$1,500
5-Year Monitoring	$30,000
Sub-total	***$52,400***
3. Trash and Debris Removal	
Biological Pre-Removal Surveys	$4,050
Cultural Resource Compliance	$2,100
Environmental Monitor	$19,000
Debris Removal and Sorting	$86,680
Metal Hauling	$3,700
Tire Hauling and Disposal	$5,000
Wood Hauling and Disposal	$1,800
Miscellaneous Hauling and Disposal	$14,500
Maintenance Inspections	$19,500
5-Year Monitoring	$43,200
Sub-total	***$199,530***
4. Riparian Restoration	
Pre-Installation Documentation (Baseline Assessment)	$4,200
Fence Installation	$11,680
10-year Maintenance	$76,000
10-year Monitoring	$104,000
Sub-total	***$195,880***
Combined Annual Reports for Tasks 1-4 (5 to	***$67,500***

10 Years)	
Sub-Total	**$751,730**
Total Cost with 20% Contingency	**$974,076***

*Contingency includes costs associated with construction, maintenance, monitoring, and reporting for tasks 1-4.

11.1.2 Maintenance and Monitoring Funding

Funds for management and monitoring will be provided by an endowment or other security instrument appropriate to provide the average (inflation-adjusted) annual budget required to cover management tasks (this includes monitoring). The earnings assumptions are specific to the investment strategy, administrative costs, and inflation assumptions of the financial management entity. The capitalization rate and details related to the funding will be finalized upon approval of the management plans, including the WMMP, and selection of the Land Manager.

11.1.3 Form of the Letter of Credit

Financial assurance during the initial monitoring period will be guaranteed by PVS through issuance of a Letter of Credit or a Performance Bond or equivalent financial instrument. The dollar amount of the Letter of Credit (or equivalent) will be based on the estimated cost of mitigation implementation to be determined upon acceptance of the mitigation plan by resource agencies and is subject to final approval by the USACE. The final dollar amount will be provided by PVS under separate cover prior to the start of construction. Detailed financial information will be provided in the conservation easement and funding agreement.

12 NOTIFICATION OF COMPLETION

The client will notify and coordinate with the appropriate resource agencies to seek concurrence that the final performance standards have been met through the submittal of the final monitoring report and a letter requesting a Notification of Completion. The final report will include analysis of quantitative sampling data that will illustrate that the final performance standards have been met. The Site may qualify for early approval if final performance standards have been met prior to year five.

13 REFERENCES

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Appendices

Appendix A
Figures

Energy Renewal PARTNERS, LLC

Legend

County Line
Project Footprint
Valadeao Ranch Conservation Lands
City Limit
Valley Floor Conservation Lands
Silver Creek Ranch Conservation Lands

N

0 2 4
Miles

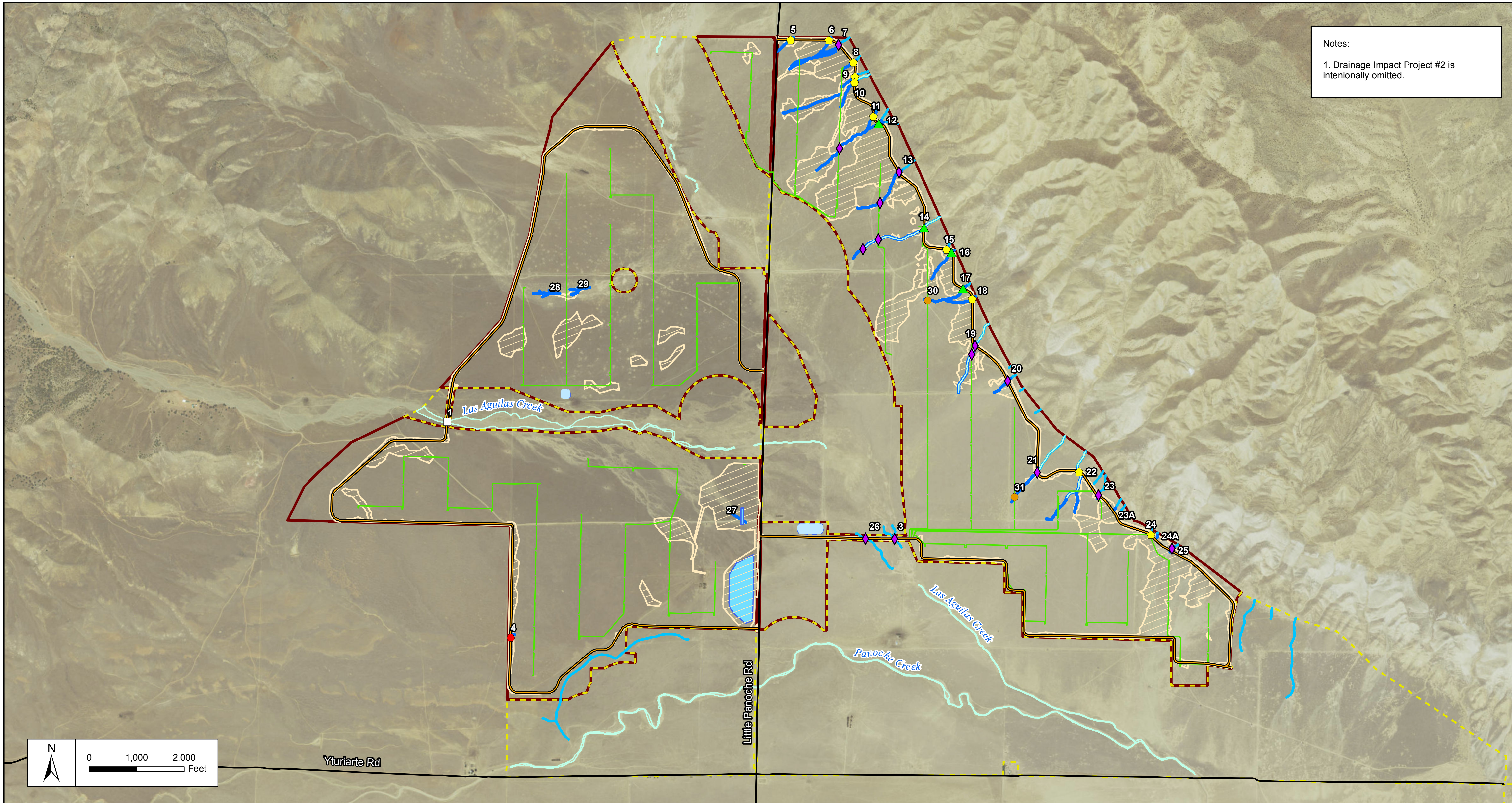
BR
10/14/2014

Panoche Valley Solar Project

PV Project Location Overview

FIGURE

1



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www.energyrenewalpartners.com
Energy Renewal PARTNERS, LLC

Legend

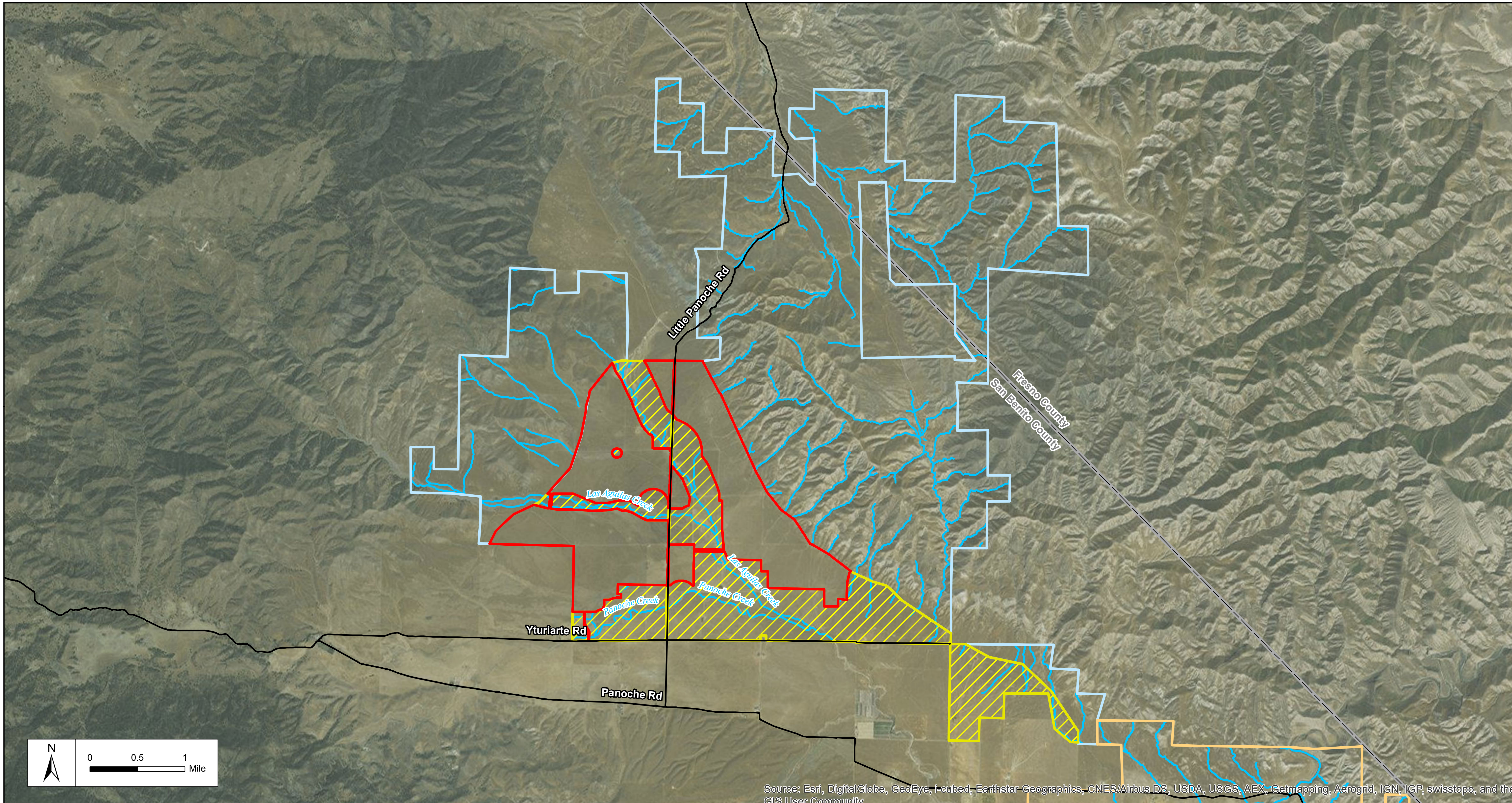
- Project Footprint
- Valley Floor Conservation Lands
- Grading Area
- Detention Pond
- Perimeter Road
- AC Block Feeder
- Federal Jurisdictional Drainage
- Temporary Water Pond
- Drainage
- Drainage Impact
- Culvert
- Diversion
- Low Water Crossing
- Single Span Bridge
- Trench
- Vented Ford

Panoche Valley Solar Project

Drainage Impacts

FIGURE 2

JH 2015-08-18



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Energy Renewal PARTNERS, LLC

Legend

- Project Footprint
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- Stream/Drainage

Panoche Valley Solar Project

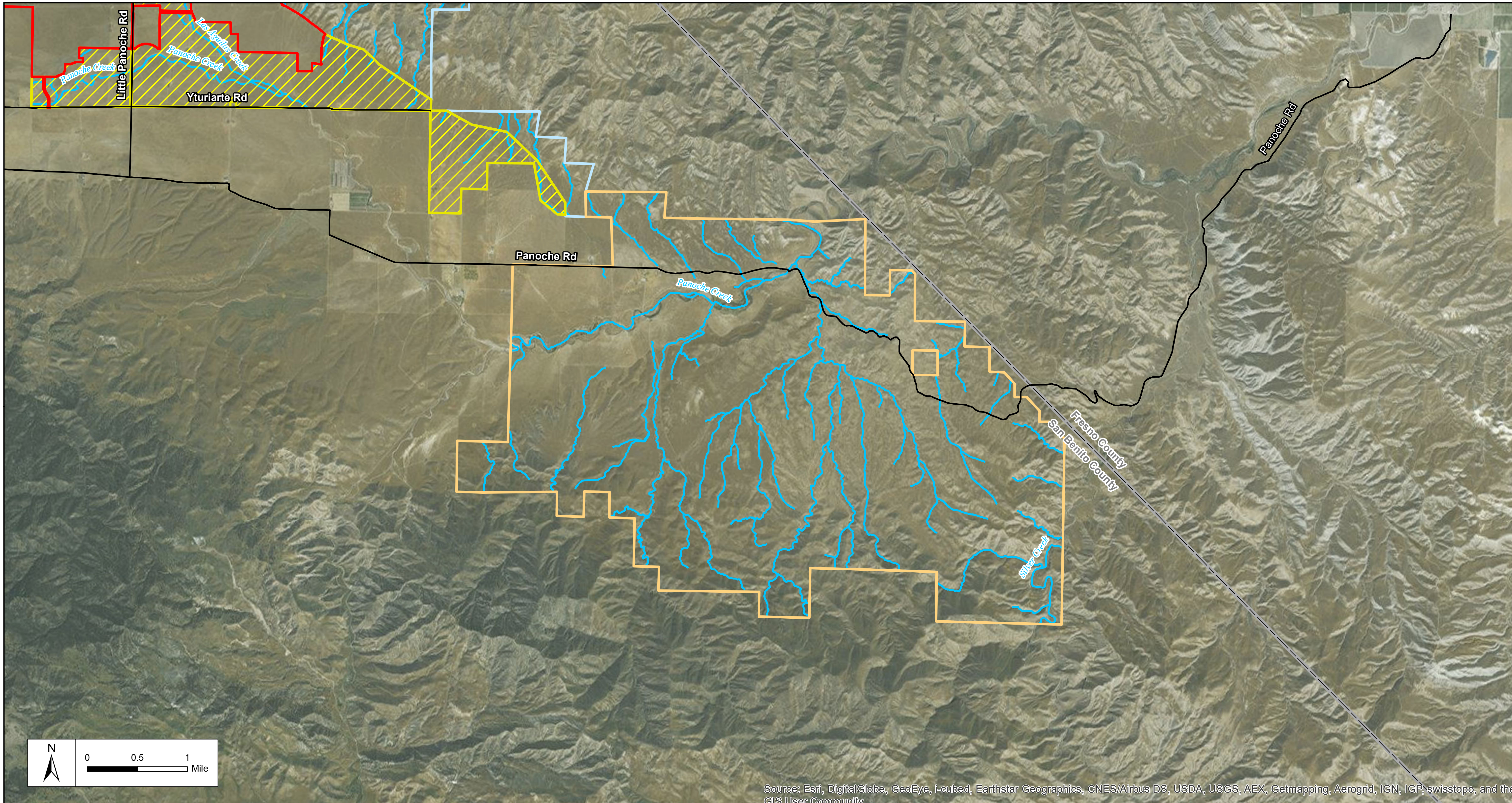
Waters on Conservation Lands

Valadeao Ranch and Valley Floor

FIGURE

3a

JH 2015-01-28



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PARTNERS, LLC

Legend

- Project Footprint
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- Stream/Drainage

Panoche Valley Solar Project

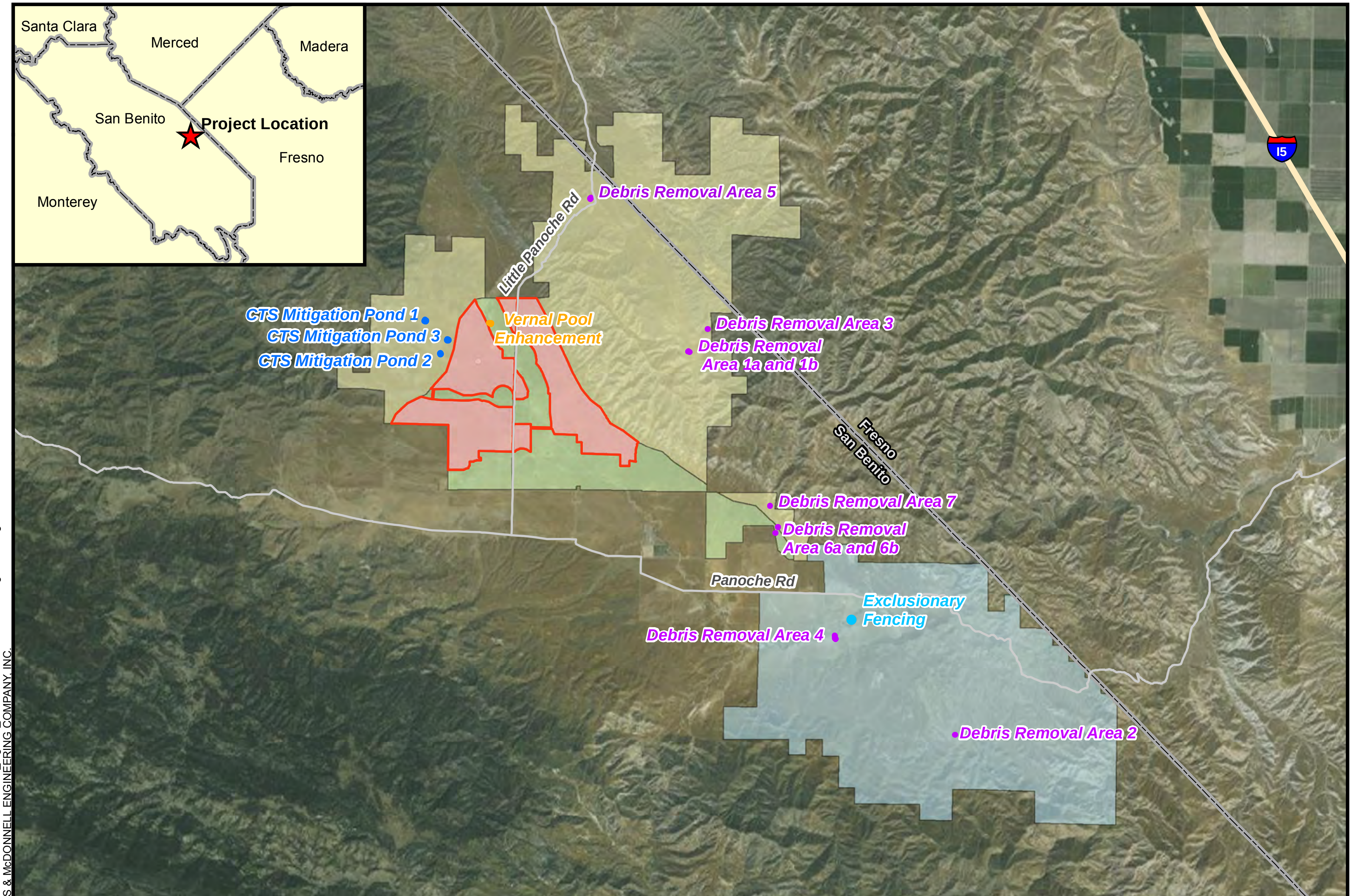
Waters on Conservation Lands

Silver Creek Ranch

FIGURE

3b

JH 2015-01-28



LEGEND

Streets	County Boundary
Exclusionary Fencing	Project Area
CTS Pond	Silver Creek Ranch
Debris Removal Area	Valley Floor
Vernal Pool Enhancement	Valadeao Ranch

0 1 2 4 Miles

N

Source: ESRI and Burns & McDonnell Engineering.

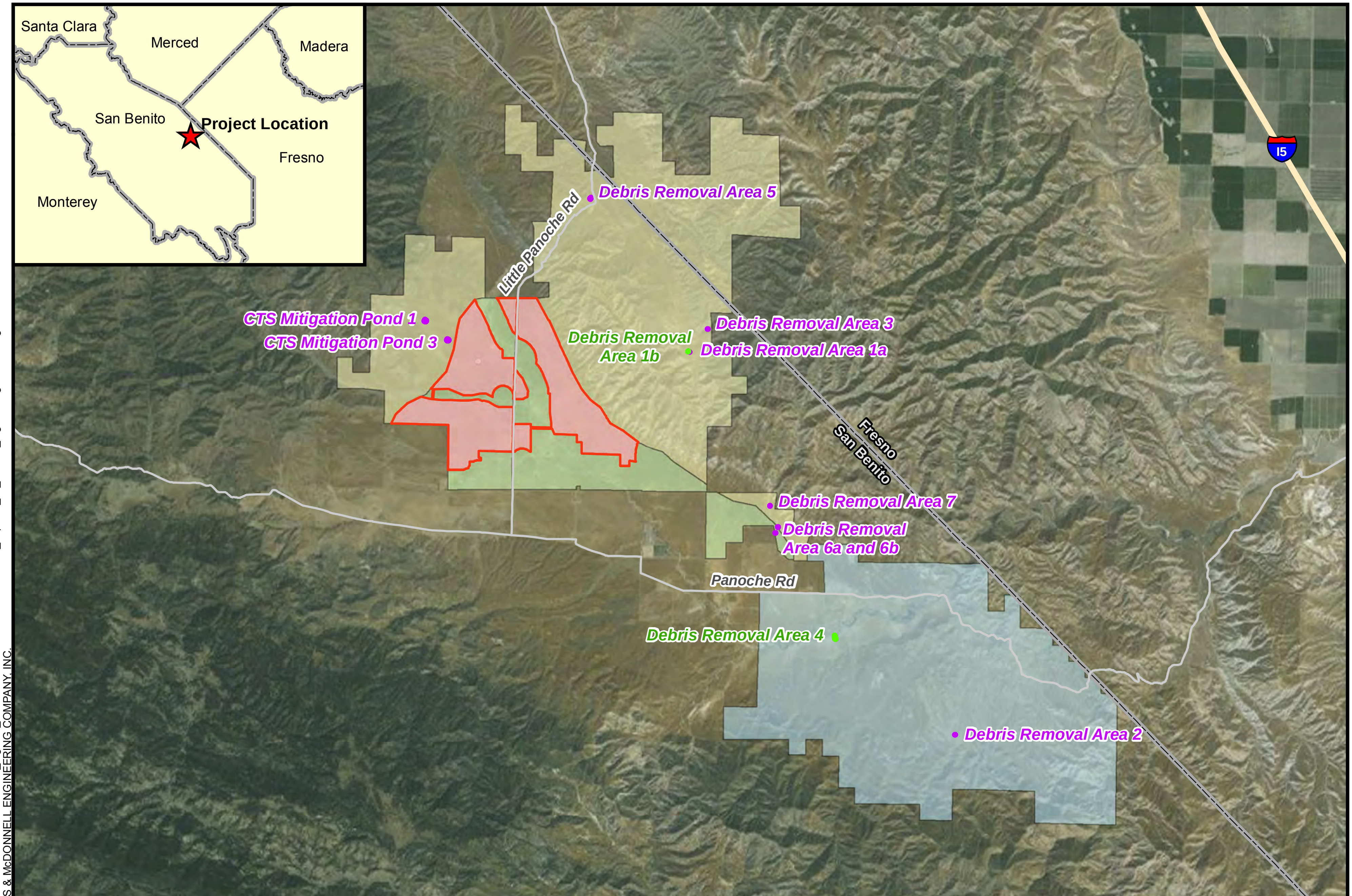
BURNS McDONNELL

Figure 4

MITIGATION AREAS OVERVIEW

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 4 Mitigation Areas Overview.mxd

Issued: August 19, 2015 twong



LEGEND

Streets	Project Area
County Boundary	Silver Creek Ranch
Federal and State Water	Valley Floor
State Water	Valadeao Ranch

0 1 2 4 Miles

N

Source: ESRI and Burns & McDonnell Engineering.

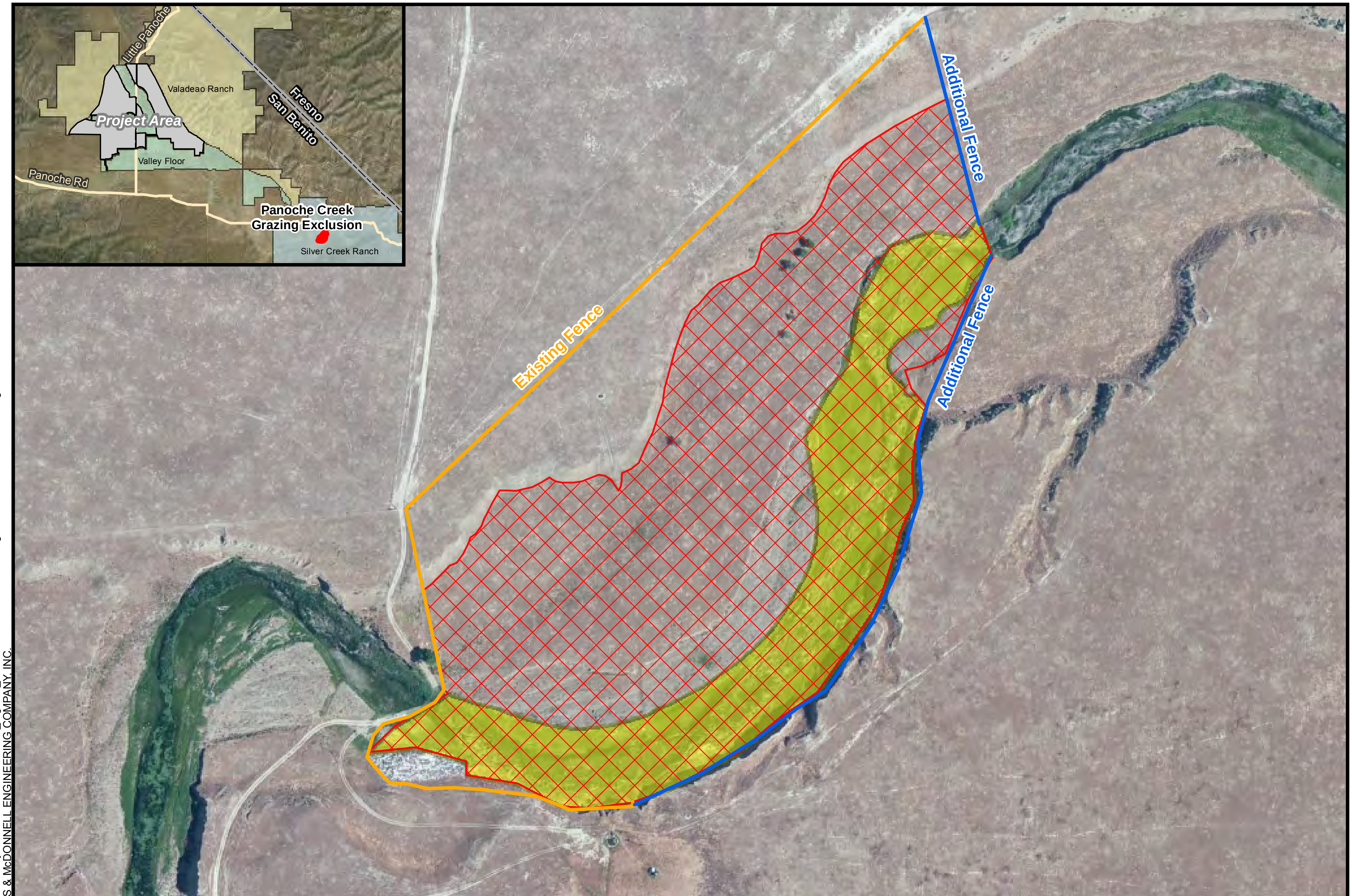
BURNS McDONNELL

Figure 4a

MITIGATION AREAS POTENTIAL IMPACTS TO WATERS OVERVIEW

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 4a Mitigation Areas PIW Overview.mxd

Issued: August 19, 2015 twong



LEGEND

Additional Fence
Existing Fence
Jurisdictional Wetland Area, 5.81 acres
State Water Area, 16.97 acres

0 125 250 500 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

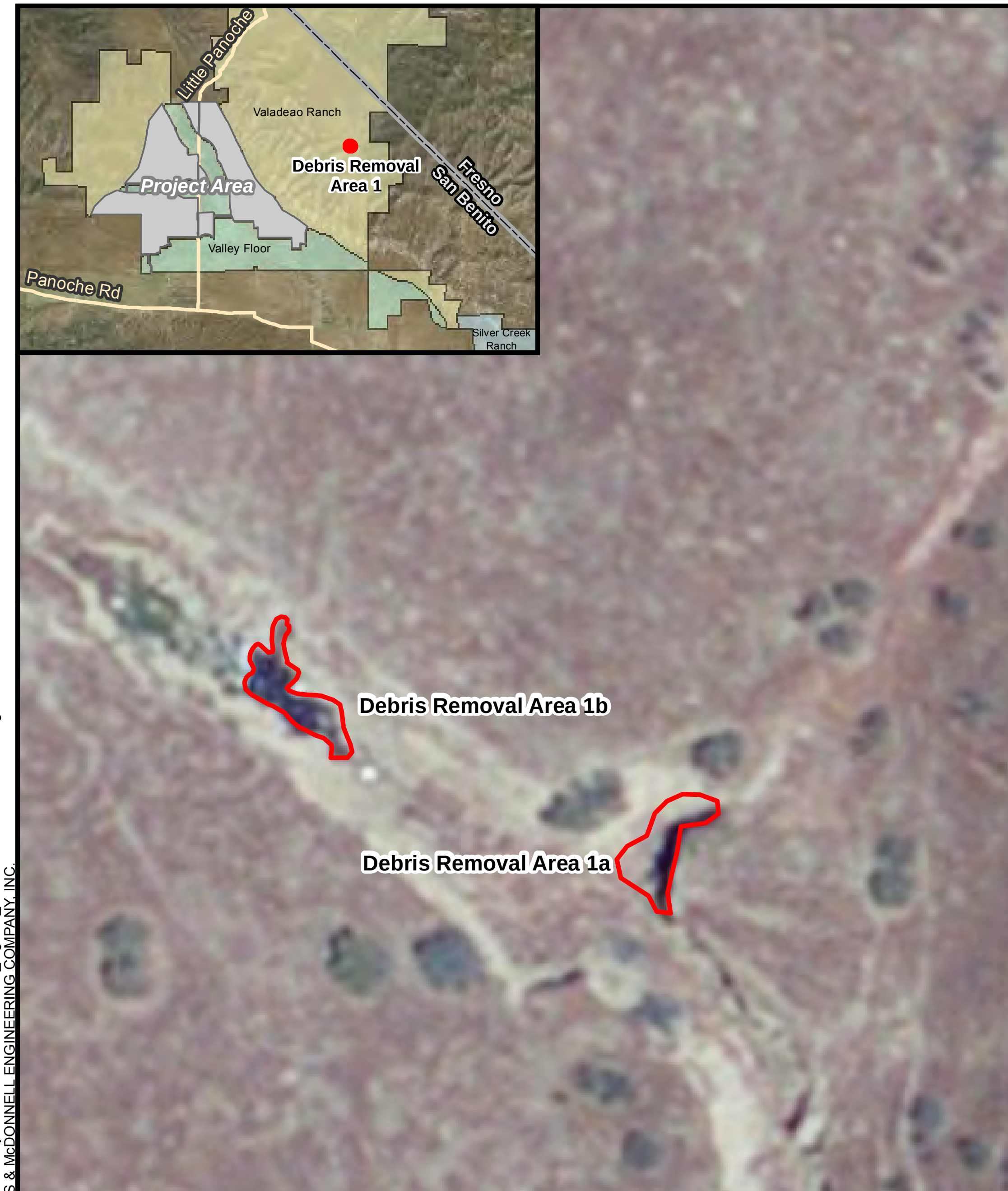
BURNS McDONNELL

Figure 5

PANOCHE CREEK GRAZING EXCLUSION

Path: F:\Projects\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 5 Panoche Creek Grazing Exclusion.mxd

Issued: May 12, 2015 twong



LEGEND

Debris Removal Area

0 20 40 80
Feet
N

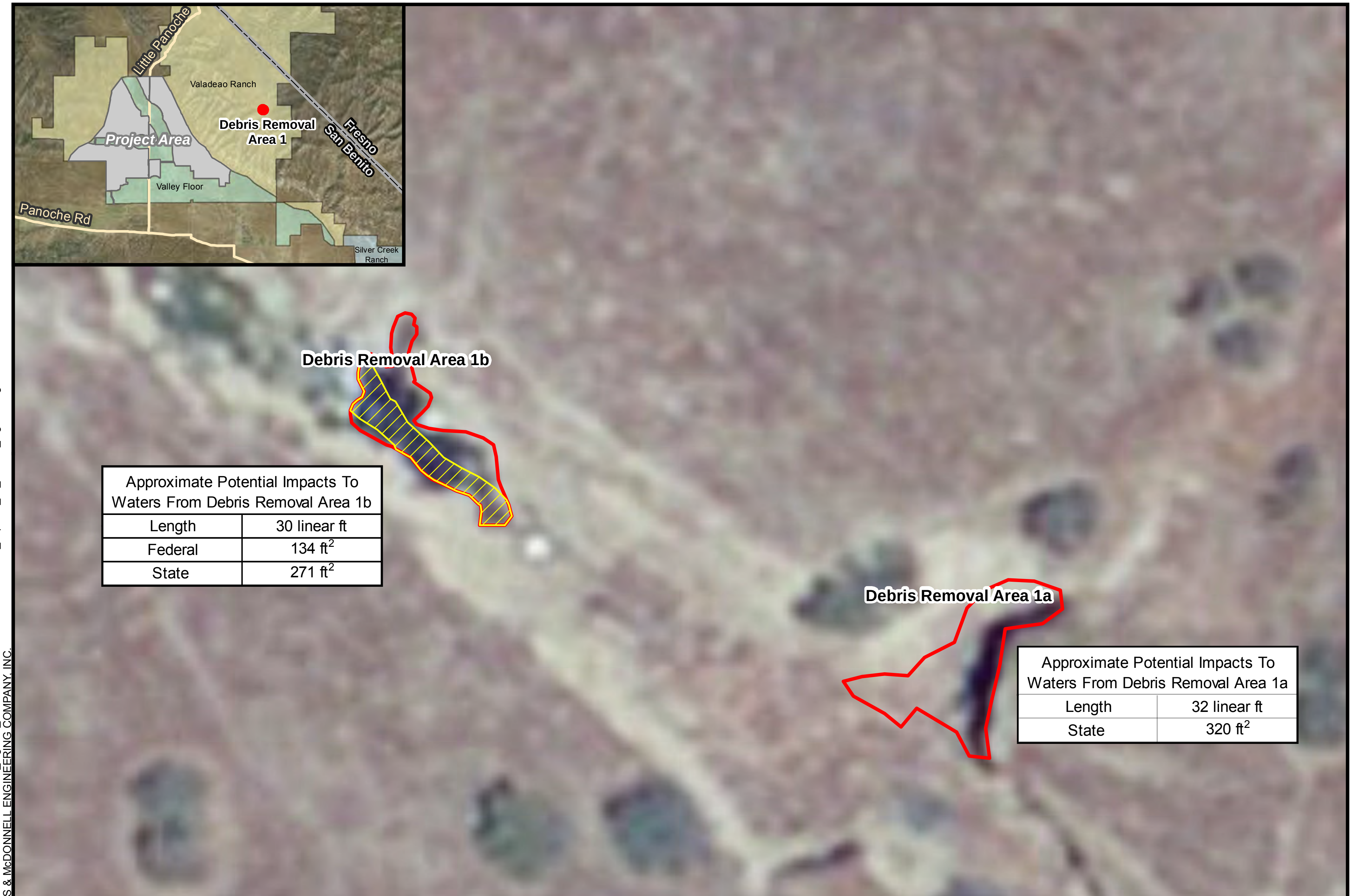
Source: ESRI and Burns & McDonnell Engineering.

Figure 6

DEBRIS REMOVAL AREA 1a AND 1b

Path: F:\Projects\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 6 Debris Removal Area 1.mxd

Issued: May 12, 2015 twong



Approximate Potential Impacts To Waters From Debris Removal Area 1b	
Length	30 linear ft
Federal	134 ft^2
State	271 ft^2

Approximate Potential Impacts To Waters From Debris Removal Area 1a	
Length	32 linear ft
State	320 ft^2

LEGEND

Potential Impacts to Federal Waters

Potential Impacts to State Waters

0 10 20 40 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 6a

POTENTIAL IMPACTS TO WATERS DEBRIS REMOVAL AREA 1a AND 1b

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 6a PIW Debris Removal Area 1.mxd

Issued: August 19, 2015 twong

LEGEND

Debris Removal Area

0 40 80 160 Feet

N

BURNS McDONNELL

Source: ESRI and Burns & McDonnell Engineering.

Figure 7

DEBRIS REMOVAL AREA 2

Path: F:\Projects\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 7 Debris Removal Area 2.mxd

Issued: May 12, 2015 twong

Approximate Potential Impacts To Waters From Debris Removal Area 2	
Length	22 linear ft
State	365 ft^2

LEGEND

Potential Impacts to State Waters

0 20 40 80 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 7a
POTENTIAL IMPACTS TO WATERS DEBRIS REMOVAL AREA 2

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 7a PIW Debris Removal Area 2.mxd

Issued: August 19, 2015 twong

LEGEND

Debris Removal Area

0 20 40 80 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 8

DEBRIS REMOVAL AREA 3

Path: F:\Projects\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 8 Debris Removal Area 3.mxd

Issued: May 12, 2015 twong

Approximate Potential Impacts To Waters From Debris Removal Area 3	
Length	17 linear ft
State	67 ft^2

LEGEND

Potential Impacts to State Waters

0 10 20 40 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS & McDONNELL

Figure 8a
POTENTIAL IMPACTS TO WATERS DEBRIS REMOVAL AREA 3

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 8a PIW Debris Removal Area 3.mxd

Issued: August 19, 2015 twong

LEGEND

Debris Removal Area

0 40 80 160 Feet

N

BURNS McDONNELL

Source: ESRI and Burns & McDonnell Engineering.

Figure 9

DEBRIS REMOVAL AREA 4

Path: F:\Projects\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 9 Debris Removal Area 4.mxd

Issued: May 12, 2015 twong

Approximate Potential Impacts To Waters From Debris Removal Area 4	
Length	323 linear ft
Federal	4038 ft^2
State	10088 ft^2

LEGEND

- Potential Impacts to Federal Waters
- Potential Impacts to State Waters

0 40 80 160 Feet

N

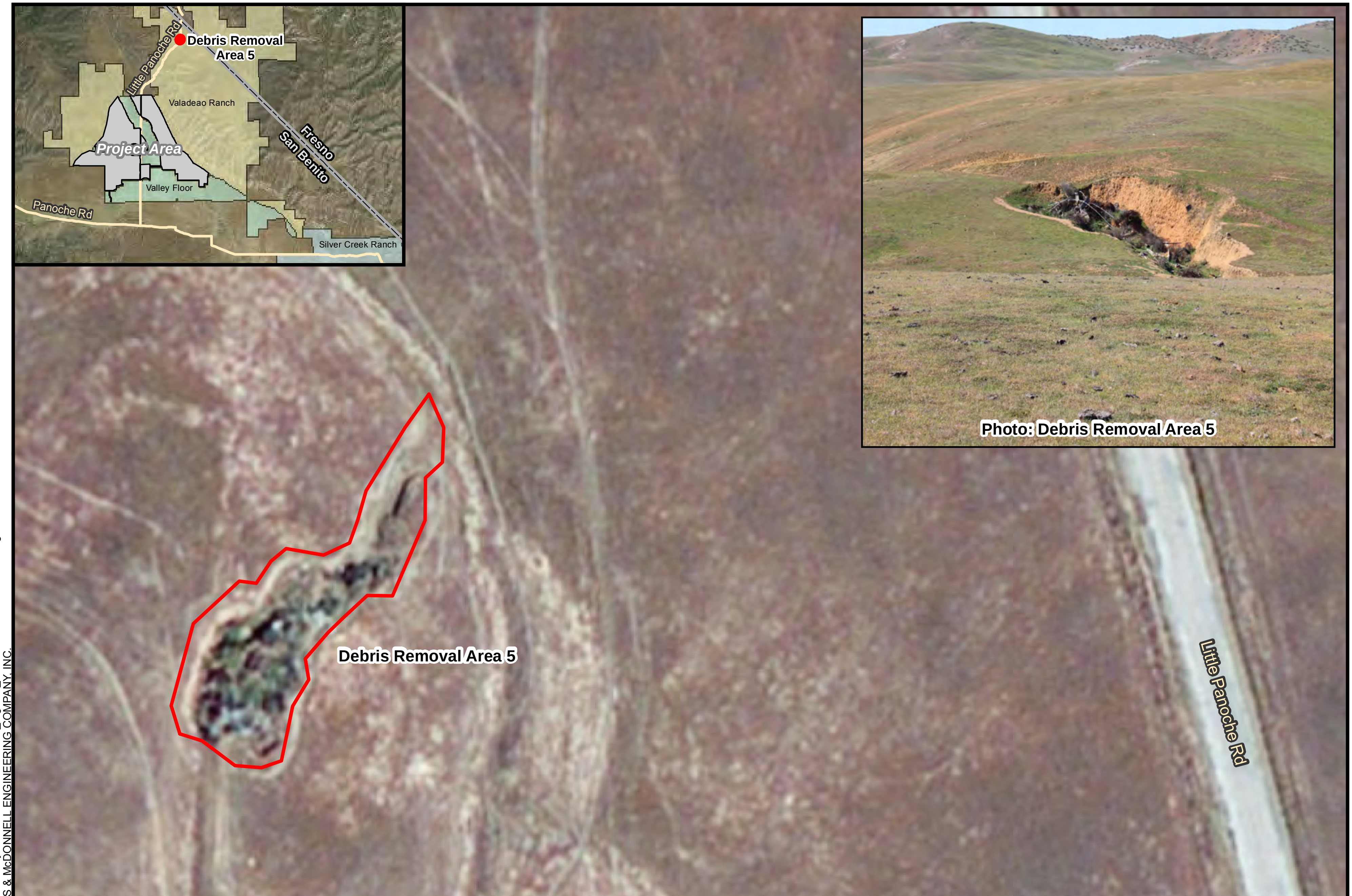
Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 9a
POTENTIAL IMPACTS TO WATERS DEBRIS REMOVAL AREA 4

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 9a PIW Debris Removal Area 4.mxd

Issued: August 19, 2015 twong



LEGEND

Debris Removal Area

0 25 50 100 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 10

DEBRIS REMOVAL AREA 5

Path: F:\Projects\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 10 Debris Removal Area 5.mxd

Issued: May 12, 2015 twong

Approximate Potential Impacts To Waters From Debris Removal Area 5	
Length	159 linear ft
State	5064 ft^2

LEGEND

Potential Impacts to State Waters

0 25 50 100 Feet

N

BURNS McDONNELL

Figure 10a
POTENTIAL IMPACTS TO WATERS DEBRIS REMOVAL AREA 5

Source: ESRI and Burns & McDonnell Engineering.

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 10a PIW Debris Removal Area 5.mxd

Issued: August 19, 2015 twong

LEGEND

Debris Removal Area

0 50 100 200 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 11

DEBRIS REMOVAL AREA 6a AND 6b

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 11 Debris Removal Area 6.mxd

Issued: August 17, 2015 twong

Approximate Potential Impacts To Waters From Debris Removal Area 6b	
Length	13 linear ft
State	136 ft^2

Approximate Potential Impacts To Waters From Debris Removal Area 6a	
Length	41 linear ft
State	734 ft^2

LEGEND

Potential Impacts to State Waters

0 50 100 200 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 11a

POTENTIAL IMPACTS TO WATERS DEBRIS REMOVAL AREA 6a AND 6b

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 11a PIW Debris Removal Area 6.mxd

Issued: August 19, 2015 twong

LEGEND

Debris Removal Area

0 20 40 80 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

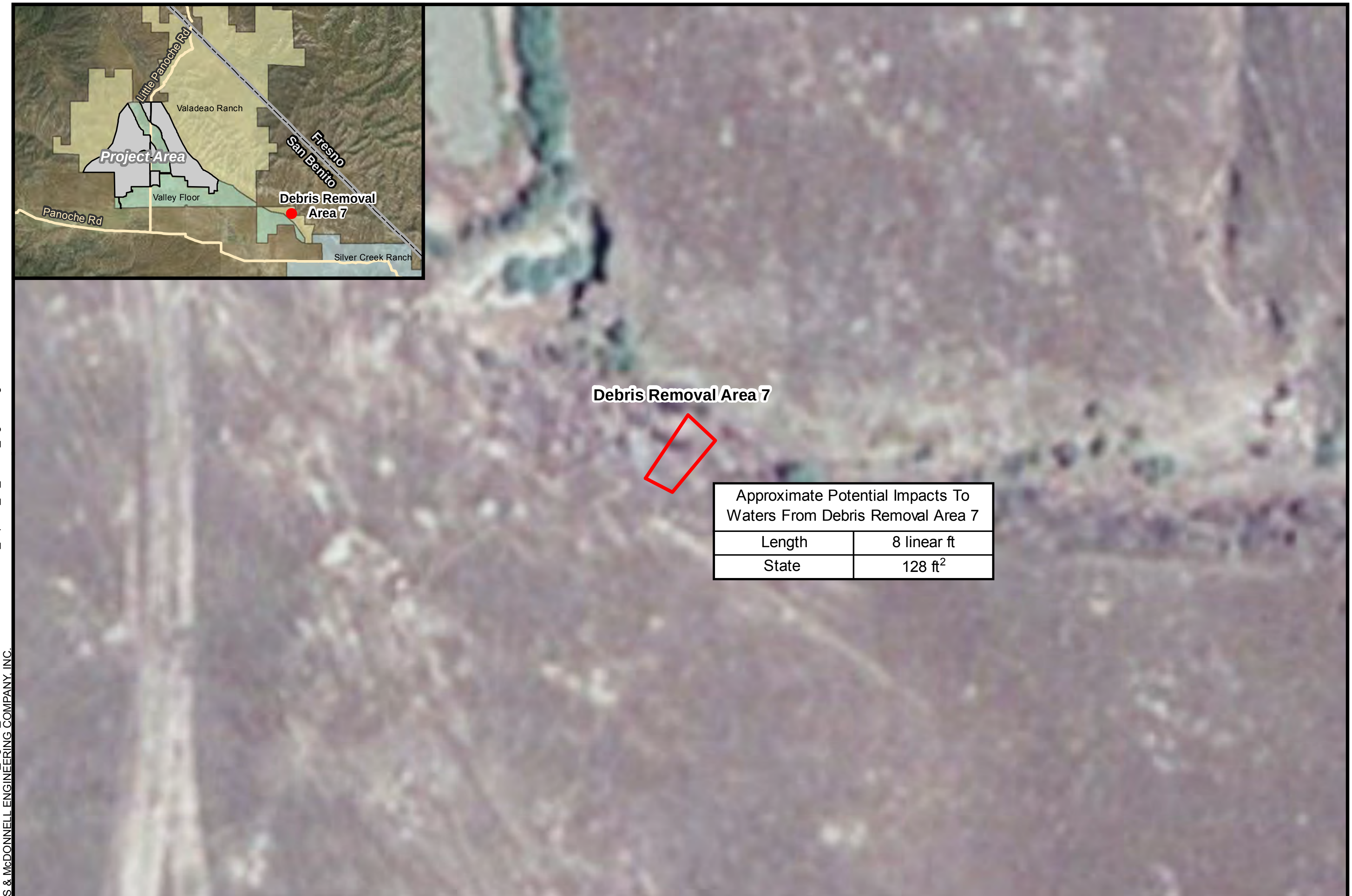
BURNS McDONNELL

Figure 12

DEBRIS REMOVAL AREA 7

Path: F:\Projects\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Figure 12 Debris Removal Area 7.mxd

Issued: May 12, 2015 twong



Approximate Potential Impacts To Waters From Debris Removal Area 7	
Length	8 linear ft
State	128 ft^2

LEGEND

Potential Impacts to State Waters

0 15 30 60 Feet

N

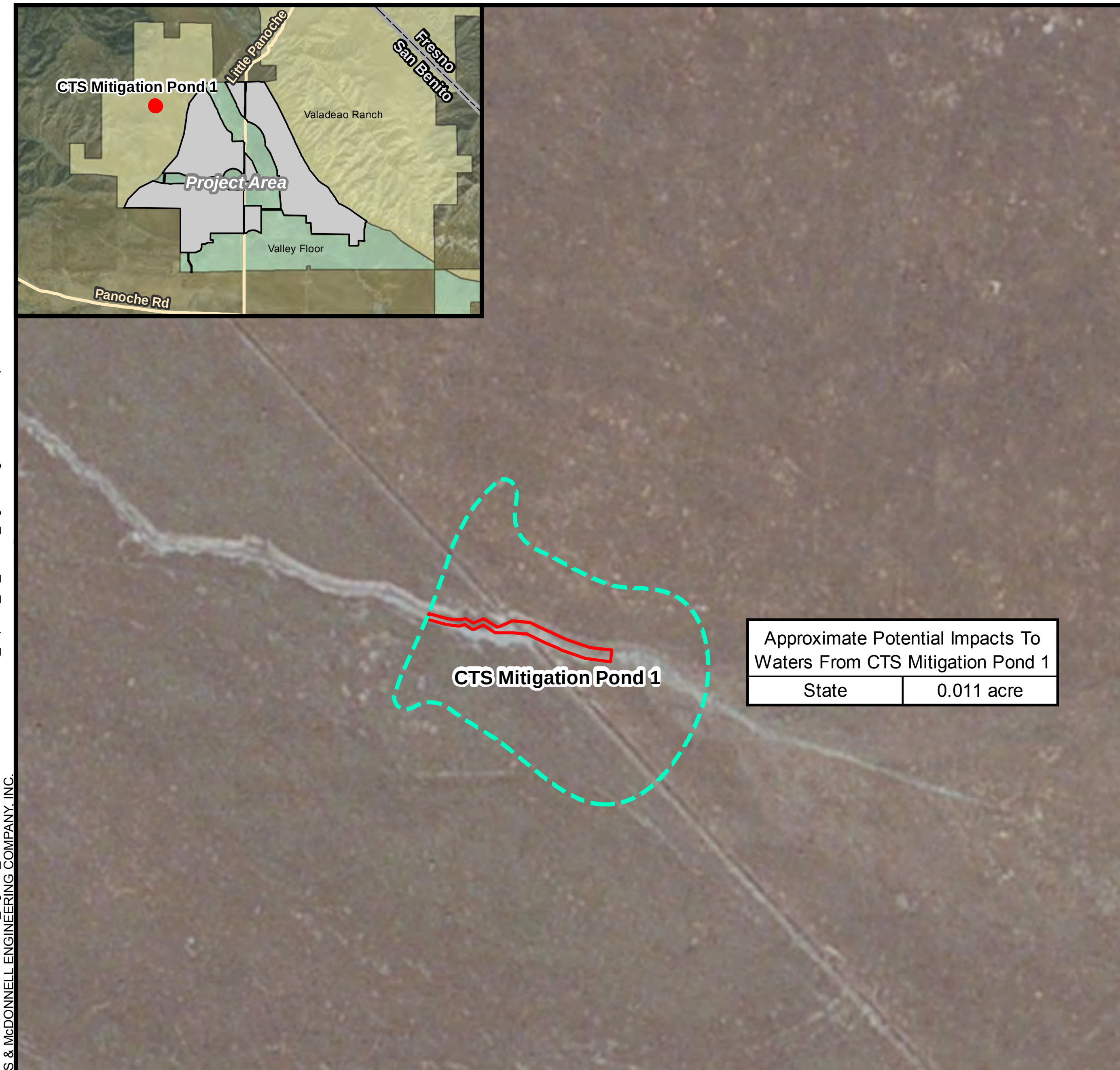
Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

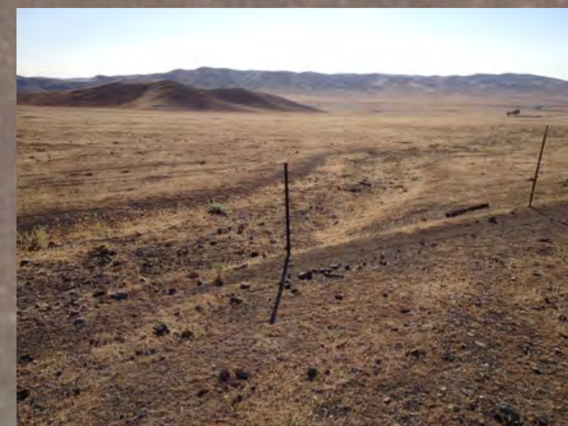
Figure 12a
POTENTIAL IMPACTS TO WATERS DEBRIS REMOVAL AREA 7

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 12a PIW Debris Removal Area 7.mxd

Issued: August 19, 2015 twong



Approximate Potential Impacts To Waters From CTS Mitigation Pond 1	
State	0.011 acre



LEGEND

CTS Mitigation Pond Grading Limit

Potential Impacts to State Waters

0 40 80 160 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 13
POTENTIAL IMPACTS TO WATERS
CTS MITIGATION POND 1

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 13 PIW Proposed CTS Pond 1.mxd

Issued: August 19, 2015 twong

LEGEND

CTS Mitigation Pond Grading Limit
(CTS Mitigation Pond 2 will not impact waters of the State or U.S.)

0 40 80 160 Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 14
POTENTIAL IMPACTS TO WATERS CTS MITIGATION POND 2

Path: G:\ESP\PanocheValleySolar\80258\Records\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 14 PIW Proposed CTS Pond 2.mxd

Issued: August 18, 2015 twong

LEGEND

CTS Mitigation Pond Grading Limit
Potential Impacts to State Waters

0 40 80 160
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

Figure 15
POTENTIAL IMPACTS TO WATERS CTS MITIGATION POND 3

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\DataFiles\ArcDocs\Potential_Impacts_To_Waters_Figures\Figure 15 PIW Proposed CTS Pond 3.mxd

Issued: August 19, 2015 twong

Appendix B
Photographs and Mapbook

Photolog from January 12, 2015 Site Visit

Conducted by Energy Renewal Partners, McCormick Biological, and Burns & McDonnell

Figure 1: Photo 20 Upstream drainage channel

Figure 2: Photo 21 Downstream view

Figure 3: Photo 22 Upstream mid-channel

Figure 4: Photo 23a Upstream drainage with grazed ephedra

Figure 5: Photo 23 Downstream mid-channel

Figure 6: Photo 24 Upstream

Figure 7: Photo 25 Downstream

Figure 8: Photo 26 Upstream

Figure 9: Photo 27 Downstream

Figure 10: Photo 28 Top of drainage from above

Figure 11: Photo 29 Silver Creek

Figure 12: Photo 30 Top of drainage

Figure 13: Photo 31 Downstream

Figure 14: Photo 32 Upstream with head cut

Figure 15: Photo 33 Upstream

Figure 16: Photo 34 Downstream

Figure 17: Photo 35 Upstream

Figure 18: Photo 36 Downstream

Figure 19: Photo 37 In-line dam with ponded basin

Figure 20: Photo 38 Dam

Figure 21: Photo 39 Dam and basin looking downstream

Figure 22: Photo 40 Upstream

Figure 23: Photo 41 Downstream

Figure 24: Photo 42 Downstream

Figure 25: Photo 43 Upstream

Figure 26: Photo 44 Upstream

Figure 27: Photo 45 Downstream

Figure 28: Photo 47 Upstream

Figure 29: Photo 48 Upstream

Figure 30: Photo 49 Downstream

Figure 31: Photo 50 In-line dam structure

Figure 32: Photo 51 Downstream

Figure 33: Photo 52 Upstream with drainage convergence on left.
Not indicated on USGS National Hydrography Dataset

Figure 34: Photo 53 Drainage. Not indicated on USGS National Hydrography Dataset

Figure 35: Photo 54 Looking upstream from top of hill

Figure 36: Photo 55 Looking downstream from top of hill

Figure 37: Photo 56 Upstream

Figure 38: Photo 57 Downstream

Figure 39: Photo 58 Downstream

Figure 40: Photo 59 Upstream

Figure 41: Photo 60 Upstream

Figure 42: Photo 61 Downstream

Figure 43: Photo 62 Downhill. No channel evident

Figure 44: Photo 63 Uphill. No channel evident

Figure 45: Photo 64 Downstream

Figure 46: Photo 65 Upstream

Figure 47: Photo 67 Downstream

Figure 48: Photo 68 Upstream

Figure 49: Photo 69 Downstream of confluence

Figure 50: Photo 70 Upstream left channel

Figure 51: Photo 71 Upstream right channel

Figure 52: Photo 72 Upstream

Figure 53: Photo 73 Downstream

Figure 54: Photo 74 Upstream

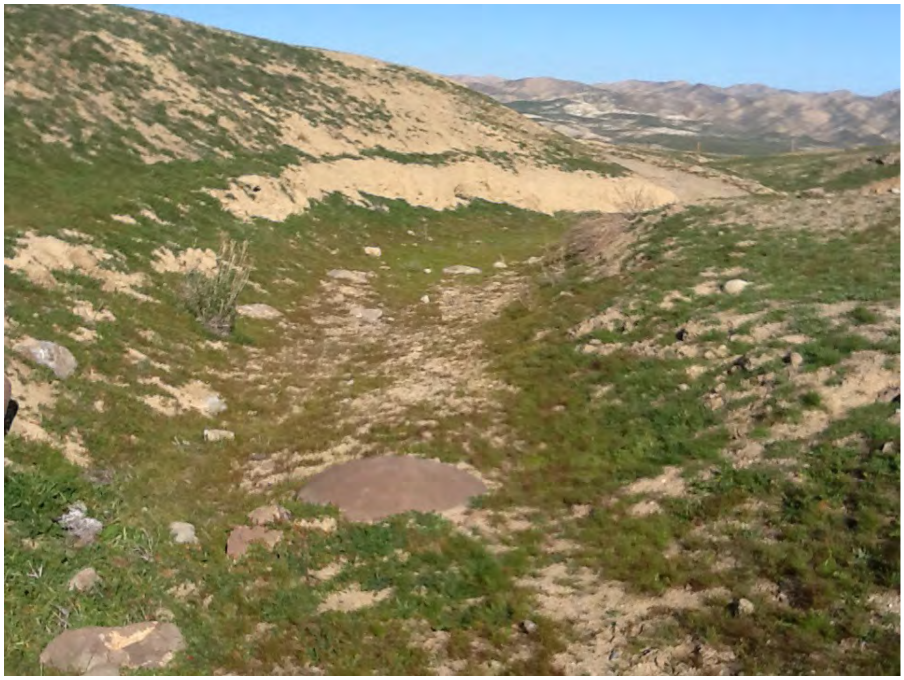


Figure 55: Photo 75 Downstream

Figure 56: Photo 76 Upstream.

Figure 57: Photo 77 Downstream

Figure 58: Photo 78 Upstream

Figure 59: Photo 79 Downstream

Figure 60: Photo 82 Upstream

Figure 61: Photo 83 Downstream

Figure 62: Photo 84 Upstream

Figure 63: Photo 85 Downstream

Figure 64: Photo 86 CTS Potential Pond 2

Figure 65: Photo 87 Potential CTS 3 upstream

Figure 66: Photo 88 Potential CTS 3 down stream

Figure 67: Photo 90 Downstream

Figure 68: Photo 91 Upstream

Figure 69: Photo 92 Downstream

Figure 70: Photo 93 Upstream

Figure 71: Photo 94 Upstream

Figure 72: Photo 95 Upstream

Figure 73: Photo 96 Upstream

Figure 74: Photo 97 Downstream. Road and culvert

Figure 75: Photo 98 Upstream with small basin.

Figure 76: Photo 99 Downstream with road and culvert

Figure 77: Photo 100 Upstream right channel

Figure 78: Photo 101 Upstream left channel

Figure 79: Photo 102 In-line dam with inundated ponded basin looking downstream.

Figure 80: Photo 103 Dammed channel

Figure 81: Photo 104 Upstream Drainage. Not indicated on USGS National Hydrography Dataset

Figure 82: Photo 105 Downstream Drainage. Not indicated on USGS National Hydrography Dataset

Figure 83: Photo 106 Drainage. Not indicated on USGS National Hydrography Dataset drainage upstream

Figure 84: Photo 107 Drainage. Not indicated on USGS National Hydrography Dataset downstream

Figure 85: Photo 108 Upstream

Figure 86: Photo 109 Downstream

Figure 87: Photo 110 Upstream

Figure 88: Photo 111 Downstream

Figure 89: Photo 112 Upstream

Figure 90: Photo 113 Downstream

Figure 91: Photo 114 Upstream

Figure 92: Photo 115 Downstream

Figure 93: Photo 116 Upstream

Figure 94: Photo 117 Downstream

Figure 95: Photo 120 Convergence of channels – downstream

Figure 96: Photo 121 Convergence left historical channel looking upstream

Figure 97: Photo 122 Convergence of channels - man made channel looking upstream

Figure 98: Photo 123 Upstream

Figure 99: Photo 124 Downstream

Figure 100: Photo 125 Historical channel upstream

Figure 101: Photo 126 Open convergence meadow that has been dammed

Figure 102: Photo 127 Upstream

Figure 103: Photo 128 Downstream toward convergence

Figure 104: Photo 129 Upstream

Figure 105: Photo 130 Downstream

Figure 106: Photo 131 Upstream

Figure 107: Photo 132 Downstream

Figure 108: Photo 133 Upstream view of unmapped Drainage. Not indicated on USGS National Hydrography Dataset

Figure 109: Photo 134 Downstream view of unmapped waters

Figure 110: Photo 135 Upstream

Figure 111: Photo 136 Downstream

Figure 112: Photo 137 Upstream

Figure 113: Photo 138 Downstream

Figure 114: Photo 139 On hill crest looking into project area at Drainage.
Not indicated on USGS National Hydrography Dataset.

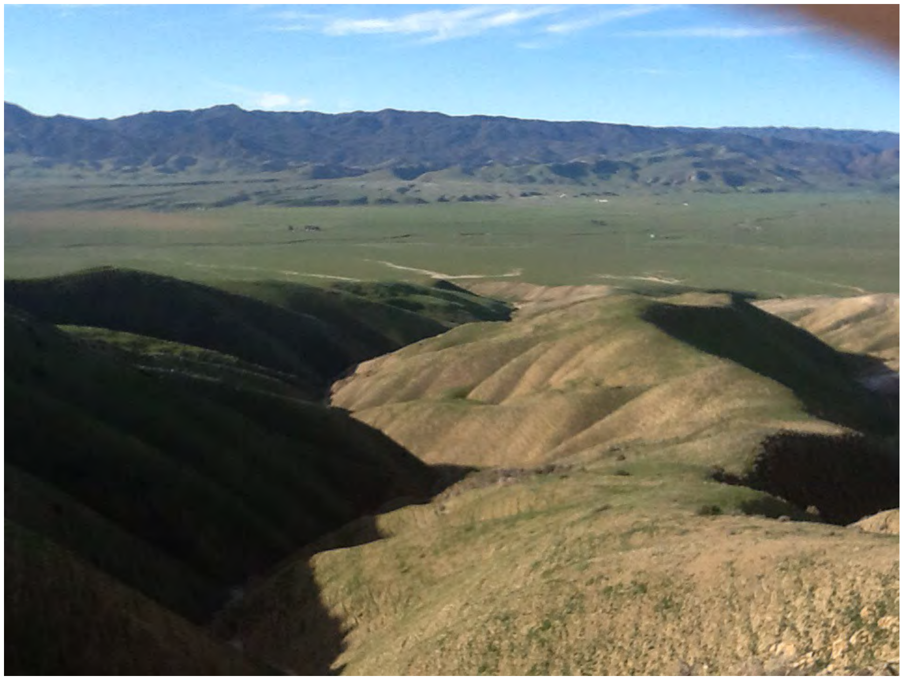


Figure 115: Photo 140 Downstream

Figure 116: Photo 141 Looking downstream Drainage.
Not indicated on USGS National Hydrography Dataset unmarked on map

Figure 117: Photo 142 Unmarked drainage looking downstream NE. Not indicated on USGS National Hydrography Dataset

Figure 118: Photo 143 Upstream

Figure 119: Photo 144 Downstream

Figure 120: Photo 146 Downstream

Figure 121: Photo 147 Upstream. Channel w some standing water

Figure 122: Photo 148 Downstream. Appears to discharge to land, no channel evident.

Figure 123: Photo 149 Upstream

Figure 124: Photo 150 Downstream

Figure 125: Photo 151 Upstream

Figure 126: Photo 152 Downstream

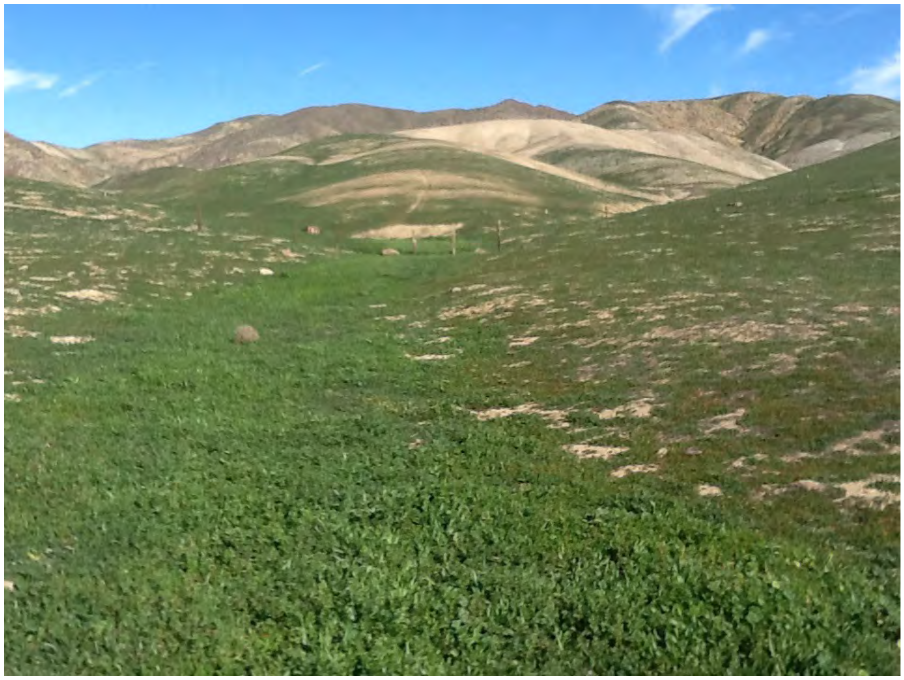
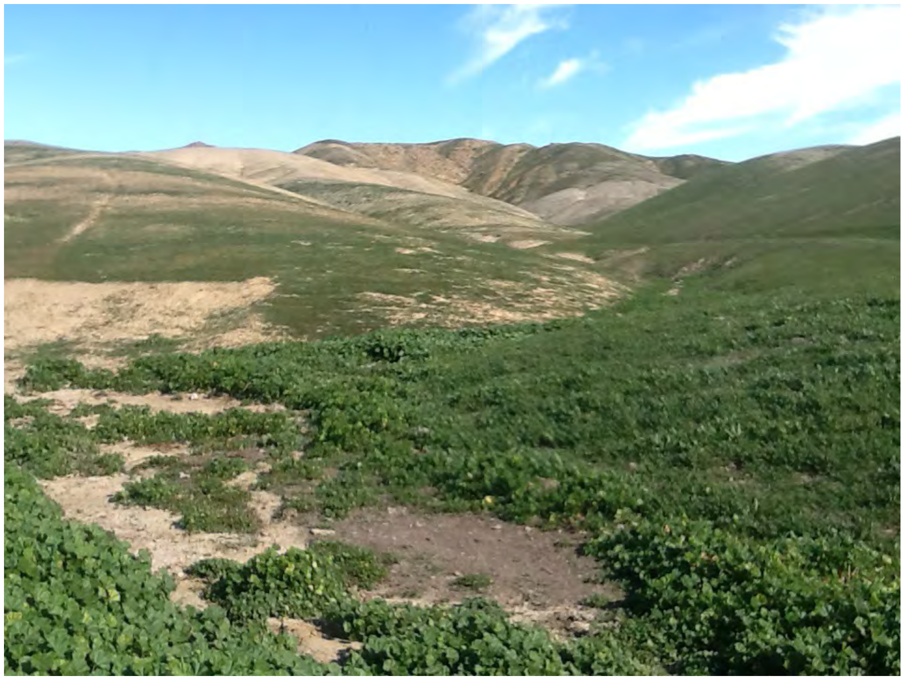


Figure 127: Photo 153 Upstream

Figure 128: Photo 154 Downstream



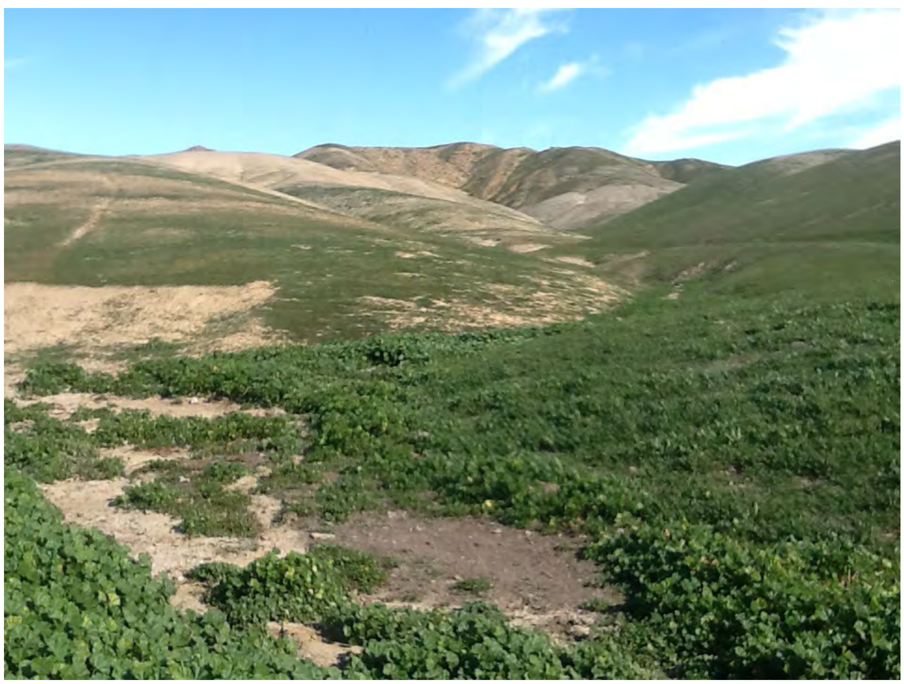


Figure 129: Photo 155 At bottom of confluence looking upstream

Figure 130: Photo 156 Downstream

Figure 131: Photo 157 Upstream

Figure 132: Photo 159 Downstream

Figure 133: Photo 160 Upstream

Figure 134: Photo 161 Downstream

Figure 135: Photo 162 Upstream from main channel

Figure 136: Photo 163 Upstream

Figure 137: Photo 164 Downstream.

Figure 138: Photo 165 Downstream looking down canyon

Figure 139: Photo 166 Upstream

Figure 140: Photo 167 Downstream

Figure 141: Photo 168 Upstream from main channel

Figure 142: Photo 169 Upstream

Figure 143: Photo 170 Downstream

Figure 144: Photo 171 Upstream Drainage. Not indicated on USGS National Hydrography Dataset

Figure 145: Photo 172 Downstream Drainage. Not indicated on USGS National Hydrography Dataset.

Figure 146: Photo 173 Upstream

Figure 147: Photo 174 Downstream.

Figure 148: Photo 175 Upstream from main channel

Figure 149: Photo 176 Upstream

Figure 150: Photo 177 Downstream

Figure 151: Photo 178 Upstream

Figure 152: Photo 180 Drainage. Not indicated on USGS National Hydrography Dataset

Figure 153: Photo 181 Downstream

Figure 154: Photo 182 Upstream

Figure 155: Photo 183 Downstream


Figure 156: Photo 184 Upstream. Headwater continues above blue-line end on map


Figure 157: Photo 185 Downstream

Figure 158: Photo 187 Upstream

Figure 159: Photo 188 Downstream

Figure 160: Photo 189 Dam.

Figure 161: Photo 191 Dam outlet north

Figure 162: Photo 192 Dam outlet south

Figure 163: Photo 193 Upstream

Figure 164: Photo 194 Downstream

Figure 165: Photo 196 Upstream

Figure 166: Photo 197 Downstream

Figure 167: Photo 198 Upstream.

Figure 168: Photo 199 Downstream

Figure 169: Photo 200 Upstream.

Figure 170: Photo 202 Upstream

Figure 171: Photo 203 Downstream

Figure 172: Photo 204 Upstream

Figure 173: Photo trash a-d Map figure Trash Removal Area 4

Figure 174: Photo trash a-d Map figure 5 Trash Removal Area 4

Figure 175: Photo trash a-d Map figure 5 Trash Removal Area 4

Figure 176: Photo trash a-d Map figure 5 Trash Removal Area 4

Figure 177: Photo 20a Downstream Old cattle dam possible removal for restoration. Four channels converge into primary, GIS does not show connectivity

Figure 178: Photo 20b Facing east. Potential enhancement where drainage can be corrected and prevent drainage flow down the existing road and have water flow across

Figure 179: Photo 20c Potential enhancement to remove road (exclude access)

Figure 180: Photo 20c Potential enhancement to remove road (exclude access)

Figure 181: Photo 22a Downstream

Figure 182: Photo 20b Facing east. Potential enhancement where drainage can be corrected and prevent drainage flow down the existing road and have water flow across

Figure 183: Photo 20c Potential enhancement to remove road (exclude access)

Figure 184: Photo 158 Downstream. Potential head cut tire washout. Restoration?

Figure 185: Photo 80 Silver creek channel to verify tamarisk infestation

Figure 186: Photo 81 Panoche creek downstream of road crossing looking downstream

Figure 187: Photo 66 Enhancement trash removal (tank in channel)

Figure 188: Photo 179 Downstream

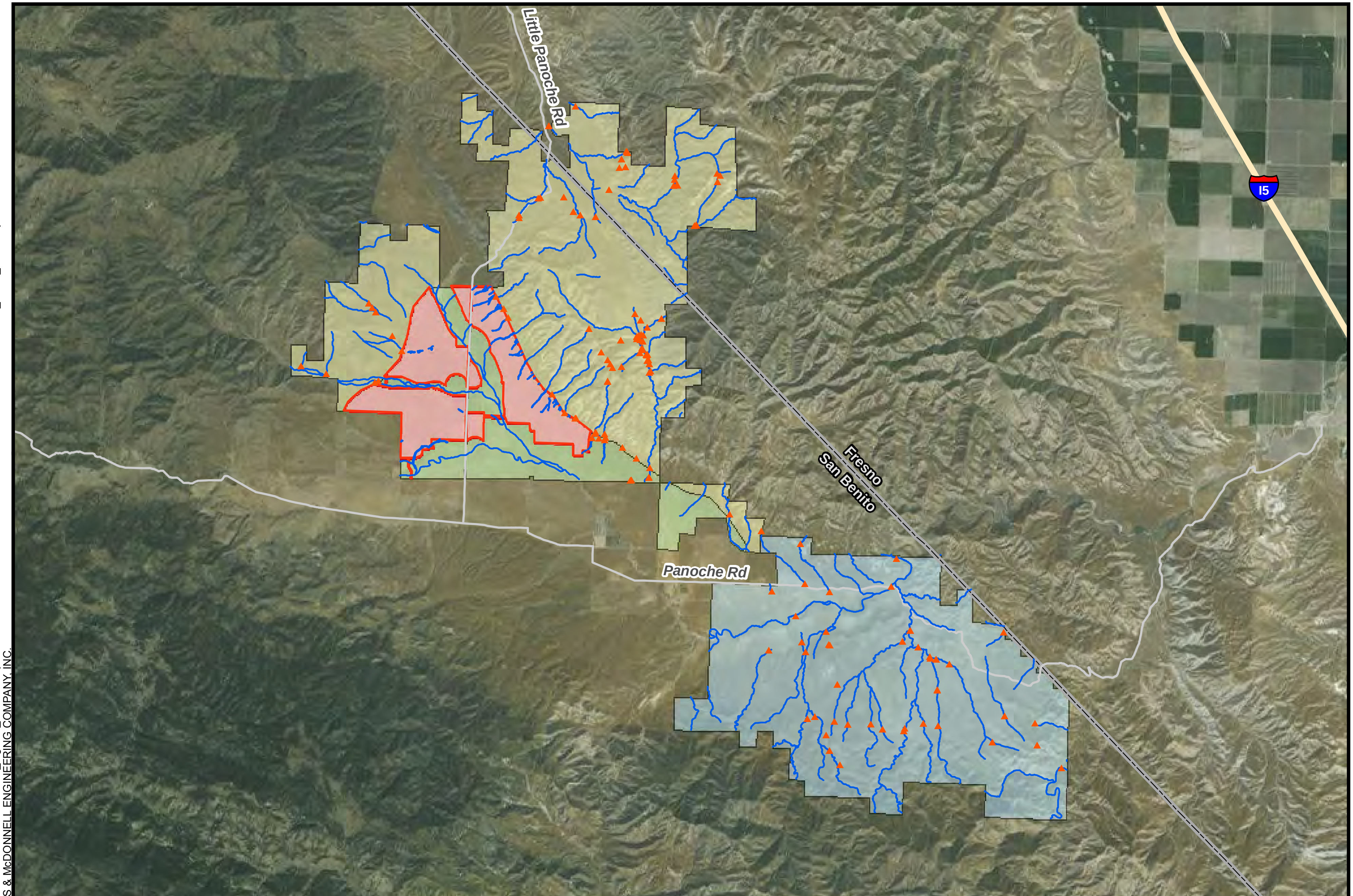
Figure 189: Photo 46 Downstream

Figure 190: Photo 186 Old trash washed down

Figure 191: Photo 118 Man-made channel to divert flow with trash looking downstream

Figure 192: Photo 119 Man-made channel with trash looking up stream

Figure 193: Photo 201 Downstream



LEGEND

- Photo Location
- Drainage
- Streets
- County Boundary
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch

0 1 2 4 Miles

N

Source: ESRI and Burns & McDonnell Engineering.

PHOTO LOCATIONS AND DRAINAGE OVERVIEW

Path: G:\ESP\PanocheValleySolar\80258\Records\GIS_Figures_Photos\Maps and Data 2015-01-28 submission\MXD\Photo Location Overview 8.5x11_Letter_Landscape.mxd

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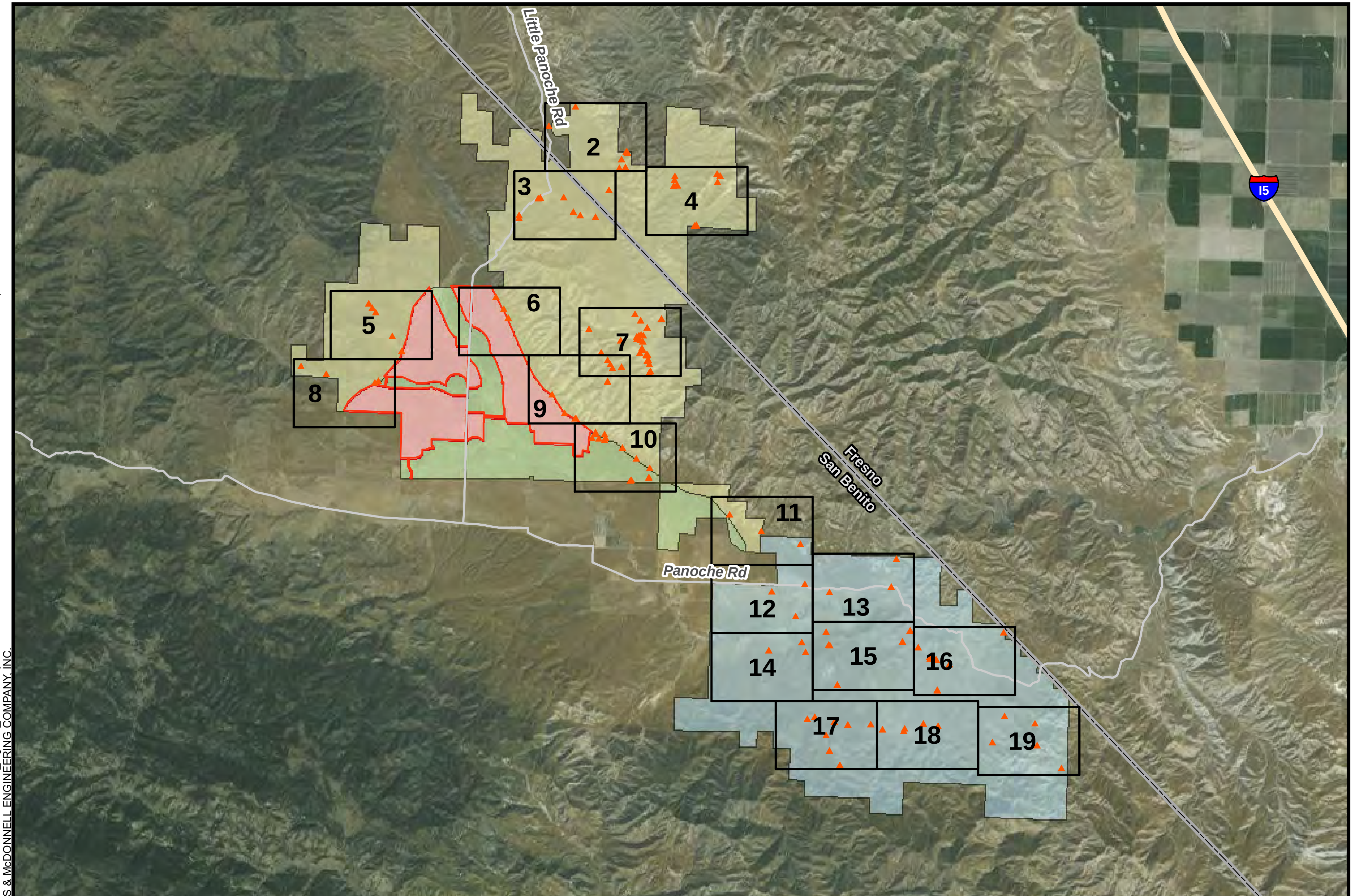

LEGEND

- Photo Location
- Streets
- County Boundary
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch

0 1 2 4 Miles

N

BURNS McDONNELL

Source: ESRI and Burns & McDonnell Engineering.

PHOTO LOCATIONS INDEX MAP

Page 1 of 19

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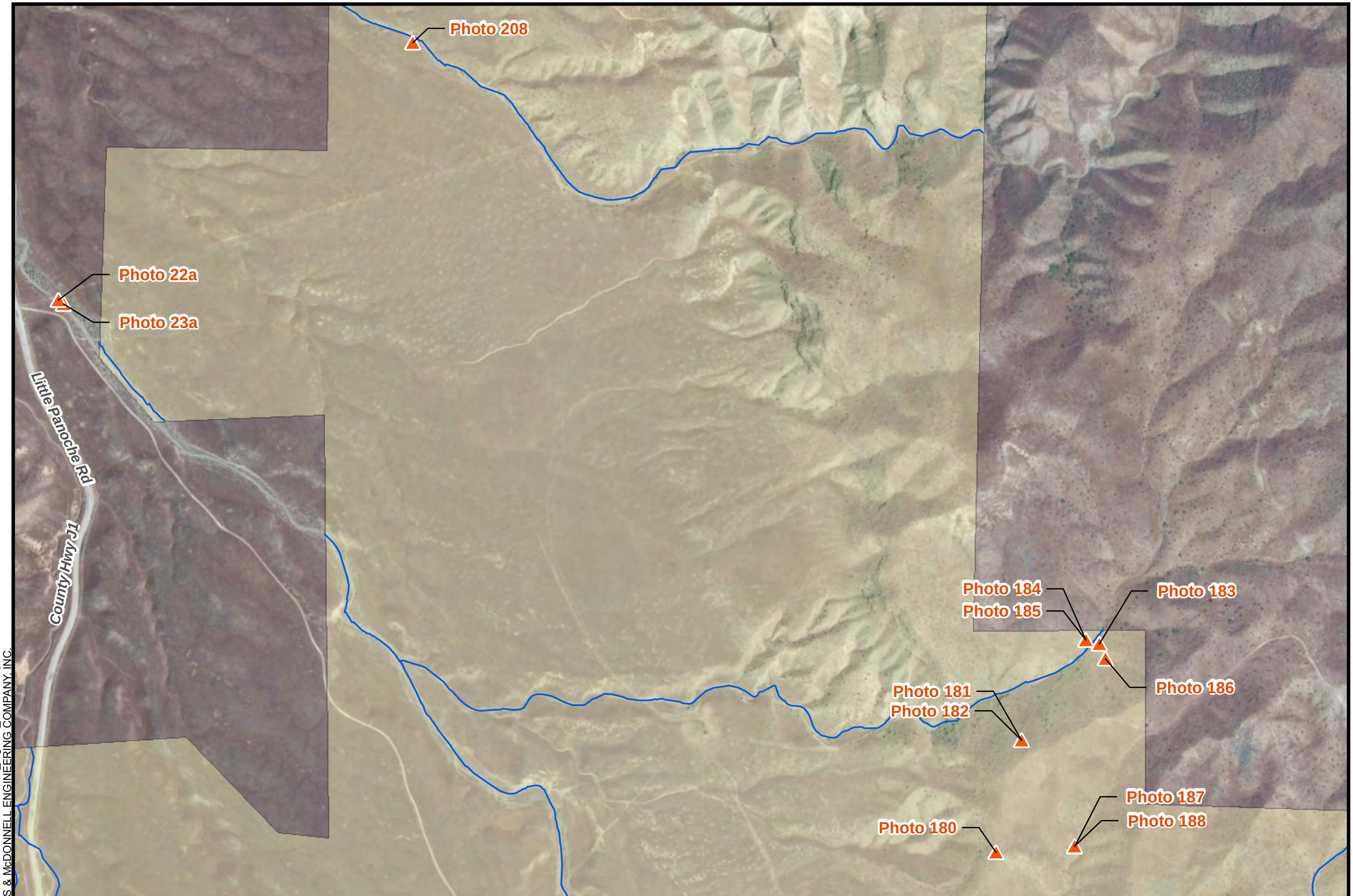
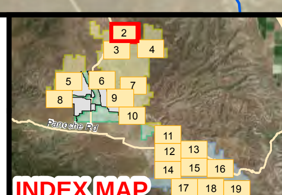


LEGEND

- Photo Location
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch



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Feet
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Source: ESRI and Burns & McDonnell Engineering.

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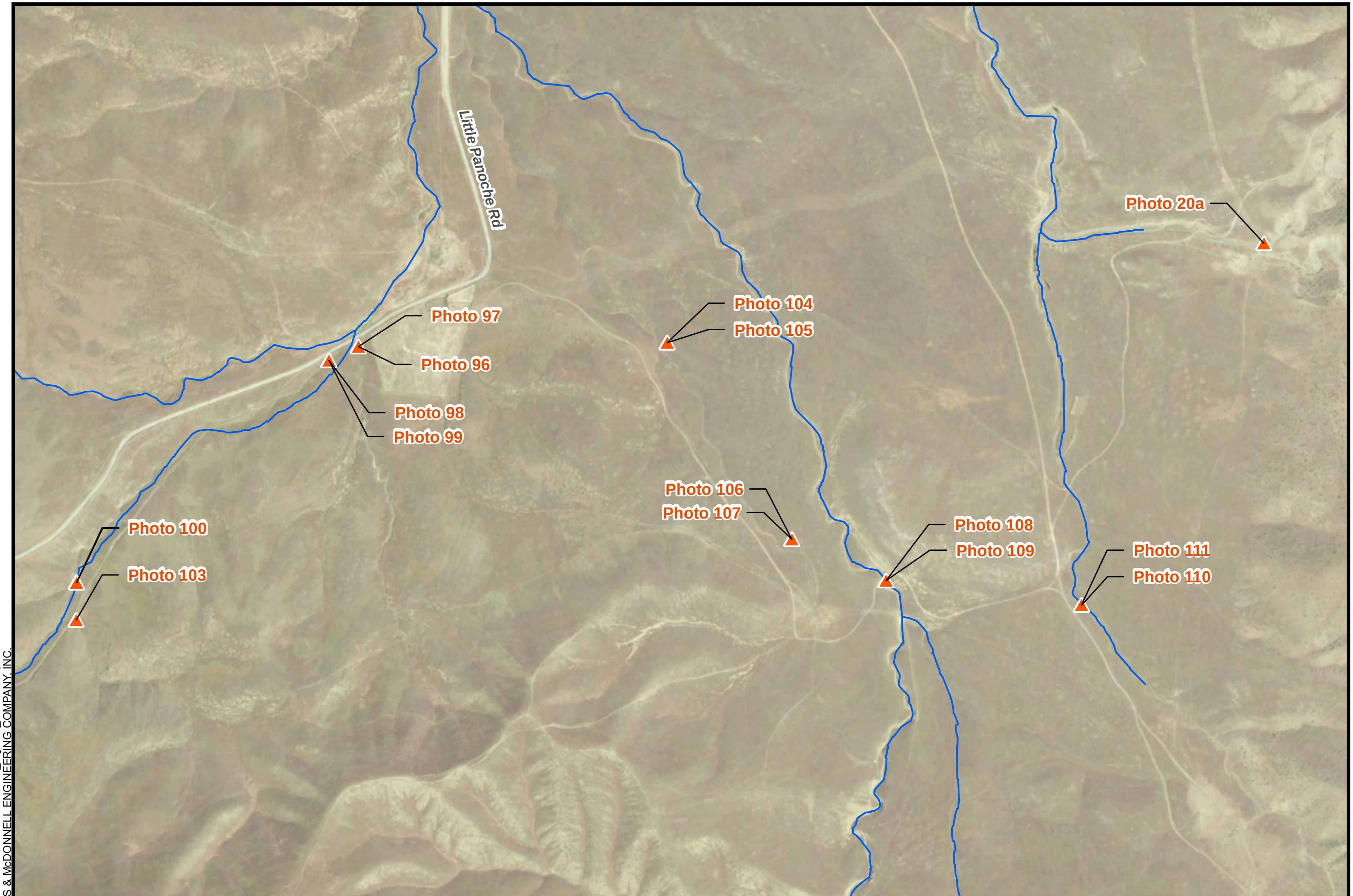
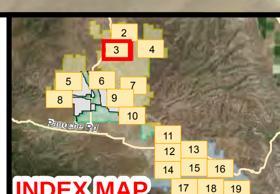


LEGEND

- ▲ Photo Location
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch



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Source: ESRI and Burns & McDonnell Engineering.

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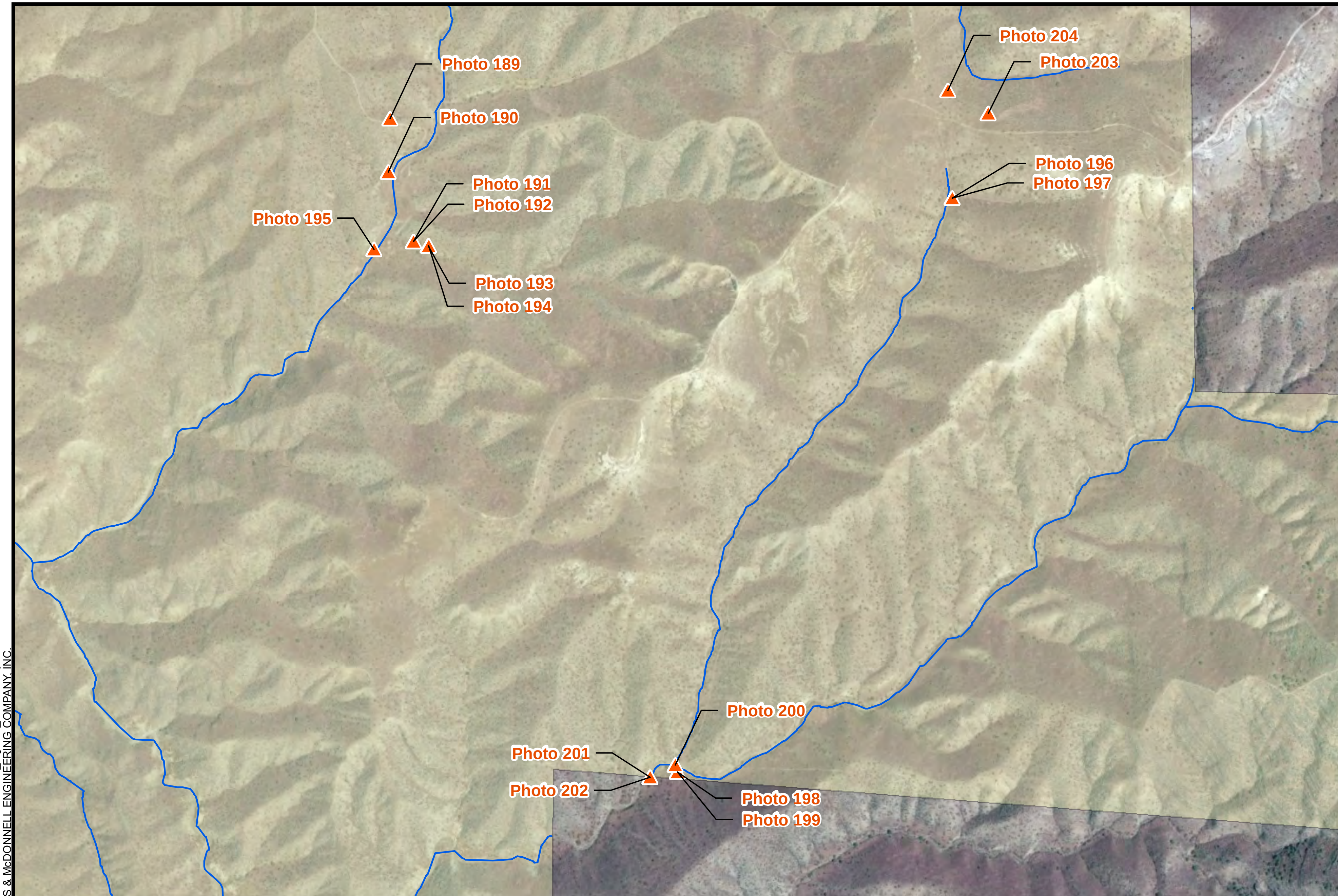

LEGEND

- Photo Location
- Project Area
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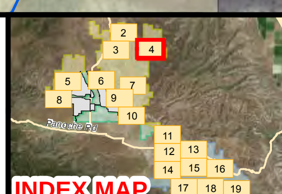
- Valley Floor
- Valadeao Ranch



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Source: ESRI and Burns & McDonnell Engineering.

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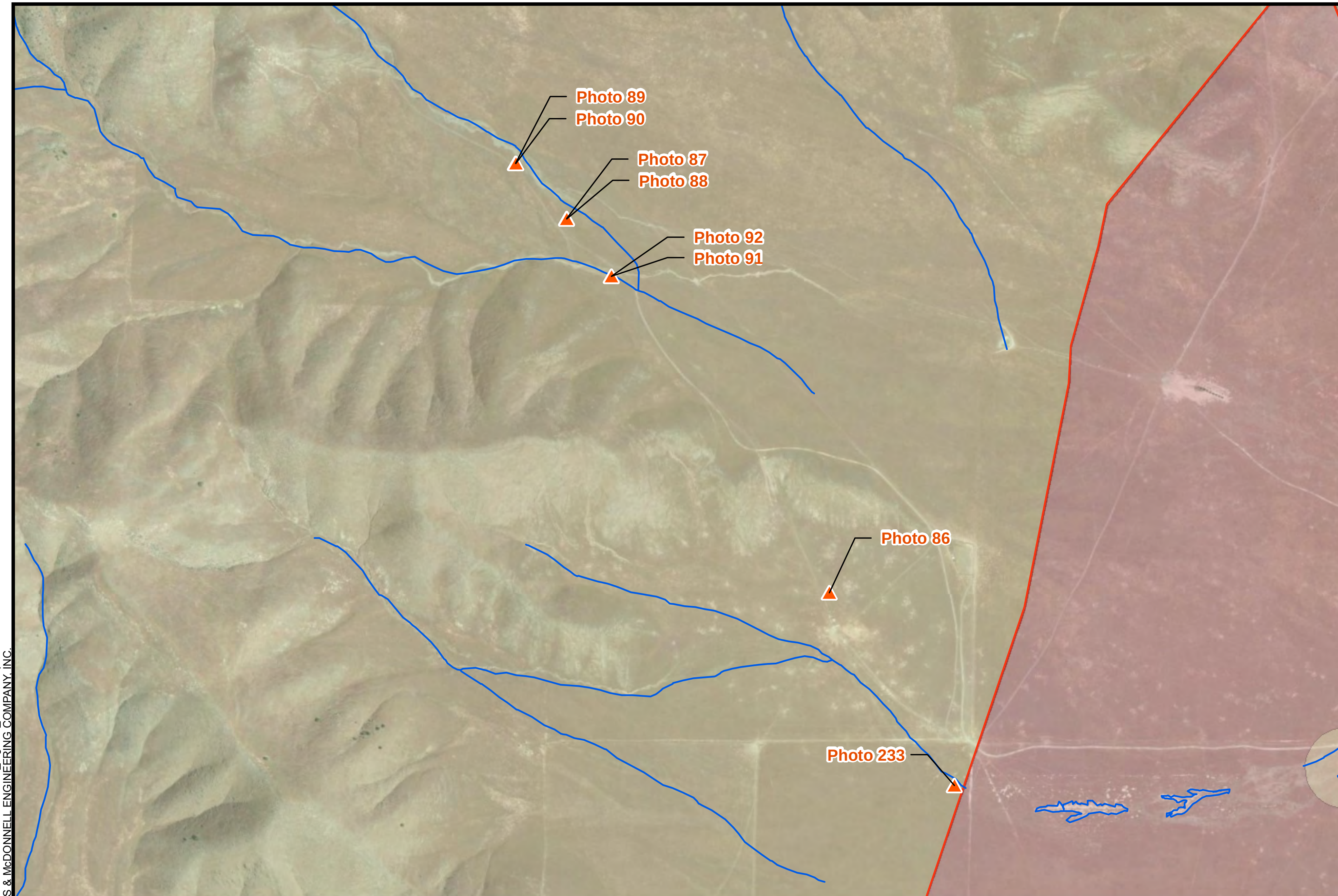

LEGEND

- Photo Location
- Project Area
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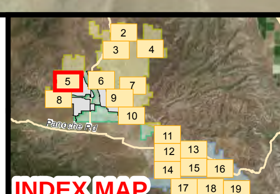
- Valadeao Ranch



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Source: ESRI and Burns & McDonnell Engineering.

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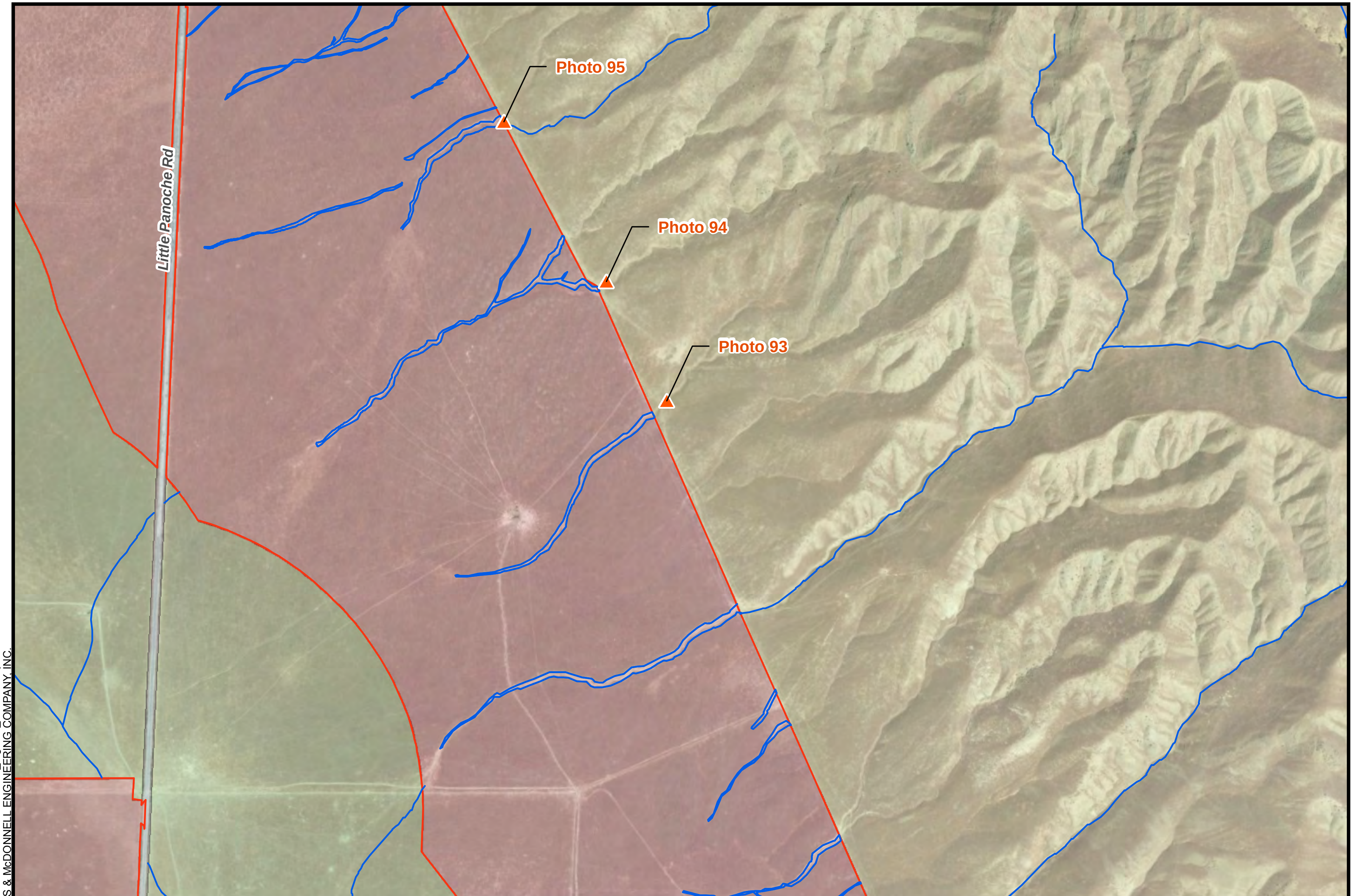
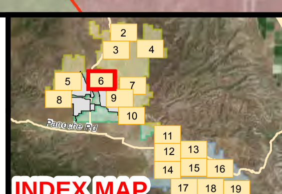


LEGEND

- ▲ Photo Location
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch



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Source: ESRI and Burns & McDonnell Engineering.

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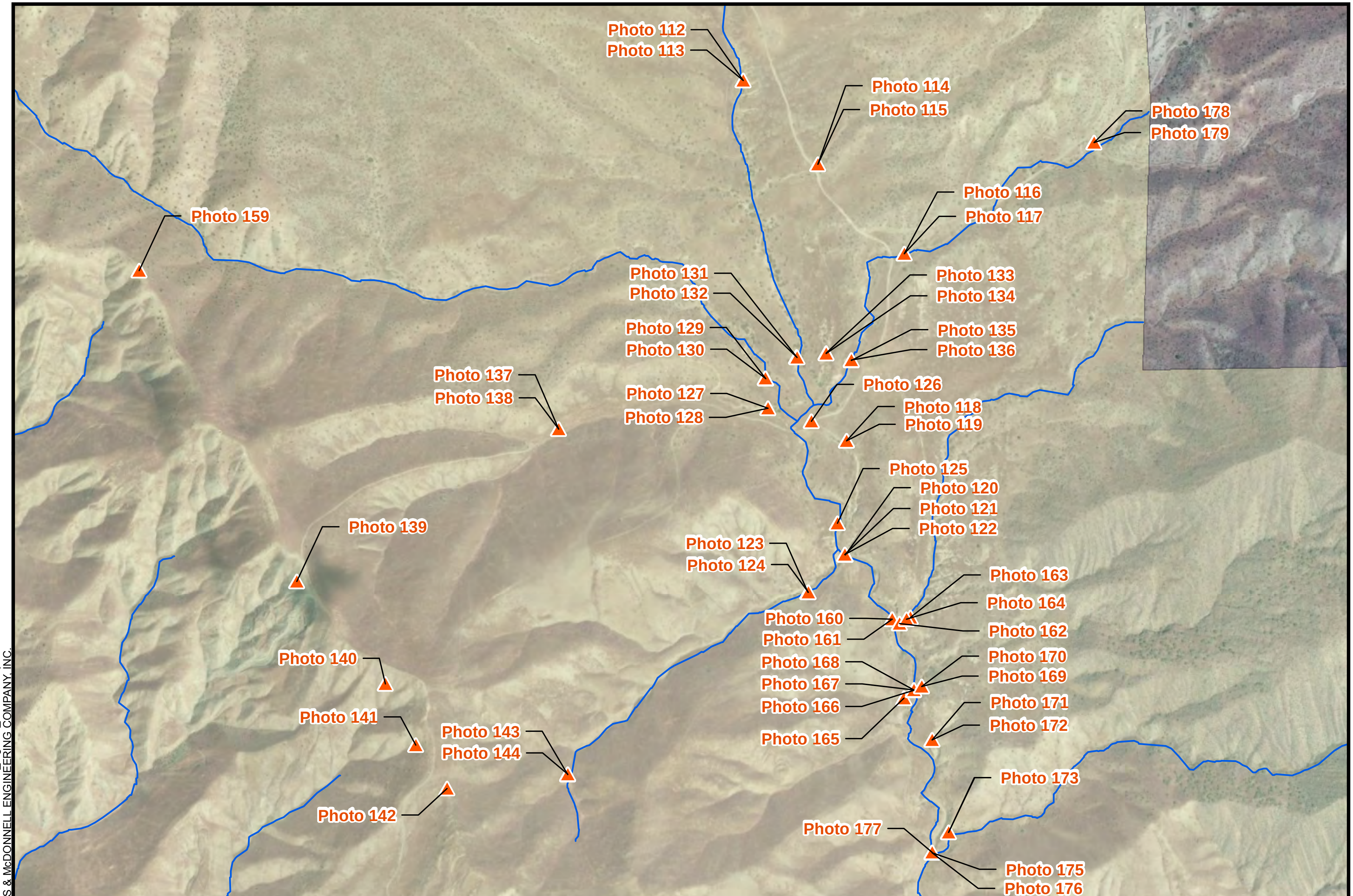

LEGEND

- Photo Location
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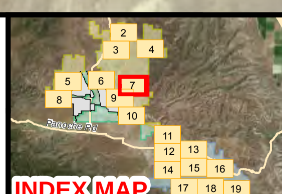
- Valadeao Ranch



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Source: ESRI and Burns & McDonnell Engineering.

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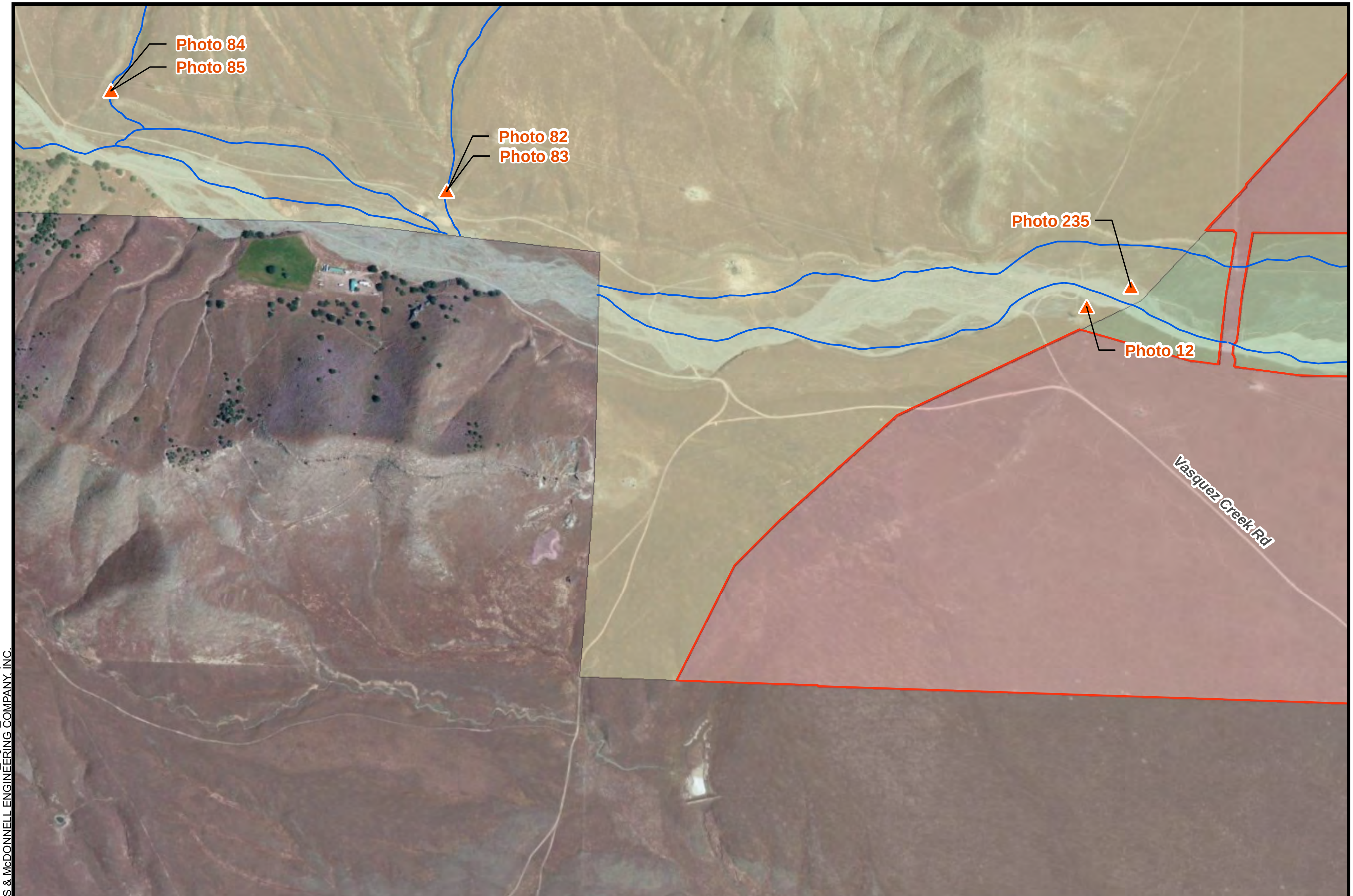
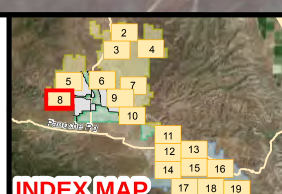


LEGEND

- ▲ Photo Location
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch



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Source: ESRI and Burns & McDonnell Engineering.

BURNS MCDONNELL

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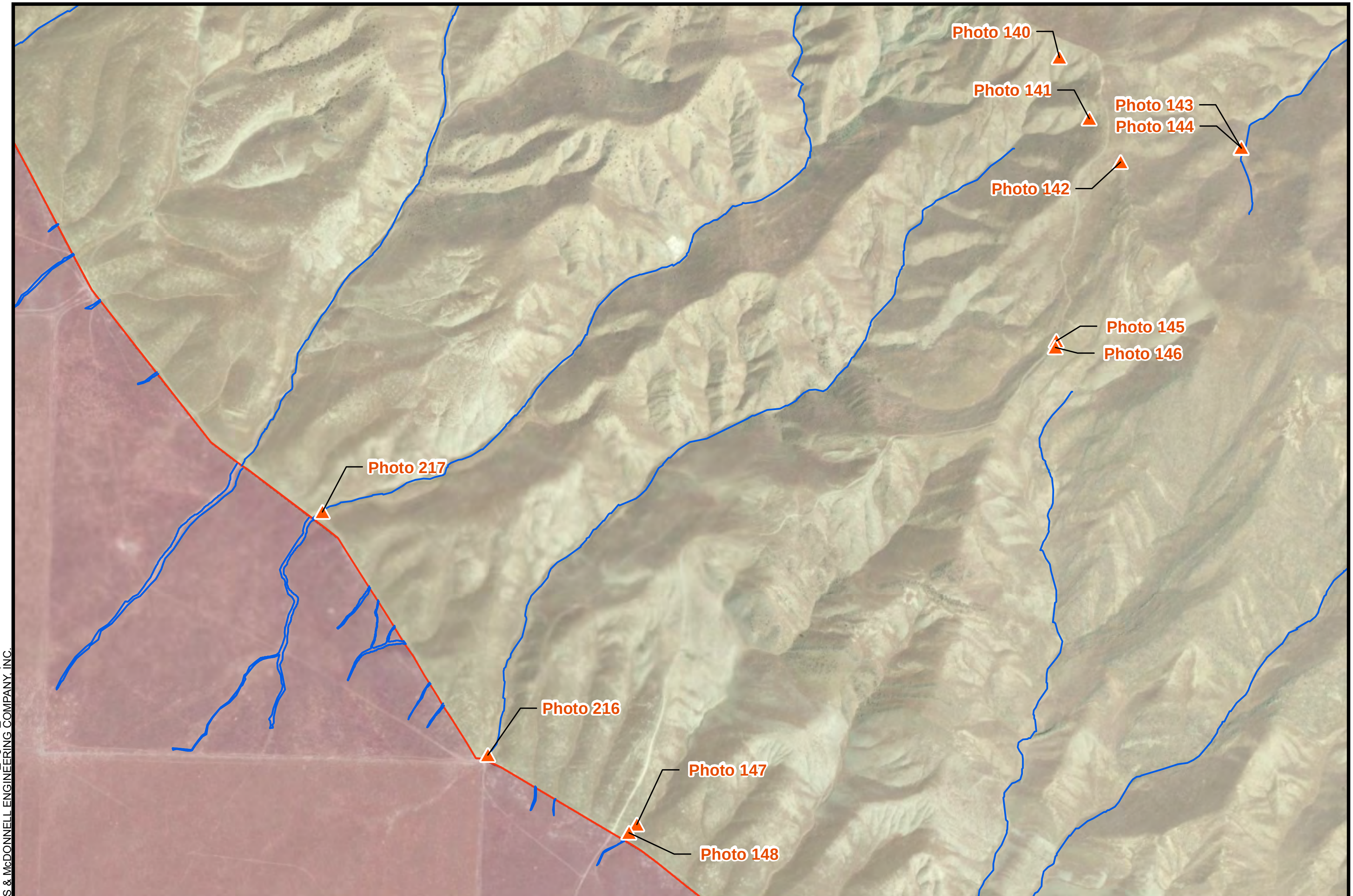

LEGEND

- Photo Location
- Project Area
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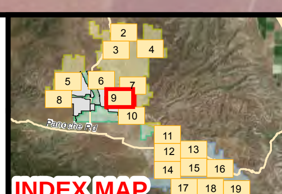

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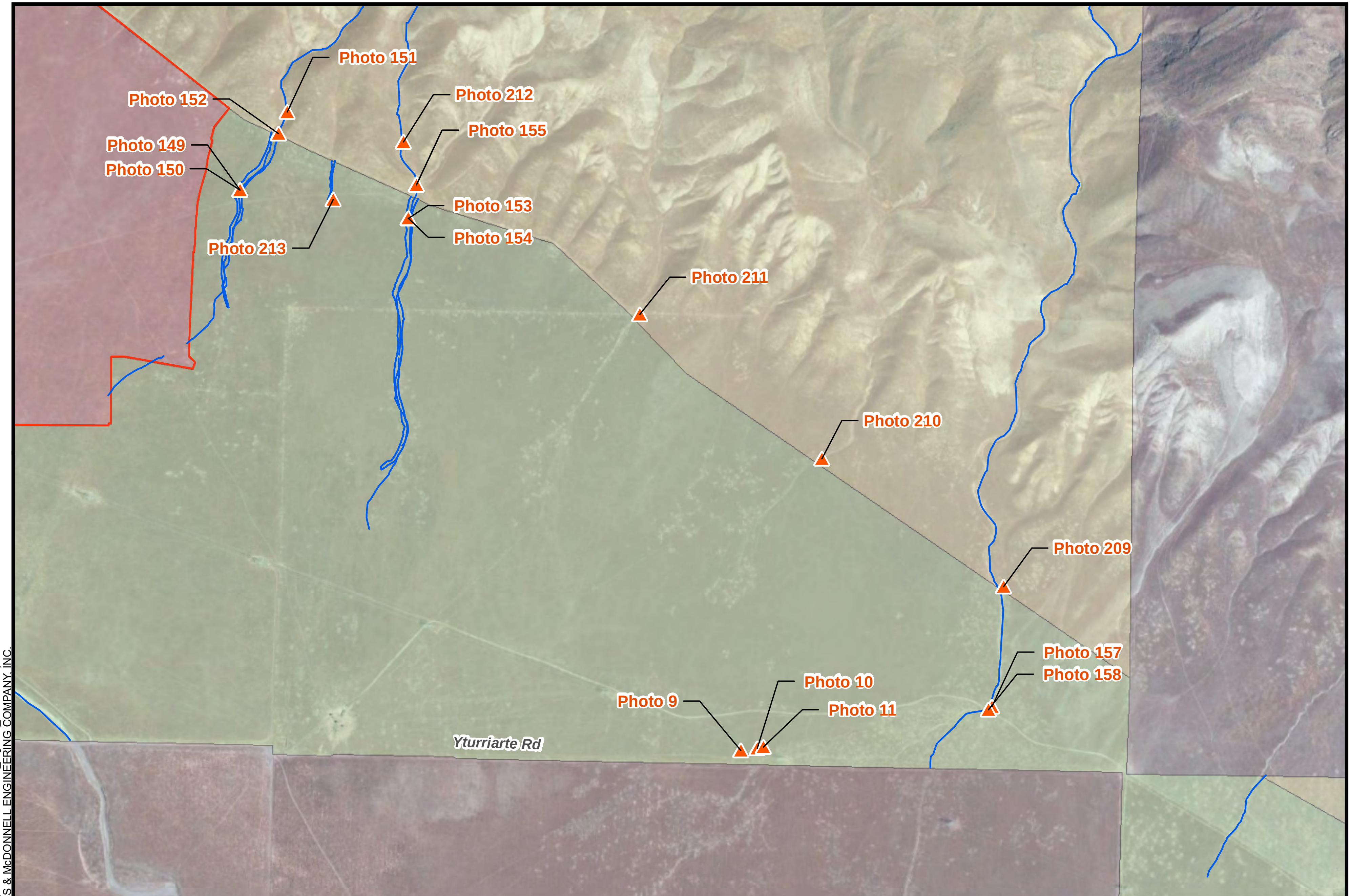

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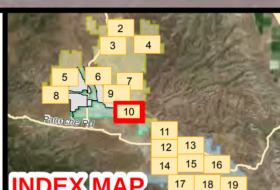
- Valley Floor
- Valadeao Ranch



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Source: ESRI and Burns & McDonnell Engineering.

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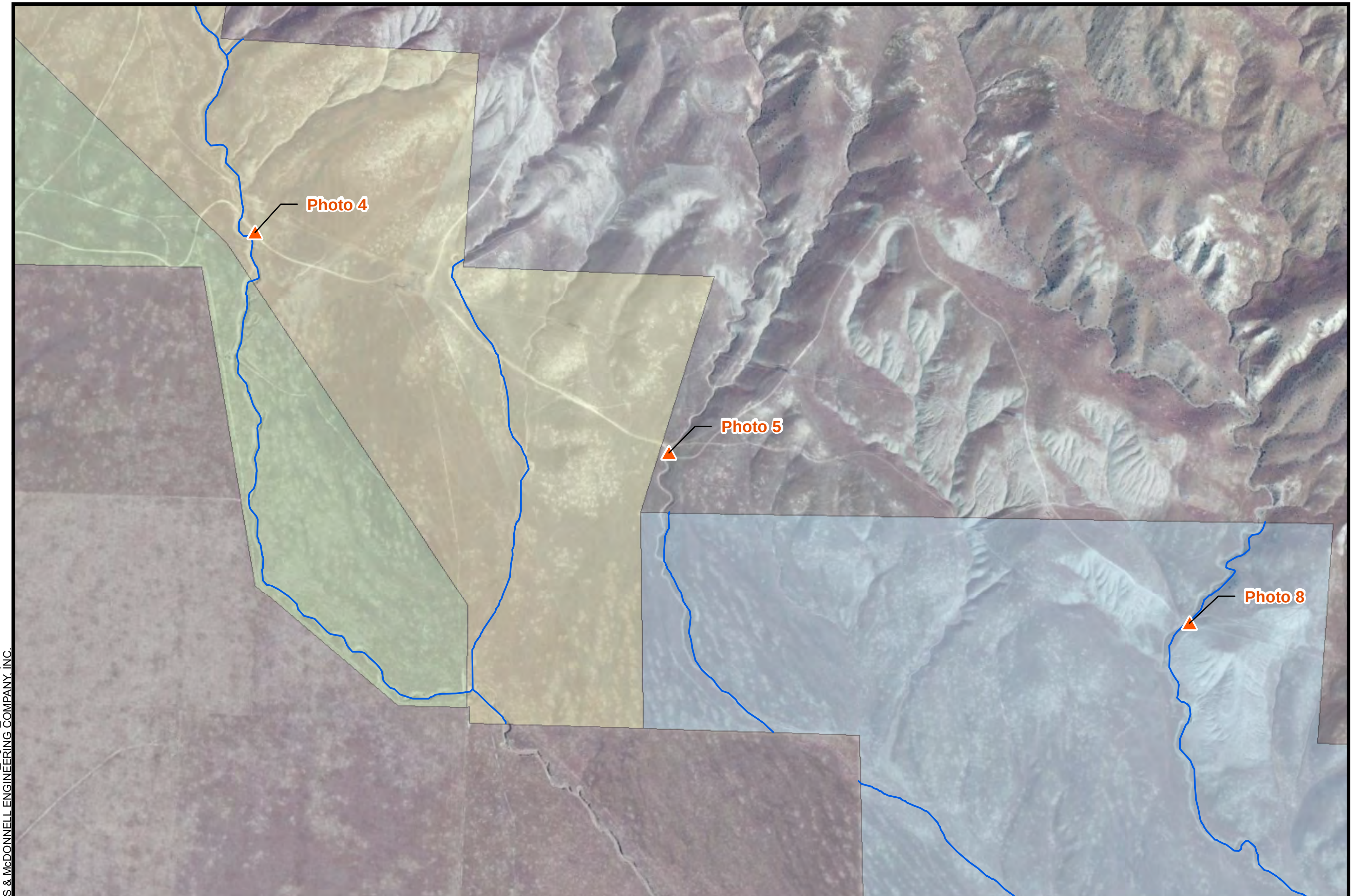

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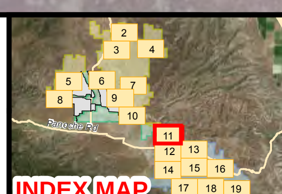
- Project Area
- Silver Creek Ranch
- Valley Floor
- Valadeao Ranch



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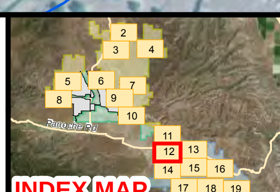

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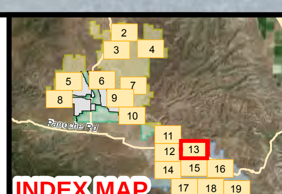

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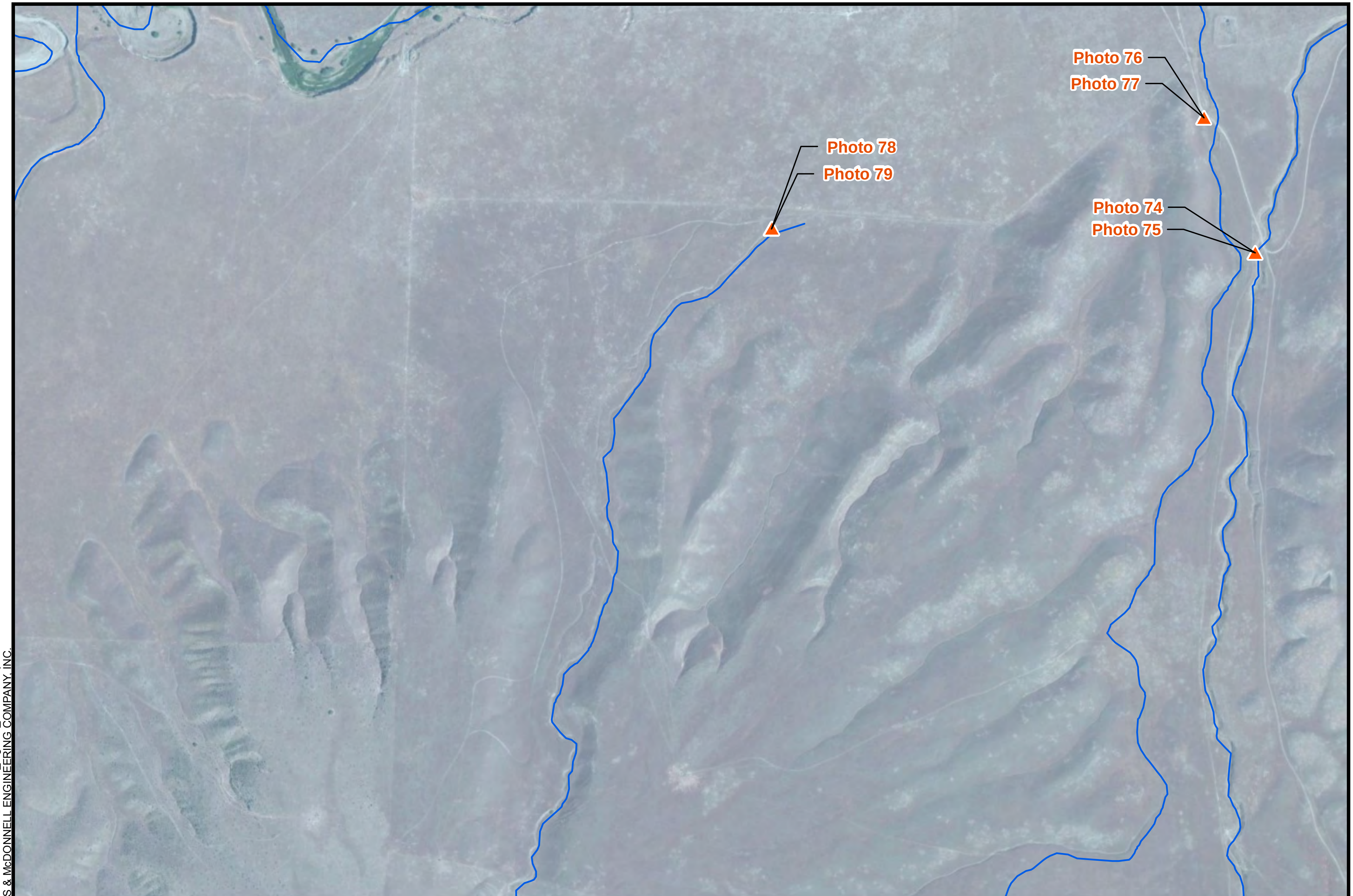

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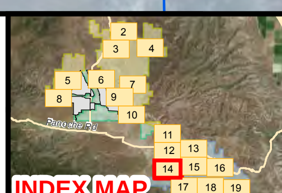

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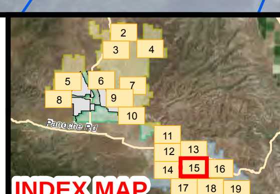

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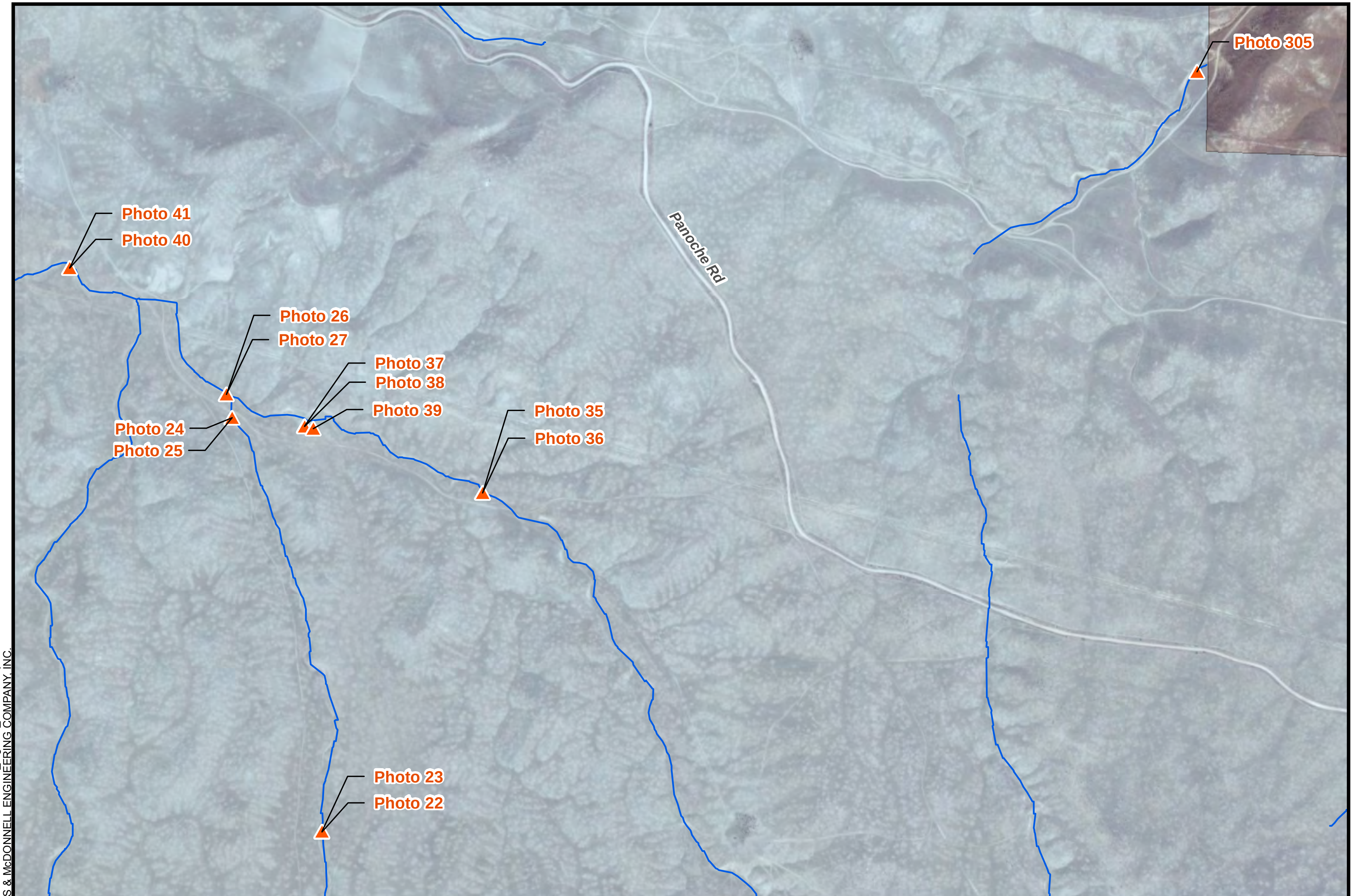

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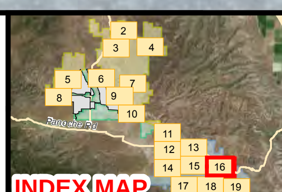

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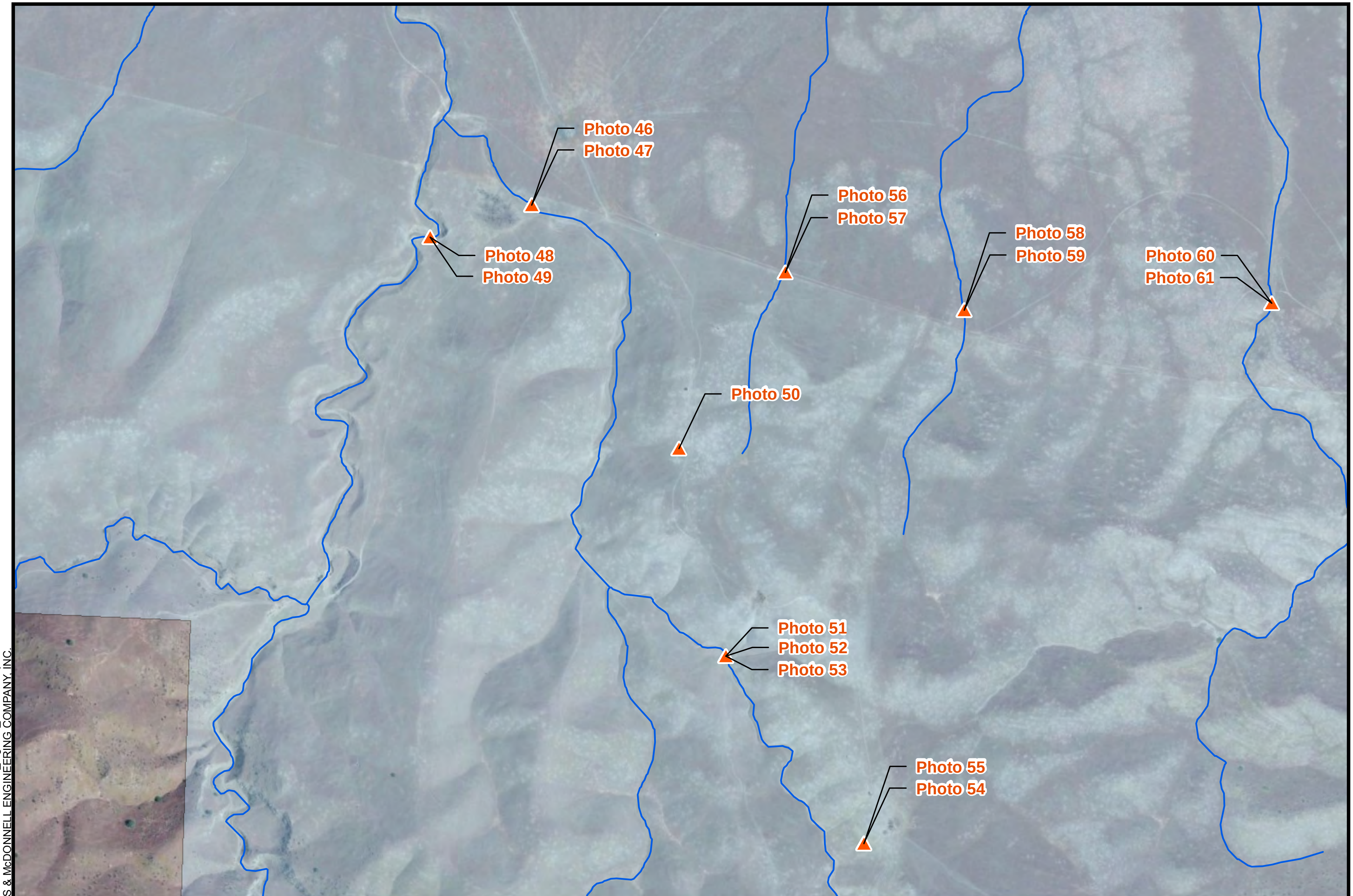

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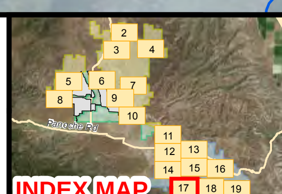
Valadeao Ranch



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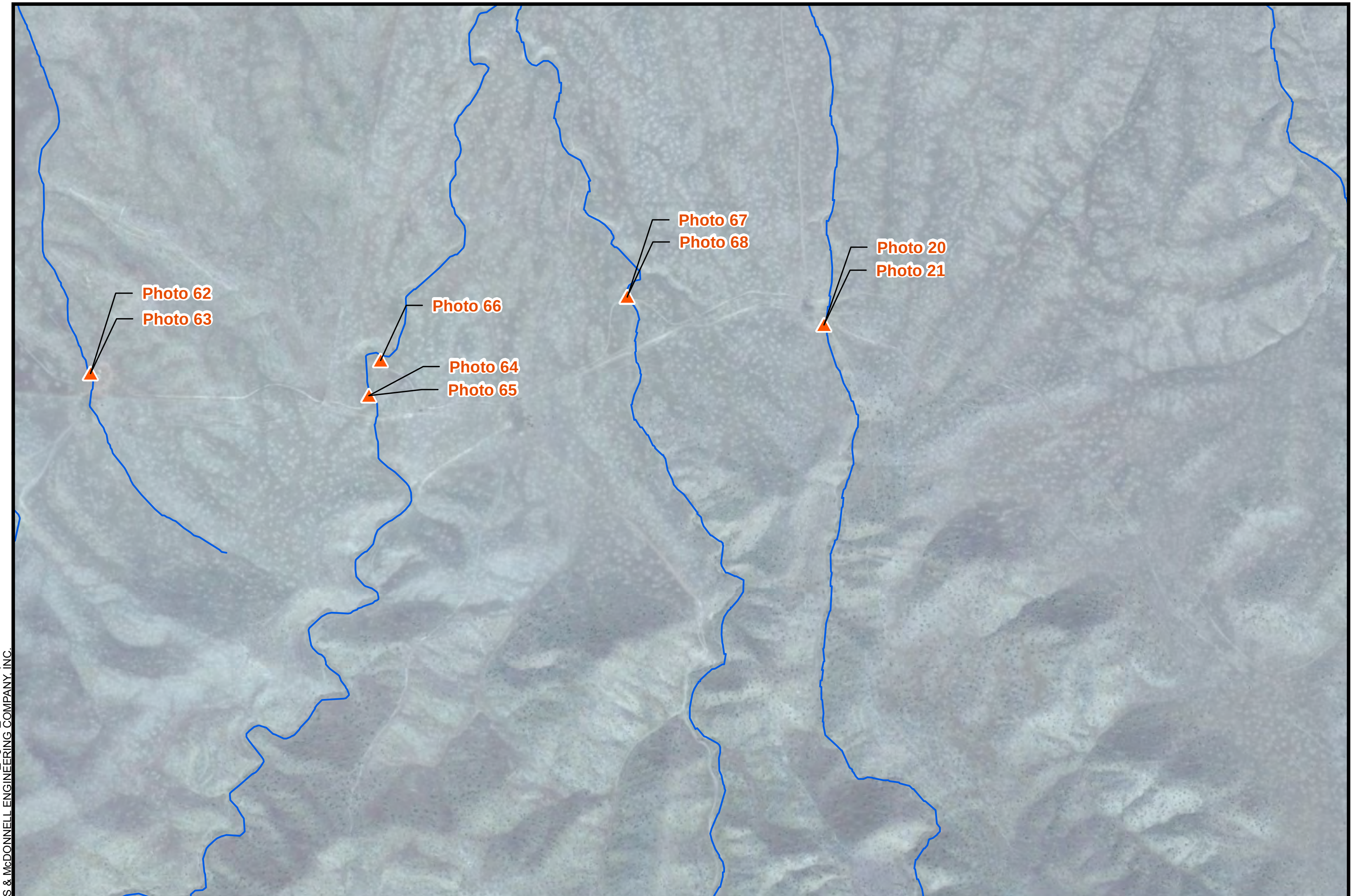

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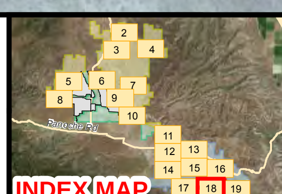

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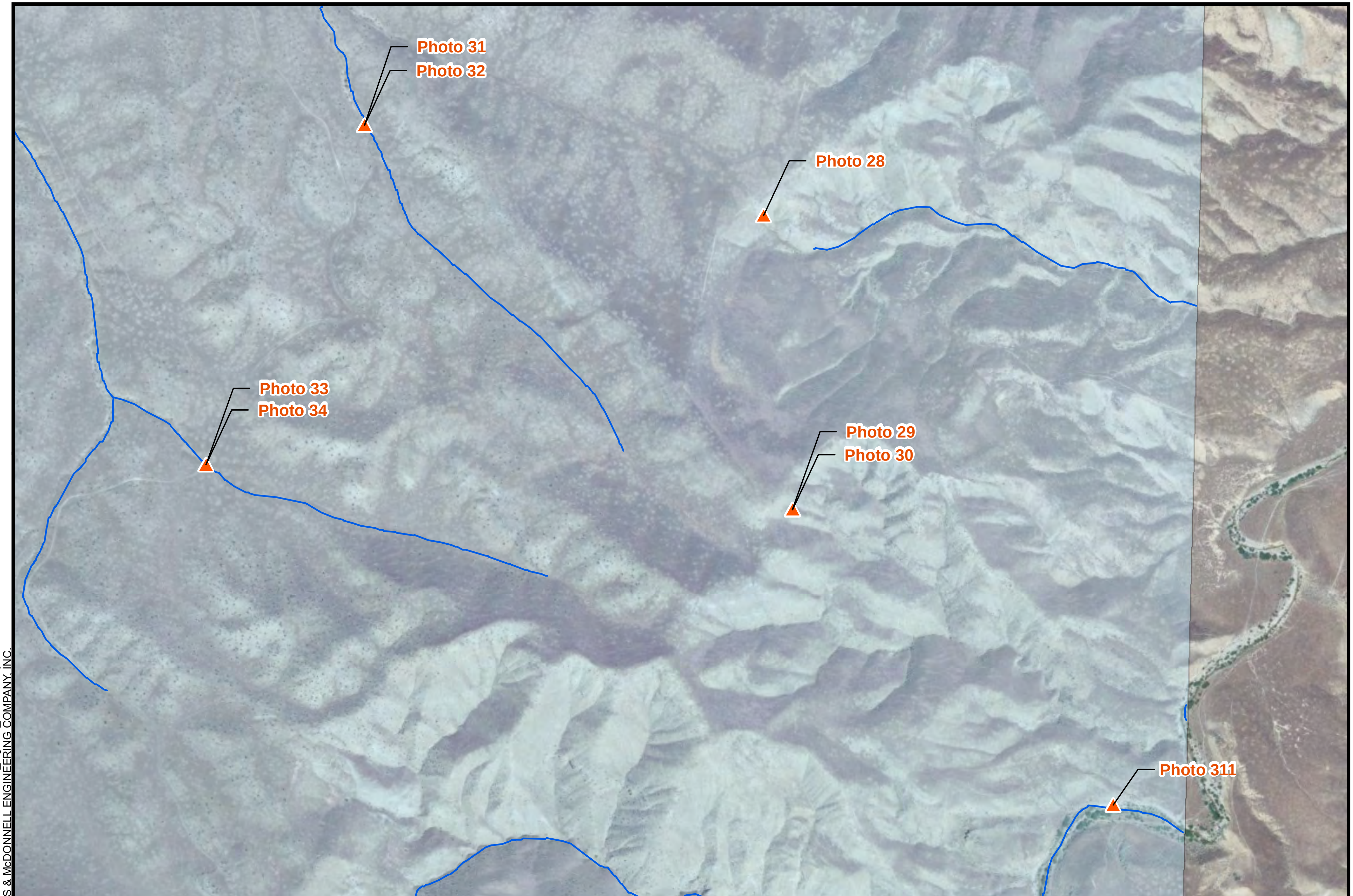

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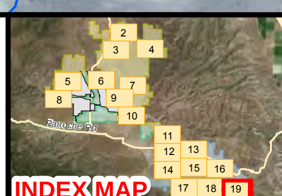

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Appendix C
USACE Performance Standards for Compensatory Mitigation Requirements Worksheet

Attachment 12505.2 Worksheet for SPD Uniform Performance Standards for Compensatory Mitigation Requirements

1	Date: 8/4/2015 DA no.: Project manager:	Mitigation site name: Debris Removal Cowardin/HGM type: riverine/riverine Habitat type: unvegetated streambed *Site coordinates:* 1a and 1b: 36°38'54.98"North and 120°49'43.47"West 2: 36°33'50.93"North and 120°45'10.83"West 3: 36°39'12.66"North and 120°49'24.39"West 4: 36°35'7.57"North and 120°47'12.04"West 5: 36°40'55.64"North and 120°51'23.55"West 6a: 36°36'30.11" North and 120°48'12.97" West 6b: 36°36'31.09" North and 120°48'11.94" West 7: 36°36'51.76"North and 120°48'18.91"West	Reference site name: immediately upstream and downstream of debris removal locations
2	Mitigation objective(s) to improve: [X] habitat conservation/biodiversity; [ ] water storage/flow attenuation; [ ] water quality; [ ] target population of special status biota; [ ] specific aquatic resource function(s); [ ] other:		
3	Mitigation type (select one): [ ] re-establishment; [ ] establishment; [X] rehabilitation; [ ] enhancement		
	If enhancement, indicate function(s) to be increased: function 1: function 2 (if applicable): function 3 (if applicable):		
4	Primary type(s) of site treatment: [ ] introduction of plant materials; [ ] invasive species control; [ ] hydrological manipulation; [X] topographic/substrate manipulation		
5	Aquatic resource type (select one): [X] riverine; [ ] depressional wetland; [ ] tidal wetland; [ ] slope wetland; [ ] other:		
6	Performance standard categories (select all that apply): [X] physical; [ ] hydrologic; [ ] fauna; [ ] flora; [ ] water quality (ecological)		
7	Using selections from 2-6 above, insert applicable performance standards and targets from .12505.1-SPD Table of Uniform Performance Standards for Compensatory Mitigation Requirements into worksheet rows below. Add or remove rows for any category, as needed.		

Number/Categories: Performance Standards: Targets ("R" indicates reference):

		Year 1:	Year 2:	Year 3:	Year 4:	Year 5:
Physical-1	All debris has been removed from designated removal sites (unless specifically left in the channel to maintain stability upon approval of the USACE).	Debris Removed				
Physical-2	The acreage of the ephemeral drainages enhanced must equal 0.39 acres (17,173 ft^2)	--	--	--	--	--
Physical-3	The elevation of the streambed of the ephemeral drainages where the debris is removed must be lower than the upstream streambed and must be higher than the downstream streambed such that when water is flowing there is no obvious impediment to or obstruction					
Flora-1	By year 3, the enhanced ephemeral drainages will have an absolute cover of plant species equal to a minimum of 50% of the absolute cover of reference sites upstream and downstream of the enhanced area within the same ephemeral drainage, reference sites are available immediately downstream or upstream that have the same characteristics as the debris removal site			50%		

Flora-2	By year 5, the enhanced ephemeral drainages will have an absolute cover of plant species equal to a minimum of 85% of reference sites upstream and downstream of the enhanced area within the same ephemeral drainage if reference sites are available immediately downstream that have the same characteristics as the debris removal site					85%
Flora-3	The number and relative cover of invasive plants, which are not considered common and abundant by the Project's Weed Control Plan plants, in the enhanced ephemeral drainage must be equal to or less than the number and relative cover of invasive plants in the reference sites of within the same ephemeral drainage upstream and downstream of the enhanced area.					
Flora-4	The number and relative cover of hydrophytic plants (i.e. FAC, FACW, OBL) in the enhancement areas must meet or exceed the number and relative cover in the reference sites in the upstream and downstream portion of the same drainage if reference sites are available immediately downstream or upstream that have the same characteristics as the debris removal site.					

Attachment 12505.2 Worksheet for SPD Uniform Performance Standards for Compensatory Mitigation Requirements

1	Date: August 4, 2015 DA no.: Project manager:	Mitigation site name: **Livestock Exclusionary Fencing** Cowardin/HGM type: Riverine Habitat type: Site coordinates: Approx. 36°35'18.89"N, 120°46'55.28"W	Reference site name: To be determined
2	Mitigation objective(s) to improve: [X] habitat conservation/biodiversity; [ ] water storage/flow attenuation; [ ] water quality; [ ] target population of special status biota; [ ] specific aquatic resource function(s); [ ] other:		
3	Mitigation type (select one): [X] re-establishment; [ ] establishment; [X] rehabilitation; [ ] enhancement		
	If enhancement, indicate function(s) to be increased: function 1: function 2 (if applicable): function 3 (if applicable):		
4	Primary type(s) of site treatment: [X] introduction of plant materials; [X] invasive species control; [ ] hydrological manipulation; [ ] topographic/substrate manipulation		
5	Aquatic resource type (select one): [X] riverine; [ ] depressional wetland; [ ] tidal wetland; [ ] slope wetland; [ ] other:		
6	Performance standard categories (select all that apply): [ ] physical; [ ] hydrologic; [ ] fauna; [X] flora; [ ] water quality (ecological)		
7	Using selections from 2-6 above, insert applicable performance standards and targets from .12505.1-SPD Table of Uniform Performance Standards for Compensatory Mitigation Requirements into worksheet rows below. Add or remove rows for any category, as needed.		

Number/Categories: Performance Standards: Targets ("R" indicates reference):

		Year 1:	Year 2:	Year 3:	Year 4:	Year 5:
Physical-1	Enhanced area must equal 11.16 acres					
Flora-1	Increase woody stem density or cover by at least 10 percent over baseline conditions. Woody stem species include Populus fremontii, Salix sp., Baccharis salicifolia, Atriplex lentiformis, and other shrubs and trees found in the Panoche Creek riparian area within Silver Creek Ranch.					
Flora -2	Manage non-native, invasive plant species designated in the Project's Weed Control Plan so they don't detrimentally impact the livestock exclusion area.					
Flora -3	Seeding will be accomplished at a point in the construction schedule that optimizes access to disturbed portions of the site for seed distribution and optimizes the use of natural rains to aid in germination and growth.					
Flore- 4	Woody cover has exceeded 10 percent by the end of the five to 10 year time period.					

Attachment 12505.2 Worksheet for SPD Uniform Performance Standards for Compensatory Mitigation Requirements

1	Date: August 4, 2015 DA no.: Project manager:	Mitigation site name: **CTS Ponds 1, 2, & 3** Cowardin/HGM type: Habitat type: Site coordinates (California State Plane IV): 1: Easting 6003919 ft., Northing 2126765.8 ft. 2: Easting 6005146.8 ft., Northing 2124084.6 ft. 3: Easting 6005744.76 ft., Northing 2125206.75 ft.	Reference site name: Known CTS Breeding Pond 12 Site coordinates (California State Plane IV): Easting 6006089.05 ft., Northing 2126090.60 ft.
2	Mitigation objective(s) to improve: [X] habitat conservation/biodiversity; [ ] water storage/flow attenuation; [ ] water quality; [X] target population of special status biota; [ ] specific aquatic resource function(s); [ ] other:		
3	Mitigation type (select one): [ ] re-establishment; [X] establishment; [ ] rehabilitation; [ ] enhancement		
	If enhancement, indicate function(s) to be increased: function 1: function 2 (if applicable): function 3 (if applicable):		
4	Primary type(s) of site treatment: [ ] introduction of plant materials; [ ] invasive species control; [ ] hydrological manipulation; [X] topographic/substrate manipulation		
5	Aquatic resource type (select one): [ ] riverine; [X] depressional wetland; [ ] tidal wetland; [ ] slope wetland; [ ] other:		
6	Performance standard categories (select all that apply): [ ] physical; [X] hydrologic; [X] fauna; [X] flora; [ ] water quality (ecological)		
7	Using selections from 2-6 above, insert applicable performance standards and targets from .12505.1-SPD Table of Uniform Performance Standards for Compensatory Mitigation Requirements into worksheet rows below. Add or remove rows for any category, as needed.		

Number/Categories: Performance Standards: Targets ("R" indicates reference):

Physical-1		Year 1:	Year 3:	Year 5:	Year 7:	Year 10:
Hydrologic/Fauna -1	Pools will capture sufficient surface water runoff to fill to approximately 3 feet during the wet season and will have continuous inundation for sufficient time for CTS larval development and metamorphosis (at least 10 weeks).					
Hydrologic/Fauna -2	Seasonal dry-down no later than June to preclude bullfrogs from colonizing the pools and to successfully recruit metamorphs.					
Hydrologic -3	Under average rainfall conditions the pools will be inundated a minimum of 3 out of every 10 years.					

Hydrologic-4	The constructed CTS breeding ponds shall meet the requirements of a wetland or other water as identified by the USACE in the 1987 Wetland Delineation Manual, Regional Supplement. A delineation of waters of the U.S. shall be completed by a qualified biologist and submitted to the USACE in years 5 and 10 of the monitoring period. The acreage of wetlands or other waters shall equal 0.5 acre, as required in the mitigation plan.					
Fauna-1	Successful recruitment of CTS larvae and/or metamorphs would overrule any and all hydrological criteria as a performance standard.					
Flora-1	Vegetation composition and % cover will be consistent with the vegetation in the reference site Breeding Pond 12					
Flora-2	By year 3, the constructed ponds will have an absolute cover of plant species equal to a minimum of 50% of the absolute cover of the reference pond;		50%			
Flora-3	By year 7, the ponds will have an absolute cover of plant species equal to a minimum of 75% of the absolute cover of the reference pond;				75%	
Flora-4	By year 10, the ponds will have an absolute cover of plant species equal to a minimum of 95% of the absolute cover of the reference pond.					95%
Flora-5	The number and relative cover of invasive plants, which are not considered common and abundant by the Project's Weed Control Plan, in the mitigation ponds must be equal to or be less than the number and relative cover of invasive plants in the reference pond.					
Flora-6	The total number and relative cover of hydrophytic plants (i.e. FAC, FACW, OBL) in the constructed CTS breeding ponds must meet or exceed the number and relative cover in the reference pond.					

Appendix D
PAR

Center for Natural Lands Management
A non-profit organization for the protection and management of natural resources

27258 Via Industria, Suite B
Temecula, CA 92590-3751
Phone: 760.731.7790
Fax: 760.731.7791
www.cnlm.org

August 7, 2015

Mr. Eric Cherniss
Panoche Valley Solar, LLC
825 Oak Grove Ave., Suite B
Menlo Park, CA 94025

SUBJECT: Revised Property Analysis Record for Perpetual Stewardship and Conservation Easement Responsibilities on the ~ 24,000-acre Panoche Valley Preserve, San Benito and Fresno Counties, California (MB077)

Dear Mr. Cherniss:

The Center for Natural Lands Management (CNLM) provided a Property Analysis Record (PAR) for the Panoche Valley Preserve (Preserve or PVP) on May 22, 2015. Since then, after discussions with Panoche Valley Solar, LLC (PVS), CNLM has removed the initial and capital costs associated with boundary fencing because PVS has agreed to cover these costs independently. This revised PAR also includes an estimate of costs for two additional items that were in the habitat management plan but were inadvertently left out of the original PAR (feral pig trapping costs and electric fence for shrub restoration areas). We have also assumed that one conservation easement, rather than three, would be granted, and have adjusted relevant expenses accordingly. Thus, the attached revised PAR (dated 8/7/2015) provides a more current and complete estimate of funds needed for holding a Conservation Easement (CE) and providing perpetual stewardship on the Panoche Valley Preserve (Preserve or PVP). The Preserve is composed of three adjacent areas known as the Valadeao Ranch Conservation Lands, Valley Floor Conservation Lands, and Silver Creek Ranch Conservation Lands. The Preserve has extensive conservation values including the habitat it provides for San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia sila*), giant kangaroo rat (*Dipodomys ingens*), California tiger salamander (*Ambystoma californiense*), California condor *Gymnogyps californianus*), and other listed and native wildlife.

This revised cost estimate was determined by completing a Property Analysis Record (PAR) using CNLM's software, PAR3©. The PAR details costs associated with CNLM's anticipated responsibilities towards the Preserve. These costs are described in this PAR letter and detailed in the attached PAR analysis. Mr. Greg Warrick, CNLM Preserve Manager, and Ms. Cathy Little, CNLM Regional Preserve Manager, visited the Preserve on December 22, 2014 to assess site conditions and develop a framework for perpetual stewardship and conservation easement monitoring. Mr. Warrick and

Dr. Deborah Rogers, CNLM Director of Conservation Science and Stewardship, visited the Preserve on April 24, 2015 and met with one of the ranching operators, Mr. John Eade, to further investigate Preserve conditions. Assumptions of this analysis are that CNLM would provide perpetual stewardship and hold conservation easements, thus providing easement monitoring, enforcement, and defense.

This letter: (A) identifies the documents used in performing the PAR; (B) describes the Preserve in general narrative terms; (C) defines the conditions under which the PAR was prepared; (D) describes the stewardship and conservation easement activities (organized by PAR category); and (E) summarizes the cost estimates for these activities.

A. Documents Inventory

The following documents were reviewed in the preparation of the PAR:

- Final Environmental Impact Report, Panoche Valley Solar Farm Project. Aspen Environmental Group. (September 2010)
- Biological Assessment for the Panoche Valley Solar Facility. (April 2014)
- Draft Habitat Management Plan, Panoche Valley Solar Project Conservation Lands, San Benito and Fresno Counties, California. McCormick Biological, Inc. and Center for Natural Lands Management. (June 15, 2015)
- Draft Conservation Management Plan. (April 2014, revised internal draft January 2015)
- Incidental Take Permit Application. (April 2014)
- Blunt-nosed leopard lizard abbreviated survey results. (August 2014)
- Wetlands Mitigation and Monitoring Plan for Impacts to Water and Habitats, Panoche Valley Solar Facility Project, San Benito County, California. Energy Renewal Partners LLC. (May 15, 2015)
- Lake or Streambed Alteration Application (LSAA) Application (September 3, 2014) and Addendum (October 2014). Energy Renewal Partners, LLC.
- Various GIS files and maps (Received from PVS December 2014 - April 2015)

B. Property Description

The proposed Preserve encompasses approximately 24,146 acres and is located in eastern San Benito and western Fresno Counties (Figure 1). The Preserve will be set aside as mitigation for the Panoche Valley Solar Facility, a 2,506-acre area near Little Panoche Road and adjacent to the Preserve. The Preserve is made up of three adjacent areas, known as (from north to south): Valadeao Ranch Conservation Lands (VRCL), Valley Floor Conservation Lands (VFCL), and Silver Creek Ranch Conservation Lands (SCRCL). Much of the Valadeao and Silver Creek Ranch boundary is contiguous with property owned by the Bureau of Land Management

(BLM). The rest of the Preserve generally borders private land used currently for cattle ranching.

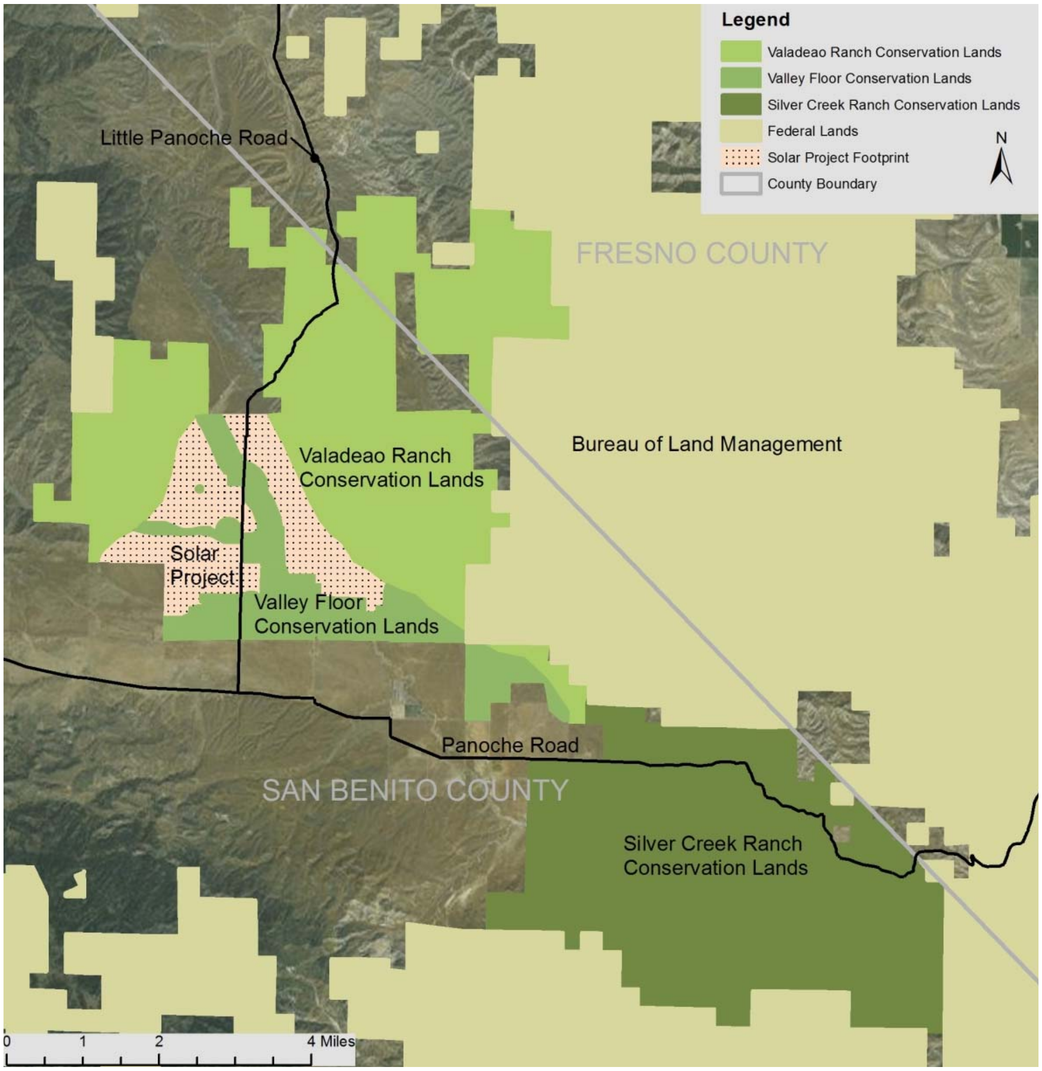

Figure 1. Lands proposed for the Panoche Valley Preserve and adjacent federal ownership, San Benito and Fresno Counties, California

The Panoche Valley and nearby rolling hills make up approximately half of the Preserve, whereas the remainder is moderately rugged terrain found in portions of the Panoche Hills and along the eastern slope of the Silver Creek drainage. There are three main creeks on site: (1) Panoche Creek runs generally east/west through VFCL before it turns south and bisects the north-central portion of Silver Creek Ranch; (2) Las Aguilas Creek runs through the western portions of VRCL and VFCL before joining Panoche Creek northwest of Silver Creek Ranch; and (3) Silver Creek clips the extreme southeast portion of Silver Creek Ranch. Both Silver Creek and Las Aguilas

Creek only have ephemeral sources of water whereas Panoche Creek has year-round or near year-round surface water. Elevations range from approximately 940 feet at the lowest point of Panoche Creek to approximately 2,320 feet at one point along the ridge overlooking the Silver Creek drainage.

Well-drained loamy and sandy loam soils of the Panoche and Kettleman Series occur over most of the site. Rocky and gravelly soils are found in the western part of Valadeao Ranch. Riverwash soils are found along Panoche and Las Aguilas Creeks and clay loam is found in portions of eastern Valadeao Ranch.

Approximately 73% of PVP is comprised of annual grassland habitat, followed by Ephedra shrubland (21%), barrens (2.4%), and saltbush shrubland (2%). Other habitat types (juniper woodlands, oak woodlands, riparian, ponds, and vernal pools) each make up less than one percent of the land area.

The most widespread and dominant herbaceous species are annual grasses including ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) are also common, especially along ranch roads. The native perennial grass, Sandberg bluegrass (*Poa secunda*) is locally common on the Silver Creek and Valadeao Ranches.

Larger shrubs are absent from most of the flat terrain, but *Ephedra californica* and *Atriplex polycarpa* are common in the hilly portions of Valadeao Ranch. Other shrubs found on PVP include *Artemisia californica*, *Senecio flaccidus, Eastwoodia elegans, Ericameria linearifolia, Ericameria nauseosa* scrub, *Gutierrezia californica* and *Eriogonum fasciculatum*.

Trees are rare and found only on some of the wetter sites. California juniper (*Juniperus californica*) and blue oak (*Quercus douglassi*) are found on some of the north slopes of Valadeao Ranch whereas Fremont cottonwood (*Populus fremontii*) and red willow (*Salix laevigata*) are found within small areas of riparian habitat along Panoche Creek (on Silver Creek Ranch).

Many wetland types occur on the Preserve. However, most hold water during only part of the year. Wetland and associated habitats include ephemeral spring or seasonal spring, perennial spring, seasonal stream, and drainages.

The Preserve is located within a portion of the Ciervo-Panoche Natural Area, an area that has long been a focus of conservation for several of the listed species in this region. The areas that comprise the Preserve were specifically selected due to the presence of threatened and endangered species and their proximity to large, contiguous blocks of lands administered by the BLM. This natural area is known to support substantial populations of state and/or federal listed species, as mentioned previously, including San Joaquin kit fox (SJKF; *Vulpes macrotis mutica*), giant kangaroo rat (GKR; *Dipodomys ingens*), blunt-nosed leopard lizard (BNLL; *Gambelia sila*), and San Joaquin antelope squirrel (SJAS; *Ammospermophilus nelsoni*). Additional state- and federal-listed species that are present in the region in lower numbers and that will benefit from management of these Conservation Lands include California tiger salamander (CTS; *Ambystoma californiense*), California condor (CACO; *Gymnogyps californianus*), and several branchiopods species such as vernal pool fairy shrimp (VPFS; *Branchinecta lynchi*) and possibly longhorn fairy shrimp (LHFS; *Branchinecta longiantenna*), conservancy fairy shrimp (CFS; *Branchinecta conservatio*) and vernal pool tadpole shrimp (VPTS; *Lepidurus packardi*).

C. PAR Conditions

The following is a list of conditions used in calculating CNLM's expected stewardship and conservation easement activity costs in perpetuity. Any additional permit conditions, or changes in plans or expectations, may require that changes be made to the PAR and the resulting estimate of costs.

1. PVS will retain fee title to the Preserve.

2. CNLM will be responsible for biological monitoring and management tasks on the Preserve including but not limited to: grazing management, non-native species control, monitoring of listed species and their habitat, trash removal, patrolling, and preparation of annual reports and management plans.

3. CNLM will be responsible for perpetual conservation easement monitoring, enforcement, and defense, as well as associated agency reporting.

4. CNLM will not be responsible for agency-mandated restoration efforts as a result of past or future development within the Preserve.

5. CNLM will not be responsible for any fuel management, suppression, or other vegetation clearing or thinning for fire protection.

6. Initial restoration activities (e.g., Panoche Creek restoration and dump site restoration) are not included in this PAR because these tasks will be contracted out separately by PVS.

7. Ranchers that operate on the Preserve will be responsible for providing all infrastructure and interior fencing needed for their grazing animals.

8. CNLM will maintain a boundary fence where the Preserve borders private land, with the exception of land-locked parcels of private land and small private inholdings between the Preserve boundary and BLM land. No fencing will be maintained where the Preserve borders BLM property.

D. Proposed Management

The proposed Preserve contains some of the best remaining habitat for kit foxes, antelope squirrels, giant kangaroo rats and leopard lizards, making the protection of this property a key component in the long-term conservation and ultimate recovery of these listed species. Active management will be needed to maintain the health of the natural communities, while monitoring of endangered and other key species will provide vital information on population trends as well as feedback on management effectiveness. In addition, patrolling and public access control will be necessary to protect the biological resources from public encroachment. Since much of the proposed Preserve's boundary is adjacent to other protected lands and private landowners, coordination with neighboring landowners and agencies will be essential in effectively managing this important landscape.

Consistent with CNLM's professional practices in managing conservation lands that it holds in fee, the Preserve will be managed by well-qualified CNLM staff. Labor rates in the PAR are burdened rates (i.e. they include benefits and taxes). Contracts are only used for situations such as large construction projects (e.g., fence installation), where specialized skills or permits cannot be assumed to be available in-house, or when bottlenecks in seasonal-sensitive work may occur.

Management and monitoring activities proposed for the Preserve (organized by PAR subheadings) are as follows:

1. <u>Biotic Surveys</u>. Science-based monitoring will be essential in determining population trajectories of endangered and other key species and in evaluating management strategies (key components of adaptive management). Methods of monitoring are subject to change, based on feedback over time, and input from other experts, but initially will be similar to those listed below:

    a. *Multi-species Monitoring Plots*. A total of 12 pairs of plots will be established on the PVP including six pairs on Silver Creek Ranch, and three pairs each on Valadeao Ranch and the Valley Floor Conservation Lands. The monitoring plots will be approximately 40 acres in size and paired so that management treatments can be evaluated while monitoring key species of plants and animals. Multiple species and trophic levels will be monitored concurrently, allowing for efficient data collection and evaluation of relationships among species. Methods of collecting data are described as follows:

i. Small mammal abundance will be assessed annually by placing one trapping grid (7 x 7 pattern, 10 m spacing) in the center of each monitoring plot. During trapping sessions, Sherman traps will be baited in the afternoon and checked three hours after sunset for five consecutive nights. Captured rodents will be identified and marked to differentiate them from newly captured animals on successive nights, thereby allowing for the total number of individuals by species to be tallied for each grid.

ii. Herbaceous plant cover and composition, and shrub cover will be determined annually along four 50-meter transects established within each experimental plot. Herbaceous cover and shrub cover will be estimated at the end of the growing season by determining the intercept of 100 points (0.5 m apart) along each transect. Residual dry matter will be collected from five ¼ meter square sampling frames per transect in May and June.

iii. The relative abundance of various diurnal species will be monitored along one 800-meter long transect per plot. Each transect will form a square located approximately 100 m inside the plot boundary. Each transect will be slowly walked in the morning and the number of grasshoppers, diurnal mammals, lizards, and birds will be recorded.

b. *Road Surveys*. Road surveys will be used to monitor diurnal species that are more easily monitored on a large scale (e.g. blunt-nosed leopard lizard, San Joaquin antelope squirrel). Survey routes at PVP will total approximately 50 km in length (depending on available road network) and will pass through VRCL, VFCL, and SCRCL. During surveys, an observer will slowly drive along established routes and obtain locations for each leopard lizard, antelope squirrel, and other notable wildlife species using a global positioning system (GPS). Road surveys will be conducted in the spring/early summer and repeated on three separate days to get a measure of variance.

c. *Kit Fox Surveys*. Remote cameras will be used to monitor kit fox distribution on the PVP. Cameras will be set up (with bait nearby) at 80 different locations during the fall and early winter and run for a minimum of 2 weeks at each location. Digital images on the camera will be reviewed and visits by kit foxes and other notable wildlife will be recorded. Other information (GPS location, time, date) for each animal picture will be entered into a database.

d. *CTS Monitoring*.

i. Hydrology will be monitored in existing and created pond(s) to determine whether ephemeral conditions are favorable or unfavorable for CTS and their predators (e.g., bullfrogs). Hydrology monitoring will occur annually for the first three years and every three years thereafter for all created and existing ponds on the Conservation Lands. Staff gauges will be installed in each pond within 6 to 12 months after Project's construction. Depth and approximate percent of inundation at each pond will be recorded monthly throughout the rainy season.

ii. Qualitative surveys will be conducted annually at all existing and created pond(s) once during the wet season and once during the dry season. These surveys will qualitatively document the vegetation composition and structure around each of the ponds, record hydrology, document any signs of erosion or sedimentation, presence of any invasive plant species, and monitor any structural components and associated structures for the created CTS pond(s). Permanent photopoints will be established to document the conditions of the created CTS pond(s). Photos will be taken annually during the peak rainy season and at the end of the rainy season to document the seasonal dry-down period.

iii. Annual larval surveys will be conducted for the first three years and every three years thereafter by a qualified herpetologist within all existing and created CTS pond(s) to determine whether or not CTS are present, if they are breeding, and if bullfrogs or other introduced predators are present. The purpose of these surveys is to provide a temporal snapshot of the status of the CTS on an ongoing basis and will include quantitative data on species and habitat condition such as non-native invasive species presence or absence, predator presence or absence, and other known threats. Size and life stage will be noted during surveys with CTS larvae above 70 mm in length deemed large enough to successfully metamorphose.

e. *Vernal Pool Monitoring*.

i. Protocol-level surveys will be conducted for two years in a row to determine if listed vernal pool branchiopod species are present on the Conservation Lands and, if present, their distribution. If no listed vernal pool branchiopod species are observed, protocol-level surveys will be conducted every 15 years to determine if the status has changed.

ii. If it is determined that listed vernal pool branchiopod species are present on the Preserve, modified wet-season monitoring surveys will be conducted every three years within the vernal pools. Monitoring will be conducted twice during the wet season to target the potential listed species present. At each pool, 5 to 15 standardized dip-net pulls will be completed and species and relative abundance will be recorded for all individuals collected. Photos will be taken of each pool during surveys.

iii. Hydrology monitoring will be conducted to determine the extent of ponding in relation to precipitation patterns over time and to inform vernal pool branchiopod surveys. Surveys will be conducted annually for the first three years and every three years thereafter. Staff gauges will be installed within each pool. Depth and extent of inundation will be recorded approximately twice monthly throughout the wet season.

iv. In order to assess impacts of vegetation management and climatic variation on the vernal pool flora and develop long-term management strategies, vernal pool vegetation monitoring surveys will be conducted at vernal pools annually for the first three years and then every five years. Total vegetation cover and the estimated absolute cover of each species within sampling plots will be recorded. Qualitative surveys also will be conducted once during peak vegetation flowering period in the spring. Surveys will consist of taking a photo of each pool, and making general notes on habitat quality, signs of altered hydrology, sedimentation or erosion activity, trash and debris, any damages from other activities, and whether any invasive plant species are present.

f. *Riparian Assessments*. A riparian assessment will be conducted across selected reaches of the creek drainages every 5 years. During the surveys, photos will be taken to document condition, plant species cover and composition will be recorded, and the stream bank will be assessed.

g. *Mapping Shrub Cover.* Vegetation mapping (through interpretation of aerial photographs and field checking) will occur once every five years to track long-term changes in shrub cover.

h. *RDM Monitoring*. Monitoring residual dry matter (RDM) is important for managing California annual rangelands. Although RDM will be monitored on the plots described above, this will only cover a small portion of the ranch. Therefore a more rapid estimation technique suitable for large areas will be employed throughout the entire conservation land area. This method will include performing a series of clip-plots in key areas with differing aspects, elevations, and vegetation types to calibrate the surveyor's visual estimates and traversing much of the conservation lands to visually estimate and map the entire area. Key areas should be located within relatively uniform vegetation and away from areas of heavy use by cattle (e.g., watering points). RDM will be measured and photographs will be taken at a minimum of 30 key areas each year for calibration purposes. Color-coded maps showing RDM zones within each pasture and for the entire conservation area will be produced annually.
RDM will also be measured and or estimated to determine range readiness before livestock are turned out on a given pasture.

i. *Climate*. Annual precipitation levels greatly influence the abundance and distribution of plant and animal species in the Panoche Valley. Therefore, precipitation data from on-site rain stations will be summarized for each water year to track the effects of this important variable.

2. Field Equipment. This PAR includes costs for various field equipment including two small pickup trucks, one quad runner, traps and trapping supplies, sprayers, phones, staff uniforms, binoculars, and miscellaneous tools for fencing, signage and other tasks. The applied mileage rate includes estimated costs for fuel, insurance, registration, maintenance, and vehicle replacement.

3. General Maintenance. The managing entity will collect and remove trash from the site on a regular basis. Labor hours for trash collection, coordination with neighboring landowners, and funds for dump fees are included in this section.

4. Habitat Maintenance. Managing for an appropriate habitat structure and suppression of some non-native plants will be key management actions on PVP lands. Brome grasses and other non-native annual grasses dominate much of the area, and these species may cause problems for desert-adapted species, especially during wet periods when they become especially dense. Tamarisk and many other invasive, non-native species are known to establish in and degrade riparian habitat, so riparian areas will likely need to be treated on occasion. It is anticipated that controlled grazing will be used to maintain an appropriate habitat structure in the uplands with some herbicide use in localized areas. Depending on the invasive species, various techniques will be used in riparian areas. Backpack sprayers typically will be used for localized infestations

and ATV- or truck-mounted sprayers will be used in areas with larger populations of non-native plants.

5. Habitat Restoration. Continuous cattle grazing and/or wildfires have likely killed shrubs in the past and helped create open grasslands over most of the PVP. Saltbush provides cover for blunt-nosed leopard lizards and San Joaquin antelope squirrels, and is an important habitat component for LeConte's thrashers (and many other bird species). To accelerate the establishment of shrubs within portions of PVP, saltbush seed will be collected and planted within areas of extensive grassland. Saltbush seed will be collected from local plants to maintain genetic integrity of the saltbush populations. A 5-foot wide spike-tooth harrow will be pulled behind a pickup or quad runner to scarify the soil surface and provide a good seedbed for planting. Seeded strips will be separated by at least 100 meters to help keep shrub densities from becoming unnaturally high. It is anticipated that shrub restoration will be ongoing, as wildfires are likely to continue in the future within the PVP area.

6. Other Expenses. The PAR includes funding for the following categories in support of the management tasks listed above:

   a. *Office Maintenance*. The PAR includes an appropriate share of rent, utilities, supplies, and equipment for maintaining a local office for two full time preserve managers.

   b. *Operations*. Liability insurance, external audits, staff training, and maintenance of accreditation by the Land Trust Accreditation Commission, and professional memberships are included in this category. Because of the need for the Preserve Managers to stay current with appropriate and effective methods for habitat and species management, some funds have been provided to allow participation in professional workshops or conferences. Also included in this section is a one-time contribution to CNLM's Legal Defense Fund (1% of the endowment), and a one-time contribution to CNLM's Research and Development Fund (1% of the endowment).

   c. *Contingency*. CNLM includes a contingency amount of 10% on most items. Because of the responsibility for managing the Preserve in perpetuity, funding will occasionally be needed to respond to unforeseen events and challenges to the long-term stewardship of the site.

   d. *Administration.* The costs of administering contracts, running payroll, benefits, accounting, and other tasks in support of employees are included in this section. CNLM uses a standard 24% overhead rate (as a percentage of annual operational costs).

7. Public Services. In the past, illegal dumping and other forms of trespass have occurred in the PVP area. Patrolling in combination with proper signs and fencing (see site construction/maintenance section) should curtail illegal and inappropriate activities by the public. The managing entity will, during much of the year, have personnel on site conducting field tasks, but some patrolling will be needed during the winter months and at other times of limited field work. Signs will be placed along the boundaries of the PVP's parcels at a rate of one per 500 feet along major roads and at a rate of one per ¼ mile along the more remote portions of the border.

8. Reporting. This section includes internal reporting requirements and reports required by agencies. A report of management activities, conservation easement compliance monitoring reports, and agency-required permit reports will be produced annually. A work plan and budget will also be prepared annually. The management plan will be periodically updated to incorporate changes in Preserve conditions as well as information gained from onsite experience and other sources. This section also includes indirect reporting costs, such as maintenance of GIS and biological databases.

9. Site Construction/Maintenance. Fences are used to control livestock grazing and clearly delineate boundaries and reduce trespass within PVP. Because BLM has similar goals regarding listed species management, areas that are currently adjacent to BLM land will not be fenced. Only areas of the PVP that are adjacent to private land will be fenced. Approximately 27.5 miles of new fence will be needed to provide fences along the boundary with private land (because current fences are often not on property boundaries) and to provide fencing for control plots. The remaining existing private boundary fence is approximately 17.5 miles. This fence is in variable condition and it is estimated that approximately half of this fence will need to be replaced before 30 years (the approximate life of a fence). In addition, the entire 45 miles of fence will need to be replaced approximately every 30 years. Fence costs used in the PAR were based on estimates from two companies that have built fence in the Panoche area.

E. Cost Estimates

The PAR cost estimate has two components: (1) an "Initial & Capital" (I&C) amount to cover the first three years of operating expenses, any initial capital expenses (such as signs or fences), portion of vehicle acquisition costs, and payments to CNLM's Legal Fund and Research and Development Fund; and (2) an endowment amount to cover perpetual stewardship costs. The endowment must be sufficient to provide income to cover the cost of managing the Preserve, inflation, and trust management fees in perpetuity. The I&C amount provides a source of funds for management of the Preserve in the first years of operation, allowing the endowment time to begin accumulating investment income for use to support management expenses after the I&C period elapses, as well as protecting the value of the endowment during the first few years following establishment, buffering against any temporary downward trend in the market.

To determine the drawdown rate to use in calculating the endowment, CNLM, in consultation with its financial advisors, uses a 40-year history of changes in the consumer price index, bond returns, stock appreciation and yields (assuming a balanced portfolio) as its basis for assuming an annual average drawdown rate, after inflation, of 4.5% (the growing perpetual annuity). Other managers of the endowment might have substantially different rates of investment return and consequently different initial endowment values for supporting the required growing perpetual annuity.

Assuming that CNLM holds and manages the endowment and conducts the stewardship and conservation easement responsibilities in perpetuity as detailed in the attached PAR, the following funding amounts will be required for the Preserve:

Funding Requirements	
Initial & Capital Costs	$1,773,153
Held in Trust (Endowment)	$10,704,033
Total Amount	**$12,477,186**

The endowment for management and conservation easement activities will enable experienced and professional CNLM staff to provide the range of protection and management activities appropriate for the conservation values of this Preserve in perpetuity.

Please understand that these costs are based on the assumption that CNLM will manage the Preserve, hold the conservation easement (CE), and hold the endowment for both purposes in perpetuity. Should any of these assumptions change, the funding needed--either the annual budget or the amount needed for the endowment, or both--may change. Further, in the event that the CE and stewardship functions are separated at some point in the future (e.g., the stewardship obligations are transferred to another qualified entity) that portion of the endowment fund dedicated to supporting CE MED (monitoring, enforcement, and defense) obligations will remain with the CE holder in perpetuity. Such division in roles would probably result in less annual funding being available for stewardship should the endowment be separated because the CE holder has certain fixed, immutable obligations. The endowment calculation represented above is based on the assumption of combined roles and the resulting efficiencies have been assumed and applied. If those efficiencies could no longer be applied, the entire cost of holding the CE would need to be determined based on both specific CE-related activities and proportional costs for support of professional staff and organizational structure.

Further, please understand that this letter represents staff due diligence regarding the initial and perpetual stewardship and CE responsibilities and costs only. It does not represent a commitment by CNLM to accept these responsibilities.

The time lag between this cost estimate (as represented by the date of this letter) and the actual establishment of the endowment will influence the final management cost. **The terms and conditions of this proposal are valid for a period of six (6) months from the date of this letter**.

Please sign the duplicate copy of the final page of this letter acknowledging receipt of this PAR and return it to our office.

If you have any questions or comments regarding this PAR analysis, please do not hesitate to contact me.

Sincerely,

David R. Brunner
Executive Director
Center for Natural Lands Management

Attachment: Property Analysis Record: Panoche Valley Preserve, dated August 7, 2015

ACKNOWLEDGMENT RECEIPT

PAR (MB077) FROM CNLM

Please sign, date, and return this acknowledgment page to our office, along with any payments due if applicable. An executed acknowledgment page confirms you have received from CNLM a Property Analysis Record and corresponding cover letter explaining the contents of your report.

Thank you.

____
Eric Cherniss, Panoche Valley Solar, LLC

____
Date

PAR

Habitat Planning In Perpetuity

The Property Analysis Record

Title:	Panoche Valley
Par Code:	MB077
Prepared by:	Greg Warrick
	CNLM
Date:	08/07/2015

Section 1 - Property Information

Property Title: Panoche Valley PAR ID: MB077 Last Modified: 08/07/2015

Location/Jurisdiction	E-San Benito/W-Fresno Co.
County	SanBenitoFresno
Address	
City, State, Zip	
Conserved Acres	24146
Management type	Contract
Date Created	04/02/2015 02:35:22 PM
Prepared for	PV2 Energy LLC
Prepared by	Greg Warrick CNLM

Project Management Information		Developer/Proponent Information	
Contact	Greg Warrick	Contact	Eric Cherniss
Company	CNLM	Company	PV2 Energy LLC
Address	27258 Via Industria, Suite B	Address	845 Oak Grove Ave., Suite B
City, State, Zip	Temecula, CA 92590	City, State, Zip	Menlo Park, CA 94025
Phone	661-829-4181	Phone	408-460-8200
Fax		Fax	
E-Mail address	gwarrick@cnlm.org	E-Mail address	eric@pv2energy.com

Cost Year 2015

Date of site visit:

Development Project

Project Name

Total Project Acres 0

Stage of planning

Notes

Exported by ADMIN on 06/02/2015
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Section 2 - Division of Responsibility

Property Title: Panoche Valley   PAR ID: MB077   08/07/2015

Description:	Responsible Party:	Notes:
Debris Removal	Manager	Initaially project proponent responsible for cleaning up debris and trash. Afterwards the preserve manager is responsible.
Fence Installation	Manager	Manager responsible for new fence along boundary with private land. Rancher responsible for all interior fences.
Fence Maintenance	Manager	Manager responsible for fence maintenance on boundary with private land. Rancher responsible for interior fencing.
Monitoring, Plant	Manager	
Monitoring, Wildlife	Manager	
Non-native plant removal - Ongoing	Manager	
Patrolling	Manager	
Signs, Access Control	Manager	
Wildlife Surveys	Manager	

Contacts List

Name:	Cherniss, Eric	Phone:	408-460-8200
Position:	Vice President	Mobile:	- -
Company/Agency:	PV2 Energy LLC	Fax:	- -
Address:	854 Oak Grove Ave, Suite 202	Email:	eric@pv2energy.com
City, State & Zip:	Menlo Park, CA 94025		

Name:	Elizando, Trisha	Phone:	512-222-1125
Position:	Owner/COO	Mobile:	- -
Company/Agency:	Energy Renewal Partners	Fax:	- -
Address:	305 Camp Craft Road	Email:	telizondo@energyrenewalpartners.com
City, State & Zip:	West Lake Hills, TX 78746		

Name:	Greg, Warrick	Phone:	661-829-4181
Position:	Preserve Manager	Mobile:	- -
Company/Agency:	CNLM	Fax:	- -
Address:	27258 Via industria, Suite B	Email:	gwarrick@cnlm.org
City, State & Zip:	Temecula, CA, CA 95290		

Name:	Kaminsky, Jennifer	Phone:	858-320-2941
Position:		Mobile:	- -
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City, State & Zip:	La Jolla, CA 92037		

Name:	Little, Cathy	Phone:	530-666-4297
Position:	Regional Preserve Manager	Mobile:	- -
Company/Agency:	CNLM	Fax:	- -
Address:	27258 Via Industria, Suite B	Email:	clittle@cnlm.org
City, State & Zip:	Temecula, CA 92590		

Name:	McCollum, Mike	Phone:	916-688-2040
Position:		Mobile:	- -
Company/Agency:	McCollum Associates	Fax:	- -
Address:	10196 Clover Ranch Drive	Email:	mccollum@mccollum.com
City, State & Zip:	Sacramento, CA 95829		

Section 4 - Contacts

Contacts List

Name:	McCormick, Randi	Phone:	661-589-4065
Position:		Mobile:	- -
Company/Agency:	McCormick Biological, Inc.	Fax:	- -
Address:	P.O. Box 80983	Email:	randi@mccormickbiologicalinc.com
City, State & Zip:	Bakersfield, CA 93380		

Name:	Pimentel, John	Phone:	408-460-8200
Position:	President	Mobile:	- -
Company/Agency:	PV2 Energy LLC	Fax:	- -
Address:	845 Oak Grove Ave., Suite 202	Email:	john@pv2energy.com
City, State & Zip:	Menlo Park, CA 94025		

Name:	Rogers, Deborah	Phone:	510-799-7701
Position:	DCSS	Mobile:	- -
Company/Agency:	CNLM	Fax:	- -
Address:	27258 Via Industria, Suite B	Email:	drogers@cnlm.org
City, State & Zip:	Temecula, CA 92590		

Section 5 - Purpose of Preservation

Property Title: Panoche Valley PAR ID: MB077 08/07/2015

Purpose of Preservation	Prioritize	Goals and Objectives
Agricultural Preservation	Not	The Conservation Lands would protect 24,146 acres of grazing lands.
Endangered Species	Not	The Conservation Lands would protect habitat for the following listed species among others: San Joaquin kit fox (Vulpes macrotis mutica), giant kangaroo rat (Dipodomys ingens), blunt-nosed leopard lizard (Gambelia sila), San Joaquin antelope squirrel (Ammospermophilus nelsoni), California tiger salamander (CTS; Ambystoma californiense), California condor (Gymnogyps californianus), and several branchiopods species such as Vernal Pool Fairy Shrimp (Branchinecta lynchi), Conservancy Fairy Shrimp (Branchinecta conservatio), Longhorn Fairy Shrimp (Branchinecta longiantenna), and Vernal Pool Tadpole Shrimp (Lepidurus packardi)
Open Space	Not	The Conservation Lands would protect 24,146 acres of open space land.
Watershed Protection	Not	The Conservation Lands would protect a portion of the Panoche/Silver Creek Watershed.
Wetlands	Not	The Conservation Lands would protect wetland habitats including ephemeral spring or seasonal spring, perennial spring, seasonal stream, wash, drainage, riparian, ponds, and vernal pools.
Wildlife Corridor	Not	The Conservation Lands would protect wildlife corridors throughout the large Conservation Land properties and through the project footprint.

Section 6 - Site Conditions

Property Title: Panoche Valley PAR ID: MB077 08/07/2015

Hydrological Features	Problem	Location	Notes
Down-cut Stream Channel	Medium	Both	Most of the larger stream channels show moderate erosion.
Water Storage	None	Both	Several water tanks on site for livestock water storage.
Wells, Sumps	None	Both	Several wells found on and off site provide livestock water.

Structures	Permitted/ Legal	Future Permitted	Problem	Location	Notes
Buildings, Outbuildings	No	No	None	Both	Barns and storage sheds on and off site.
Existing Structures	No	No	None	Both	Houses and outbuildings on Silver Creek Ranch. Not currently used.
Power or Utility Lines	No	No	None	Both	Power lines cross portions of the conservation lands.
Utility Facilities	No	No	None	Both	One PG&E gas line crosses the conservation lands (Silver Creek Ranch).

Section 7 - Land Use

Property Title: Panoche Valley PAR ID: MB077 08/07/2015

Recreation	Permitted	Future Permitted	Problem	Location	Notes
Hiking	No	No	Not Selected	Not Selected	
Passive Recreation	No	No	Not Selected	Not Selected	
Shooting/Hunting	No	No	Low	Adjacent	Permitted uses on adjacent BLM land.

Resource Use	Permitted	Future Permitted	Problem	Location	Notes
Livestock Grazing	Yes	Yes	Low	Both	Cattle grazing on conservation lands and adjacent lands. Sheep grazing on BLM allotments in Panoche Hills.

ANIMALS

Common Name: / Scientific Name:	Ranking: / Status:		Acreage:	Individual:	Notes:
AMPHIBIANS					
California Tiger Salamander *(Ambystoma californiense)*	Global: G2	National: N2N3	State:	S2S3	Observed in one pond on the Valadeao Ranch Conservation Area and there are historical occurrences in two ponds on the Valley Floor Conservation Area.
BIRDS					
Burrowing Owl *(Athene cunicularia)*	Global: G4	National: N4B,N4	State:	S2	Observed during surveys on the project footprint and Valley Floor Conservation Area.
California Condor *(Gymnogyps californianus)*	Global: G1	National: N1	State:	S1	Was not observed on the Conservation Lands during surveys. However, suitable foraging habitat exists, and one of the active release sites is located at Pinnacles National Monument, approximately 16 flight miles southwest of the Conservation Lands.
Tricolored Blackbird *(Agelaius tricolor)*	Global: G2	National: N2N3	State:	S2	Species observed during surveys on the project footprint and Valey Floor conservation Area.
FAIRY, CLAM, AND TADPOLE SHRIMPS					
Conservancy Fairy Shrimp *(Branchinecta conservatio)*	Global: G1	National: N1	State:	S1	Was not observed on the Valley Floor or Valadeao Ranch Conservation Area during surveys. No vernal pools were identified during summer surveys on the Silver Creek Ranch, so no vernal pool branchiopod surveys were conducted in the Conservation Area.
Longhorn Fairy Shrimp *(Branchinecta longiantenna)*	Global: G1	National: N1	State:	S1	Was not observed on the Valley Floor or Valadeao Ranch Conservation Area during surveys. No vernal pools were identified during summer surveys on the Silver Creek Ranch, so no vernal pool branchiopod surveys were conducted in that Conservation Area.
Vernal Pool Fairy Shrimp *(Branchinecta lynchi)*	Global: G3	National: N3	State:	S2S3	Observed in one pool on the project footprint. Was not observed on the Valley Floor or Valadeao Ranch Conservation Area during

				surveys. No vernal pools were identified during summer surveys on the Silver Creek Ranch, so no vernal pool branchiopod surveys were conducted in that Conservation Area.
MAMMALS				
Giant Kangaroo Rat *(Dipodomys ingens)*	Global: G2	National: N2	State: S2	Observed on the Valadeao Ranch, Silver Creek Ranch, and Valley Floor Conservation Lands.
Kit Fox - San Joaquin Valley Population *(Vulpes macrotis mutica)*	Global: T2	National: N2N3	State: S2S3	Observed on the Valadeao Ranch, Silver Creek Ranch, and Valley Floor Conservation Lands.
Nelson's Antelope Squirrel *(Ammospermophilus nelsoni)*	Global: G2	National: N2	State: S2	Observed on the Valadeao Ranch, Silver Creek Ranch, and Valley Floor Conservation Lands.
REPTILES				
Blunt-nosed leopard lizard *(Gambelia sila)*	Global:	National:	State:	Observed on the Valley Floor Conservation Area and the Silver Creek Ranch Conservation Area.

INVASIVE/EXOTIC

Common Name: / Scientific Name:	Ranking: / Status:		Acreage:	Individual:	Notes:
FLOWERING PLANTS					
Compact Brome *(Bromus madritensis)*	Global: GNR	National: NNA	State:	SNA	Dominant herbacesous species at times within the Conservation Lands.
Pin Clover *(Erodium cicutarium)*	Global: GNR	National: NNA	State:	SNA	Commonly found throughout the Conservation Lands.
Salt-cedar *(Tamarix ramosissima)*	Global: GNR	National: NNA	State:	SNA	Some Tamarix sp. individuals have been observed in or near Silver Creek.
Small-flower Tamarisk *(Tamarix parviflora)*	Global: GNR	National: NNA	State:	SNA	Some Tamarix sp. individuals have been observed within or near Silver Creek.

NATURAL COMMUNITIES

Common Name: / Scientific Name:	Ranking: / Status:		Acreage:	Individual:	Notes:
CALIFORNIA					
Barrens *()*	Global:	National:	575 575	State:	
Blue Oak and Juniper Woodland *()*	Global:	National:	68 68	State:	
California Ephedra Shrubland *(Ephedra californica Shrubland [Placeholder])*	Global: GNR	National:	4964 4964	State:	
Drainage/Stream *()*	Global:	National:	88 88	State:	
Introduced Annual Grassland *()*	Global:	National:	17407 17407	State:	
Ponds *()*	Global:	National:	4 4	State:	
Saltbush Shrubland *()*	Global:	National:	476 476	State:	
Vernal Pools *()*	Global:	National:	3.1 3.1	State:	
Wetlands *()*	Global:	National:	235.1 235.1	State:	

PLANTS

Common Name: / Scientific Name:	Ranking: / Status:			Acreage:	Individual:	Notes:
FLOWERING PLANTS						
Benitoa *(Benitoa occidentalis)*	Global: G3	National: N3	State: S3.3			Observed on the Valadeao Ranch Conservation Area.
Chaparral Groundsel *(Senecio aphanactis)*	Global: G3	National: N1	State: S1.2			Observed on the Valadeao Ranch Conservation Area.
Naked Buckwheat *(Eriogonum nudum var. indictum)*	Global: T3	National: N3	State: S3.2			Observed in the Ephedra shrubland alliance on the conservation lands.
Salinas Milk-vetch *(Astragalus macrodon)*	Global: G3	National: N3	State: S3.3			Observed on the Valadeao Ranch Conservation Area
Santa Clara Thornmint *(Acanthomintha lanceolata)*	Global: G3	National: N3	State: S3.2			Observed on the Valadeao Ranch Conservation Area.
Serpentine Leptosiphon *(Leptosiphon ambiguus)*	Global: G3	National: N3	State: S3.2			Observed on the Valadaeo Ranch Conservation Area.

Section 9 - Documents and Maps

Property Title: Panoche Valley PAR ID: MB077 08/07/2015

Document Path & Name	Contact/Affiliation	Phone/Fax/Email	Date Added
Description: Draft Conservation Management Plan \	Eric Cherniss/PV2 Energy LLC/	408-460-8200	12/10/2015
Description: Final Environmental Impact Report \	Eric Cherniss/PV2 Energy LLC/	408-460-8200	12/10/2014
Description: Biological Assessment \	Eric Cherniss/PV2 Energy LLC/	408-460-8200	12/10/2014
Description: Incidental Take Permit Application \	Eric Cherniss/PV2 Energy LLC/	408-460-8200	12/10/2014
Description: LSAA Application and Addendum \	Eric Cherniss/PV2 Enerby LLC/	408-460-8200	12/10/2014
Description: BNLL Abbreviated Survey Results \	Eric Cherniss/PV2 Energy LLC/	408-460-8200	12/10/2014
Description: Wetlands Mitigation Monitoring Plan \	Eric Cherniss/PV2 Energy LLC/	408-460-8200	01/29/2015

Section 10 - Permits and Agreements

Property Title: Panoche Valley PAR ID: MB077 08/07/2015

Permit or Agreement	Date Issued	Expiration Date	Permit Number
Army Corp of Engineers	/ /	/ /	

Agency/Division/Type: USACE

Permit Purpose: Clean Water Act 404, revised application submitted December 2014. Completed in coordination with NEPA process expected June-Sept 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
County	/ /	/ /	

Agency/Division/Type: County of San Benito

Permit Purpose: CEQA Authorization. Final EIR released in 2010. Draft Supplemental EIR released in December 2014. Final SEIR expected April 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
County Requirement	/ /	/ /	

Agency/Division/Type: County of San Benito

Permit Purpose: Conditional Use Permit. Approved October 2010. Revised application submitted in November 2014. Revised CUP expected April 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Other	/ /	/ /	

Agency/Division/Type: SHPO, State Historic

Permit Purpose: Section 106 Consultation. Section 106 consultation initiated (again) by USACE March 2015. Completed in coordination with NEPA process; expected June-Sept 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
Regional Water Quality Control Board	/ /	/ /	

Agency/Division/Type: Central Coast RWQCB

Permit Purpose: Section 401 Certification. Revised application submitted February 2014. Public notice of 401 on Feb. 20, 2015. Expected April 2015. Also, Construction General Storm Water Permit. Not yet developed.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

State Dept. of Fish and Game	/ /	/ /	

Agency/Division/Type: CDFW

Permit Purpose: Incidental Take Permit. Revised application submitted March 2015. Expected June 2015. Also, Lake and Streambed Alteration Agreement. Revised application submitted March 2015. Expected June 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
US Fish and Wildlife	/ /	/ /	

Agency/Division/Type: USFWS

Permit Purpose: Section 7 Consultation, Endangered/Threatened Species Take Permit. Biological Assessment submitted; accepted by USFWS as complete on Nov. 18, 2014. Expected June 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Section 14 - Initial & Capital Tasks and Costs

Property Title: Panoche Valley PAR ID: MB077 08/07/2015

Task List	Specific Description	Unit	Quantity	Cost / Unit	Annual Cost	Times Years	Cont %	Total Cost
BIOTIC SURVEYS								
Conservation Easement	Compliance Management	L. Hours	40.00	52.50	2,100.00	3.0	0.0	6,300.00
Conservation Easement	Compliance Monitoring	L. Hours	80.00	52.50	4,200.00	3.0	0.0	12,600.00
Ecologist	Plant/Animal surveys	C. Hours	120.00	90.00	10,800.00	3.0	10.0	35,640.00
General Wildlife Surveys	Diurnal Animal Transects	L. Hours	144.00	52.50	7,560.00	3.0	0.0	22,680.00
General Wildlife Surveys	Road Surveys	L. Hours	120.00	52.50	6,300.00	3.0	0.0	18,900.00
Mammalogist	Camera stations KF	L. Hours	120.00	52.50	6,300.00	3.0	0.0	18,900.00
Mammalogist	Grid setup and maintenance	L. Hours	192.00	52.50	10,080.00	1.0	0.0	10,080.00
Mammalogist	Small Mammal Trapping	L. Hours	600.00	52.50	31,500.00	3.0	0.0	94,500.00
Monitor Climate	Field Data Collection	L. Hours	64.00	52.50	3,360.00	3.0	0.0	10,080.00
Permit fee	SCP	Item	2.00	415.00	830.00	1.0	10.0	913.00
Plant Ecologist	Assess Riparian Veg	L. Hours	112.00	52.50	5,880.00	1.0	0.0	5,880.00
Plant Ecologist	Herb. spp. cover/comp	L. Hours	240.00	52.50	12,600.00	3.0	0.0	37,800.00
Plant Ecologist	Monitor VP hydrology	C. Hours	100.00	90.00	9,000.00	1.0	10.0	9,900.00
Plant Ecologist	Vernal Pool veg monitoring	C. Hours	120.00	90.00	10,800.00	3.0	10.0	35,640.00
Range Ecologist	Grazing coordination	L. Hours	140.00	52.50	7,350.00	3.0	0.0	22,050.00
Range Ecologist	Monitor RDM entire area	L. Hours	230.00	52.50	12,075.00	3.0	0.0	36,225.00
Range Ecologist	Monitor RDM on plots	L. Hours	160.00	52.50	8,400.00	3.0	0.0	25,200.00
Science Director	Decision support reviews	L. Hours	110.00	72.50	7,975.00	3.0	0.0	23,925.00
Science Director	Site vist	L. Hours	20.00	72.50	1,450.00	3.0	0.0	4,350.00
Wildlife Biologist	Branchiopod modified	L. Hours	120.00	52.50	6,300.00	1.0	0.0	6,300.00
Wildlife Biologist	CTS Larval Survey	C. Hours	120.00	90.00	10,800.00	3.0	10.0	35,640.00
Wildlife Biologist	Monitor hydrology CTS	L. Hours	20.00	52.50	1,050.00	3.0	0.0	3,150.00
Wildlife Biologist	Protocol branchiopod	C. Hours	320.00	90.00	28,800.00	1.0	10.0	31,680.00
Wildlife Biologist	Protocol branchiopod	L. Hours	600.00	52.50	31,500.00	1.0	0.0	31,500.00
Wildlife Biologist	Protocol branchiopod train	L. Hours	280.00	52.50	14,700.00	1.0	0.0	14,700.00
Wildlife Biologist	Survey pond condition	L. Hours	20.00	52.50	1,050.00	3.0	0.0	3,150.00
Sub-Total								557,683.00
FIELD EQUIPMENT								
Binoculars	Binoculars, Low-end 10 X	Pair	2.00	195.00	390.00	1.0	10.0	429.00
Camera - Digital	Camera traps, batteries, sd	Item	10.00	300.00	3,000.00	1.0	10.0	3,300.00
Camera - Digital	Low-end Camera	Item	2.00	300.00	600.00	1.0	10.0	660.00
Chemical Sprayer	5 Gallon	Item	2.00	150.00	300.00	1.0	10.0	330.00
Chemical Sprayer	Vehicle rig	Item	1.00	525.00	525.00	1.0	10.0	577.50
Equipment	Misc tools/equipment	Item	1.00	600.00	600.00	3.0	10.0	1,980.00
GPS, Rover & Base Unit	Sub-meter GPS	Item	2.00	4,000.00	8,000.00	1.0	10.0	8,800.00
Harrow	spike-tooth harrow	Item	1.00	550.00	550.00	1.0	10.0	605.00
Lock	Heavy duty lock	Item	15.00	20.00	300.00	1.0	10.0	330.00
Pond draining	Pump and hoses	Item	1.00	200.00	200.00	1.0	10.0	220.00
Protective Clothing	Clothing, gloves	Person	2.00	90.00	180.00	3.0	10.0	594.00
Quad Runners, 4WD	Mid-range Quality	Item	1.00	5,445.00	5,445.00	1.0	10.0	5,989.50
Quad Runners, 4WD	fuel/maintenance	Item	1.00	1,200.00	1,200.00	3.0	10.0	3,960.00
Storage	Storage container and	Item	1.00	3,500.00	3,500.00	1.0	10.0	3,850.00
Trap	Sherman	Item	500.00	25.00	12,500.00	1.0	10.0	13,750.00
Trap	Wild pig corral trap	Item	1.00	3,000.00	3,000.00	1.0	10.0	3,300.00
Trapping supplies	Bait	Item	3.00	50.00	150.00	3.0	10.0	495.00
Vehicle	Mileage (4x4)	Mile	51,867.00	0.90	46,680.30	3.0	10.0	154,044.99
Vehicle	Pickup 4x4	Item	2.00	35,000.00	70,000.00	1.0	0.0	70,000.00
Sub-Total								273,214.99

Task List	Specific Description	Unit	Quantity	Cost / Unit	Annual Cost	Times Years	Cont %	Total Cost
GENERAL MAINTENANCE								
Dump Fees	Dump Fee	Item	4.00	25.00	100.00	3.0	10.0	330.00
Sanitation Control	Collection And Disposal	L. Hours	30.00	52.50	1,575.00	3.0	0.0	4,725.00
Trash Liners	Liners	Item	10.00	6.75	67.50	3.0	10.0	222.75
Sub-Total								5,277.75
HABITAT MAINTENANCE								
Exotic Plant Control	Herbicide	Gallon	4.00	80.00	320.00	3.0	10.0	1,056.00
Exotic Plant Control	NPDES/APAP Application	Item	1.00	7,000.00	7,000.00	1.0	10.0	7,700.00
Exotic Plant Control	Spray	L. Hours	120.00	52.50	6,300.00	3.0	0.0	18,900.00
Sub-Total								27,656.00
HABITAT RESTORATION								
Seeding	Monitor success	L. Hours	80.00	52.50	4,200.00	2.0	0.0	8,400.00
Seeding	Seeding, inc collection	L. Hours	300.00	52.50	15,750.00	2.0	0.0	31,500.00
Sub-Total								39,900.00
OFFICE MAINTENANCE								
Computer, PC Color	Laptop & Software	Item	2.00	1,700.00	3,400.00	1.0	10.0	3,740.00
Furniture	Office furniture	Item	2.00	250.00	500.00	1.0	10.0	550.00
GIS ARC/INFO	GIS, Pc Based	Item	2.00	600.00	1,200.00	1.0	10.0	1,320.00
Organization	Organization, resupply	L. Hours	60.00	52.50	3,150.00	3.0	0.0	9,450.00
Preserve Office	Reimbursement	Month	24.00	292.00	7,008.00	3.0	10.0	23,126.40
Telephone	Emerg. Sat-Phone	Item	2.00	1,100.00	2,200.00	1.0	10.0	2,420.00
Telephone	Phone service	Item	2.00	1,200.00	2,400.00	3.0	10.0	7,920.00
Telephone	Sat-Phone Service	Item	2.00	600.00	1,200.00	3.0	10.0	3,960.00
Sub-Total								52,486.40
OPERATIONS								
Audit	Audit-cost share	Annual	1.00	3,000.00	3,000.00	3.0	10.0	9,900.00
Conferences	Room and food	Day	20.00	350.00	7,000.00	3.0	10.0	23,100.00
Conferences	Travel	Item	2.00	750.00	1,500.00	3.0	10.0	4,950.00
Contracts	Produce Contracts	L. Hours	24.00	52.50	1,260.00	3.0	0.0	3,780.00
Employee Training	Classes/conferences	L. Hours	128.00	52.50	6,720.00	3.0	0.0	20,160.00
Employee Training	Herbicide training	L. Hours	12.00	52.50	630.00	3.0	0.0	1,890.00
Employee Training	PM transition, new	L. Hours	80.00	52.50	4,200.00	1.0	0.0	4,200.00
Insurance	Flat fee	Fee	1.00	300.00	300.00	3.0	10.0	990.00
Insurance	General-Acre	Acre	24,156.00	0.40	9,662.40	3.0	10.0	31,885.92
Insurance	LTA CE Legal Fund	Fee	1.00	48.00	48.00	3.0	10.0	158.40
Insurance	Pollution	Fee	1.00	500.00	500.00	3.0	10.0	1,650.00
Internal coordination	coordination/meetings	L. Hours	48.00	52.50	2,520.00	3.0	0.0	7,560.00
Legal & Emergency Fund	Establish Fund 1%	1% endow.	1.00	107,289.00	107,289.00	1.0	0.0	107,289.00
Membership	LTA/CCLT	Fee	1.00	75.00	75.00	3.0	10.0	247.50
Membership	PM professional org.	Fee	2.00	250.00	500.00	3.0	10.0	1,650.00
Project Accounting	Setup And Maintain	Item	1.00	375.00	375.00	1.0	10.0	412.50
Research &	Establish Fund 1%	1% endow.	1.00	107,289.00	107,289.00	1.0	0.0	107,289.00
Subscription	CNDDB	Fee	1.00	25.00	25.00	3.0	10.0	82.50
Supervisor Site Visit	Lodging	Item	1.00	250.00	250.00	3.0	10.0	825.00
Supervisor Site Visit	Mileage	Mile	1,500.00	0.90	1,350.00	3.0	10.0	4,455.00
Sub-Total								332,474.82

Task List	Specific Description	Unit	Quantity	Cost / Unit	Annual Cost	Times Years	Cont %	Total Cost
PUBLIC SERVICES								
Access Control	Patrolling & CE monitor	L. Hours	240.00	52.50	12,600.00	3.0	0.0	37,800.00
Access Control	Site use requests and	L. Hours	96.00	52.50	5,040.00	3.0	0.0	15,120.00
Agency Coordination	BLM Coordination	L. Hours	48.00	52.50	2,520.00	3.0	0.0	7,560.00
Agency Coordination	Fire and mosquito control	L. Hours	8.00	52.50	420.00	1.0	0.0	420.00
Community Outreach	Communication- outside	L. Hours	24.00	52.50	1,260.00	3.0	0.0	3,780.00
Sign	Boundary posts	Item	300.00	11.50	3,450.00	1.0	10.0	3,795.00
Sign	Boundary signs	Item	500.00	6.36	3,180.00	1.0	10.0	3,498.00
Sign	Boundary signs- install	L. Hours	300.00	30.00	9,000.00	1.0	0.0	9,000.00
Website	Updates	L. Hours	8.00	52.50	420.00	3.0	0.0	1,260.00
Sub-Total								82,233.00
REPORTING								
Agency Report	Permit Renew Amend	L. Hours	16.00	52.50	840.00	1.0	0.0	840.00
Agency Report	Permit Reports	L. Hours	120.00	52.50	6,300.00	3.0	0.0	18,900.00
Annual Reports	Annual Summary Report	L. Hours	60.00	52.50	3,150.00	3.0	0.0	9,450.00
Annual Work Plan	Plan And Par Budget	L. Hours	24.00	52.50	1,260.00	3.0	0.0	3,780.00
Database Management	Data Input, analysis	L. Hours	192.00	52.50	10,080.00	3.0	0.0	30,240.00
GIS/CAD Management	Data Management	L. Hours	104.00	52.50	5,460.00	3.0	0.0	16,380.00
Sub-Total								79,590.00
SITE CONSTRUCTION/MAINT.								
Fence	Electric fence materials	Lin. Ft.	7,920.00	0.60	4,752.00	1.0	10.0	5,227.20
Fence	Maintenance, repair	L. Hours	100.00	52.50	5,250.00	3.0	0.0	15,750.00
Sub-Total								20,977.20
Subtotal								1,471,493.16
Administration								301,659.63
Total								1,773,152.79

Task List	Specific Description	Unit	Number of Units	Cost / Unit	Annual Cost	Years Divide	Cont %	Total Cost
BIOTIC SURVEYS								
Conservation Easement	Compliance Management	L. Hours	40.00	52.50	2,100.00	1.0	10.0	2,310.00
Conservation Easement	Compliance Monitoring	L. Hours	80.00	52.50	4,200.00	1.0	10.0	4,620.00
Ecologist	Plant/Animal surveys	C. Hours	120.00	90.00	10,800.00	1.0	10.0	11,880.00
General Wildlife	Diurnal Animal Transects	L. Hours	144.00	52.50	7,560.00	1.0	10.0	8,316.00
General Wildlife	Road Surveys	L. Hours	120.00	52.50	6,300.00	1.0	10.0	6,930.00
Mammalogist	Camera stations KF	L. Hours	120.00	52.50	6,300.00	1.0	10.0	6,930.00
Mammalogist	Grid setup and	L. Hours	48.00	52.50	2,520.00	5.0	10.0	554.40
Mammalogist	Small Mammal Trapping	L. Hours	600.00	52.50	31,500.00	1.0	10.0	34,650.00
Monitor Climate	Field Data Collection	L. Hours	64.00	52.50	3,360.00	1.0	10.0	3,696.00
Permit fee	SCP	Item	2.00	415.00	830.00	2.0	10.0	456.50
Plant Ecologist	Assess Riparian Veg	L. Hours	85.00	52.50	4,462.50	5.0	10.0	981.75
Plant Ecologist	Herb. spp. cover/comp	L. Hours	240.00	52.50	12,600.00	1.0	10.0	13,860.00
Plant Ecologist	Monitor VP hydrology	C. Hours	100.00	90.00	9,000.00	3.0	10.0	3,300.00
Plant Ecologist	Monitor shrub cover entire	L. Hours	120.00	52.50	6,300.00	5.0	10.0	1,386.00
Plant Ecologist	Vernal Pool qualitative	L. Hours	10.00	52.50	525.00	1.0	10.0	577.50
Plant Ecologist	Vernal Pool veg	C. Hours	120.00	90.00	10,800.00	5.0	10.0	2,376.00
Range Ecologist	Grazing coordination	L. Hours	140.00	52.50	7,350.00	1.0	10.0	8,085.00
Range Ecologist	Monitor RDM entire area	L. Hours	230.00	52.50	12,075.00	1.0	10.0	13,282.50
Range Ecologist	Monitor RDM on plots	L. Hours	160.00	52.50	8,400.00	1.0	10.0	9,240.00
Science Director	Decision support reviews	L. Hours	110.00	72.50	7,975.00	1.0	10.0	8,772.50
Science Director	Site vist	L. Hours	20.00	72.50	1,450.00	1.0	10.0	1,595.00
Wildlife Biologist	Branchiopod modified	L. Hours	120.00	52.50	6,300.00	3.0	10.0	2,310.00
Wildlife Biologist	CTS Larval Survey	C. Hours	120.00	90.00	10,800.00	3.0	10.0	3,960.00
Wildlife Biologist	Monitor hydrology CTS	L. Hours	20.00	52.50	1,050.00	3.0	10.0	385.00
Wildlife Biologist	Protocol branchiopod	L. Hours	600.00	52.50	31,500.00	15.0	10.0	2,310.00
Wildlife Biologist	Survey pond condition	L. Hours	20.00	52.50	1,050.00	1.0	10.0	1,155.00
Sub-Total								153,919.15
FIELD EQUIPMENT								
Binoculars	Binoculars, Low-end 10	Pair	2.00	195.00	390.00	8.0	10.0	53.62
Camera - Digital	Camera traps, batteries,	Item	10.00	300.00	3,000.00	8.0	10.0	412.50
Camera - Digital	Low-end Camera	Item	2.00	300.00	600.00	8.0	10.0	82.50
Chemical Sprayer	5 Gallon	Item	2.00	150.00	300.00	8.0	10.0	41.25
Chemical Sprayer	Vehicle rig	Item	1.00	525.00	525.00	8.0	10.0	72.18
Equipment	Misc tools/equipment	Item	1.00	600.00	600.00	1.0	10.0	660.00
GPS, Rover & Base	Sub-meter GPS	Item	2.00	4,000.00	8,000.00	8.0	10.0	1,100.00
Harrow	spike-tooth harrow	Item	1.00	550.00	550.00	8.0	10.0	75.62
Lock	Heavy duty lock	Item	15.00	20.00	300.00	5.0	10.0	66.00
Pond draining	Pump and hoses	Item	1.00	200.00	200.00	8.0	10.0	27.50
Protective Clothing	Clothing, gloves	Person	2.00	90.00	180.00	1.0	10.0	198.00
Quad Runners, 4WD	Mid-range Quality	Item	1.00	5,445.00	5,445.00	10.0	10.0	598.95
Quad Runners, 4WD	fuel/maintenance	Item	1.00	1,200.00	1,200.00	1.0	10.0	1,320.00
Storage	Storage container and	Item	1.00	3,500.00	3,500.00	30.0	10.0	128.33
Trap	Sherman	Item	500.00	25.00	12,500.00	20.0	10.0	687.50
Trap	Wild pig corral trap	Item	1.00	3,000.00	3,000.00	20.0	10.0	165.00
Trapping supplies	Bait	Item	3.00	50.00	150.00	1.0	10.0	165.00
Vehicle	Mileage (4x4)	Mile	38,448.00	0.90	34,603.20	1.0	25.0	43,254.00
Sub-Total								49,107.97

GENERAL MAINTENANCE

Task List	Specific Description	Unit	Number of Units	Cost / Unit	Annual Cost	Years Divide	Cont %	Total Cost
Dump Fees	Dump Fee	Item	4.00	25.00	100.00	1.0	10.0	110.00
Sanitation Control	Collection And Disposal	L. Hours	30.00	52.50	1,575.00	1.0	10.0	1,732.50
Trash Liners	Liners	Item	10.00	6.75	67.50	1.0	10.0	74.25
Sub-Total								1,916.75
HABITAT MAINTENANCE								
Exotic Animal Control	Drain CTS pond	L. Hours	80.00	52.50	4,200.00	10.0	10.0	462.00
Exotic Animal Control	Trapping-wild pigs	L. Hours	150.00	52.50	7,875.00	5.0	10.0	1,732.50
Exotic Plant Control	Aquatic weed control	Acre	10.00	2,000.00	20,000.00	4.0	10.0	5,500.00
Exotic Plant Control	Herbicide	Gallon	4.00	80.00	320.00	1.0	10.0	352.00
Exotic Plant Control	NPDES/APAP Permit Fee	Fee	1.00	2,100.00	2,100.00	4.0	10.0	577.50
Exotic Plant Control	NPDES/APAP Update	Item	1.00	3,000.00	3,000.00	12.0	10.0	275.00
Exotic Plant Control	Spray	L. Hours	120.00	52.50	6,300.00	1.0	10.0	6,930.00
Exotic Plant Control	Water quality testing	Item	1.00	4,500.00	4,500.00	4.0	10.0	1,237.50
Sub-Total								17,066.50
HABITAT RESTORATION								
Seeding	Monitor success	L. Hours	60.00	52.50	3,150.00	1.0	10.0	3,465.00
Seeding	Seeding, inc collection	L. Hours	225.00	52.50	11,812.50	1.0	10.0	12,993.75
Sub-Total								16,458.75
OFFICE MAINTENANCE								
Computer, PC Color	Laptop & Software	Item	2.00	1,700.00	3,400.00	5.0	10.0	748.00
Furniture	Office furniture	Item	2.00	250.00	500.00	15.0	10.0	36.66
GIS ARC/INFO	GIS, Pc Based	Item	2.00	600.00	1,200.00	5.0	10.0	264.00
Organization	Organization, resupply	L. Hours	60.00	52.50	3,150.00	1.0	10.0	3,465.00
Preserve Office	Reimbursement	Month	24.00	292.00	7,008.00	1.0	10.0	7,708.80
Telephone	Emerg. Sat-Phone	Item	2.00	1,100.00	2,200.00	8.0	10.0	302.50
Telephone	Phone service	Item	2.00	1,200.00	2,400.00	1.0	10.0	2,640.00
Telephone	Sat-Phone Service	Item	2.00	600.00	1,200.00	1.0	10.0	1,320.00
Sub-Total								16,484.96
OPERATIONS								
Audit	Audit-cost share	Annual	1.00	3,000.00	3,000.00	1.0	10.0	3,300.00
Conferences	Room and food	Day	20.00	350.00	7,000.00	1.0	10.0	7,700.00
Conferences	Travel	Day	2.00	750.00	1,500.00	1.0	10.0	1,650.00
Contracts	Produce Contracts	L. Hours	24.00	52.50	1,260.00	1.0	10.0	1,386.00
Employee Training	Classes/conferences	L. Hours	128.00	52.50	6,720.00	1.0	10.0	7,392.00
Employee Training	Herbicide training	L. Hours	12.00	52.50	630.00	1.0	10.0	693.00
Employee Training	PM transition, new	L. Hours	80.00	52.50	4,200.00	5.0	10.0	924.00
Insurance	Flat fee	Fee	1.00	300.00	300.00	1.0	10.0	330.00
Insurance	General-Acre	Fee	24,156.00	0.40	9,662.40	1.0	10.0	10,628.64
Insurance	LTA CE Legal Fund	Acre	1.00	48.00	48.00	1.0	10.0	52.80
Insurance	Pollution	Fee	1.00	500.00	500.00	1.0	10.0	550.00
Internal coordination	coordination/meetings	L. Hours	48.00	52.50	2,520.00	1.0	10.0	2,772.00
Membership	LTA/CCLT	Fee	1.00	75.00	75.00	1.0	10.0	82.50
Membership	PM professional org.	Fee	2.00	250.00	500.00	1.0	10.0	550.00
Subscription	CNDDB	Fee	1.00	25.00	25.00	1.0	10.0	27.50
Supervisor Site Visit	Lodging	Item	1.00	250.00	250.00	1.0	10.0	275.00
Supervisor Site Visit	Mileage	Mile	750.00	0.90	675.00	1.0	25.0	843.75

Task List	Specific Description	Unit	Number of Units	Cost / Unit	Annual Cost	Years Divide	Cont %	Total Cost
Sub-Total								39,157.19
PUBLIC SERVICES								
Access Control	Patrolling & CE monitor	L. Hours	240.00	52.50	12,600.00	1.0	10.0	13,860.00
Access Control	Site use requests and	L. Hours	96.00	52.50	5,040.00	1.0	10.0	5,544.00
Agency Coordination	BLM Coordination	L. Hours	48.00	52.50	2,520.00	1.0	10.0	2,772.00
Agency Coordination	Fire and mosquito control	L. Hours	8.00	52.50	420.00	2.0	10.0	231.00
Community Outreach	Communication- outside	L. Hours	24.00	52.50	1,260.00	1.0	10.0	1,386.00
Sign	Boundary posts	Item	300.00	11.50	3,450.00	8.0	10.0	474.37
Sign	Boundary signs	Item	500.00	6.36	3,180.00	8.0	10.0	437.25
Sign	Boundary signs- install	L. Hours	300.00	52.50	15,750.00	8.0	10.0	2,165.62
Website	Updates	L. Hours	8.00	52.50	420.00	1.0	10.0	462.00
Sub-Total								27,332.25
REPORTING								
Agency Report	Permit Renew Amend	L. Hours	16.00	52.50	840.00	2.0	10.0	462.00
Agency Report	Permit Reports	L. Hours	120.00	52.50	6,300.00	1.0	10.0	6,930.00
Annual Reports	Annual Summary Report	L. Hours	60.00	55.50	3,330.00	1.0	10.0	3,663.00
Annual Work Plan	Plan And Par Budget	L. Hours	24.00	52.50	1,260.00	1.0	10.0	1,386.00
Database Management	Data Input, analysis	L. Hours	192.00	52.50	10,080.00	1.0	10.0	11,088.00
GIS/CAD Management	Data Management	L. Hours	104.00	52.50	5,460.00	1.0	10.0	6,006.00
Management Plan	Management Plan	L. Hours	120.00	52.50	6,300.00	5.0	10.0	1,386.00
Sub-Total								30,921.00
SITE CONSTRUCTION/MAINT.								
Equipment Rental,	Bulldozer & Operator	Day	1.00	1,000.00	1,000.00	1.0	10.0	1,100.00
Fence	Electric fence materials	Lin. Ft.	5,280.00	0.60	3,168.00	10.0	10.0	348.48
Fence	Maintenance, repair	L. Hours	100.00	52.50	5,250.00	1.0	10.0	5,775.00
Fence	New Contract admin	Item	3.00	4,857.00	14,571.00	30.0	10.0	534.27
Fence	New Contract and	L. Hours	80.00	52.50	4,200.00	30.0	10.0	154.00
Fence	set up/maintenance	L. Hours	24.00	52.50	1,260.00	1.0	10.0	1,386.00
Fence - Installed	New--Barbed-wire, 4 Strd.	Lin. Ft.	144,747.00	5.50	796,108.50	30.0	10.0	29,190.64
Fence - Installed	Replace existing bound.	Lin. Ft.	92,246.00	5.50	507,353.00	30.0	10.0	18,602.94
Sub-Total								57,091.33
Subtotal								409,455.86
Administration								72,225.60
Total								481,681.46

Section 16 - Financial Summary

Property Title: Panoche Valley Date: 08/07/2015

1st Budget Year: 2015 ***State: CA*** ***PAR Code: MB077***

Item Descriptions	*Total*
Initial & Capital Financial Requirements	
Revenues	$0
Management Costs	$1,426,239
Contingency Expense	$45,255
Initial & Capital Management Total Costs	$1,471,493
Administrative Costs of Total Management Costs	$301,660
Initial & Capital Gross Costs	$1,773,153
Initial & Capital Net Costs	$1,773,153
Annual Ongoing Financial Requirements	
Revenues	$0
Ongoing Costs	$367,422
Contingency Expense	$42,034
Ongoing Management Total Costs	$409,456
Administrative Costs of Total Management Costs	$72,226
Ongoing Gross Costs	$481,681
Ongoing Net Costs	$481,681
Endowment Requirements for Ongoing Stewardship	
Endowment to Produce Income of $481,681	$10,704,033
Endowment per acre $443	
Stewardship costs are based on 4.50% of Endowment Earnings per Year	
Ongoing management funding per year is 481,681	
Resulting in a per acre per year cost of $20	
Total Funding Required	$12,477,186

Center for Natural Lands Management
A non-profit organization for the protection and management of natural resources

27258 Via Industria, Suite B
Temecula, CA 92590-3751
Phone: 760.731.7790
Fax: 760.731.7791
www.cnlm.org

September 9, 2015

Mr. Eric Cherniss
Panoche Valley Solar, LLC
825 Oak Grove Ave., Suite B
Menlo Park, CA 94025

SUBJECT: Property Analysis Record (PAR) for Conservation Easement Monitoring, Enforcement, and Defense (MED) Responsibilities on the ~ 24,000-acre Panoche Valley Preserve, San Benito and Fresno Counties, California (MB077)

Dear Mr. Cherniss:

The Center for Natural Lands Management (CNLM) appreciates the opportunity to provide Panoche Valley Solar LLC (PVS) with an estimate of funds needed for conducting the monitoring, enforcement, and defense responsibilities associated with holding a conservation easement (CE) on the Panoche Valley Preserve (Preserve or PVP). The Preserve is composed of three adjacent areas known as the Valadeao Ranch Conservation Lands, Valley Floor Conservation Lands, and Silver Creek Ranch Conservation Lands. The Preserve has extensive natural resources including habitat for San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia sila*), giant kangaroo rat (*Dipodomys ingens*), California tiger salamander (*Ambystoma californiense*), California condor *Gymnogyps californianus*), and other listed and native wildlife (Conservation Values).

This cost estimate was determined by completing a Property Analysis Record (PAR) using CNLM's software, PAR3©. The costs associated with CNLM's anticipated responsibilities towards the Preserve are described in this PAR letter and detailed in the attached PAR analysis. Mr. Greg Warrick, CNLM Preserve Manager, and Ms. Cathy Little, CNLM Regional Preserve Manager, visited the Preserve on December 22, 2014 to assess site conditions and develop a framework for perpetual conservation easement monitoring. Mr. Warrick and Dr. Deborah Rogers, CNLM Director of Conservation Science and Stewardship, visited the Preserve on April 24, 2015 and met with one of the ranching operators, Mr. John Eade, to further investigate Preserve conditions. Assumptions of this analysis are that CNLM would a hold a CE on the Preserve; be responsible for providing easement monitoring, enforcement, and defense; and manage the CE-related endowment.

This letter: (A) identifies the documents used in performing the PAR; (B) describes the Preserve in general narrative terms; (C) defines the conditions under which the PAR was prepared; (D) describes the CE reporting and monitoring activities (organized by PAR category); and (E) summarizes the cost estimates for these activities.

A. Documents Inventory

The following documents were reviewed in the preparation of the PAR:

- Final Environmental Impact Report, Panoche Valley Solar Farm Project. Aspen Environmental Group. (September 2010)
- Biological Assessment for the Panoche Valley Solar Facility. (April 2014)
- Draft Habitat Management Plan, Panoche Valley Solar Project Conservation Lands, San Benito and Fresno Counties, California. McCormick Biological, Inc. and Center for Natural Lands Management. (April 22, 2015)
- Draft Conservation Management Plan. (April 2014, revised internal draft January 2015)
- Incidental Take Permit Application. (April 2014)
- Blunt-nosed leopard lizard abbreviated survey results. (August 2014)
- Wetlands Mitigation and Monitoring Plan for Impacts to Water and Habitats, Panoche Valley Solar Facility Project, San Benito County, California. Energy Renewal Partners LLC. (May 15, 2015)
- Lake or Streambed Alteration Application (LSAA) Application (September 3, 2014) and Addendum (October 2014). Energy Renewal Partners, LLC.
- Various GIS files and maps (Received from PVS December 2014 - April 2015)

B. Property Description

The proposed Preserve encompasses approximately 24,146 acres and is located in eastern San Benito and western Fresno Counties (Figure 1). The Preserve will be set aside as mitigation for the Panoche Valley Solar Facility, a 2,506-acre area near Little Panoche Road and adjacent to the Preserve. The Preserve is made up of three adjacent areas, known as (from north to south): Valadeao Ranch Conservation Lands (VRCL), Valley Floor Conservation Lands (VFCL), and Silver Creek Ranch Conservation Lands (SCRCL). Much of the Valadeao and Silver Creek Ranch boundary is contiguous with property owned by the Bureau of Land Management (BLM). The rest of the Preserve generally borders private land used currently for cattle ranching.

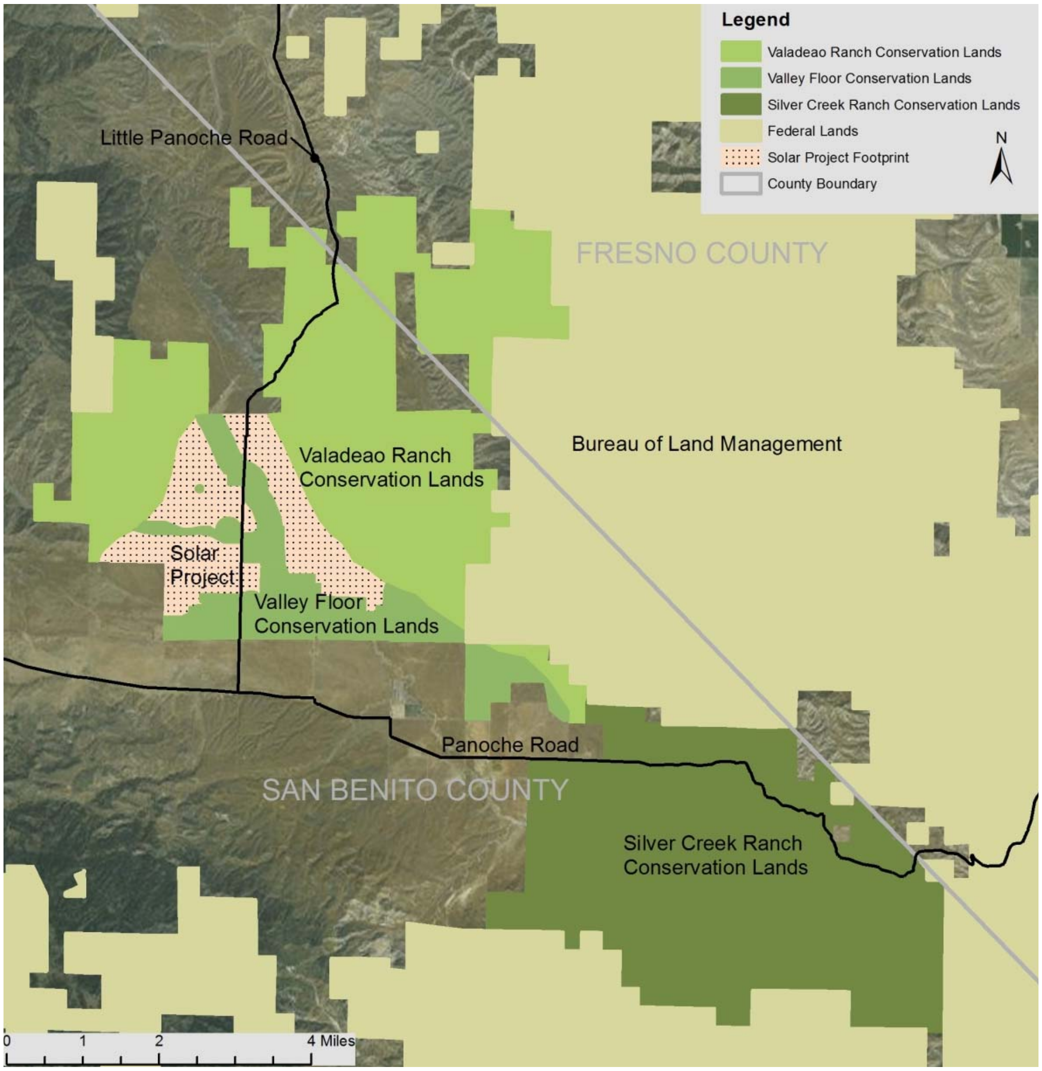

Figure 1. Lands proposed for the Panoche Valley Preserve and adjacent federal ownership, San Benito and Fresno Counties, California

The Panoche Valley and nearby rolling hills make up approximately half of the Preserve, whereas the remainder is moderately rugged terrain found in portions of the Panoche Hills and along the eastern slope of the Silver Creek drainage. There are three main creeks on site: (1) Panoche Creek runs generally east/west through VFCL before it turns south and bisects the north-central portion of Silver Creek Ranch; (2) Las Aguilas Creek runs through the western portions of VRCL and VFCL before joining Panoche Creek northwest of Silver Creek Ranch; and (3) Silver Creek clips the extreme southeast portion of Silver Creek Ranch. Both Silver Creek and Las Aguilas Creek only have ephemeral sources of water whereas Panoche Creek has year-round or near year-round surface water. Elevations range from approximately 940 feet at the lowest point of Panoche Creek to approximately 2,320 feet at one point along the ridge overlooking the Silver Creek drainage.

Well-drained loamy and sandy loam soils of the Panoche and Kettleman Series occur over most of the site. Rocky and gravelly soils are found in the western part of Valadeao Ranch. Riverwash soils are found along Panoche and Las Aguilas Creeks and clay loam is found in portions of eastern Valadeao Ranch.

Approximately 73% of PVP is comprised of annual grassland habitat, followed by Ephedra shrubland (21%), barrens (2.4%), and saltbush shrubland (2%). Other habitat types (juniper woodlands, oak woodlands, riparian, ponds, and vernal pools) each make up less than one percent of the land area.

The most widespread and dominant herbaceous species are annual grasses including ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Festuca myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Croton setigerus*), and bur clover (*Medicago polymorpha*) are also common, especially along ranch roads. The native perennial grass, Sandberg bluegrass (*Poa secunda*) is locally common on the Silver Creek and Valadeao Ranches.

Larger shrubs are absent from most of the flat terrain, but California ephedra (*Ephedra californica*) and allscale saltbush (*Atriplex polycarpa*) are common in the hilly portions of Valadeao Ranch. Other shrubs found on PVP include California sagebrush (*Artemisia californica*), shrubby ragwort (*Senecio flaccidus*), yellow aster (*Eastwoodia elegans*), narrowleaf goldenbush (*Ericameria linearifolia*), rubber rabbitbrush (*Ericameria nauseosa*) scrub, San Joaquin snakeweed (*Gutierrezia californica*) and California buckwheat (*Eriogonum fasciculatum*).

Trees are rare and found only on some of the wetter sites. California juniper (*Juniperus californica*) and blue oak (*Quercus douglassi*) are found on some of the north slopes of Valadeao Ranch whereas Fremont cottonwood (*Populus fremontii*) and red willow (*Salix laevigata*) are found within small areas of riparian habitat along Panoche Creek (on Silver Creek Ranch).

Many wetland types occur on the Preserve. However, most hold water during only part of the year. Wetland and associated habitats include ephemeral spring or seasonal spring, perennial spring, seasonal stream, and drainages.

The Preserve is located within a portion of the Ciervo-Panoche Natural Area, an area that has long been a focus of conservation for several of the listed species in this region. The areas that comprise the Preserve were specifically selected due to the presence of threatened and endangered species and their proximity to large, contiguous blocks of lands administered by the BLM. This natural area is known to support substantial populations of state and/or federal listed species, as mentioned previously, including San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, and San Joaquin antelope squirrel (*Ammospermophilus nelsoni*). Additional state- and federal-listed species that are present in the region in lower numbers and that will benefit from management of these Conservation Lands include California tiger salamander, California condor, and several branchiopod species such as vernal pool fairy shrimp (*Branchinecta lynchi*) and possibly longhorn fairy shrimp (*Branchinecta longiantenna*), conservancy fairy shrimp (*Branchinecta conservatio*), and vernal pool tadpole shrimp (*Lepidurus packardi*).

C. PAR Conditions

The following is a list of conditions used in calculating CNLM's expected conservation easement activity costs in perpetuity. Any additional permit conditions, or changes in plans or expectations, may require that changes be made to the PAR and the resulting estimate of costs.

1. Title. PVS will retain fee title to the Preserve and assume all responsibility for property taxes.

2. Boundaries. PVS will assume the cost to mark legal boundaries and maintain a boundary fence where the Preserve borders private land, with the exception of land-locked parcels of private land and small private inholdings between the Preserve boundary and BLM land. No fencing will be required where the Preserve borders BLM property. Cost of installing and maintaining signs indicating the Property is protected habitat with no public access will also be assumed by PVS as deemed necessary or required by the Conservation Easement Deed.

3. Funding the Endowment. The CE compliance monitoring endowment will be fully funded prior to CNLM accepting perpetual compliance monitoring and reporting responsibilities. It is assumed that CNLM will manage the endowment.

4. Public Use. There will be no right of general public access to the Preserve and all public activity on the Preserve will be prohibited except as provided by grazing leases, research/educational activities deemed appropriate by PVS and CNLM, or as otherwise provided in the Conservation Easement.

5. General Site Maintenance. PVS is responsible for clearing the Preserve of trash, debris, and/or hazardous materials; and for maintenance of any existing structures, roads, earthen dams, and culverts that serve a purpose that is supportive of the Conservation Values.

6. Access. It has been assumed, for the purposes of this cost analysis, that CNLM will have year-round, legal access to all areas that comprise the Preserve.

7. Long-term Management and Biological Monitoring. PVS will be responsible for stewardship of the Preserve unless and until such responsibilities, and their associated funding, are transferred. This includes performing all range and habitat management activities, performing biological monitoring, and preparing any required stewardship reporting.

8. Fire Breaks. PVS will be responsible for coordinating with California Department of Forestry and Fire Protection (CalFire) for any future fire breaks.

D. Conservation Easement PAR

Tasks and costs associated with CNLM holding a CE and monitoring the Preserve for CE compliance according to the CE-specific tasks listed in the attached PAR are described below.

1. Biotic Surveys – Conservation Easement Compliance Monitoring. Four site visits per year will be conducted by CNLM to assess status of the Preserve relative to the Conservation Values and to note any violations relative to the CE and baseline documentation.

2. Field Equipment. Vehicle costs and allowances for general field equipment required to conduct site inspections are included in this category. CNLM mileage rate is based on actual expenses for operating, maintaining, and replacing CNLM fleet vehicles used for our preserves. Specific costs included in the rate are associated with fuel, insurance, repair, regular maintenance, and replacement.

3. Office Maintenance. The PAR contains a share of rent, utilities, supplies, and equipment for maintaining a local office. Costs for providing and maintaining an appropriate work environment and tools for CNLM staff (e.g., office maintenance, computer, cell phone, etc.) are represented in the PAR as a proportional share of those total expenses based on the fraction of a full-time employee needed to fulfill staff responsibilities (i.e., ~0.13). This category also includes purchase and periodic replacement of an emergency satellite phone.

4. Operations. A share of costs associated with liability insurance, external audits, and memberships with the Land Trust Alliance and California Council of Land Trusts are included in this category. Funds have also been included to allow staff participation in professional workshops, conferences, and meetings to meet the need for the Preserve Manager to stay current with monitoring technologies, implications from changes in conservation easement law, and other advancements or changes relative to conservation easement policies and practices.

5. Reporting. An annual report summarizing results of CE compliance monitoring visits will be prepared and appropriately distributed by CNLM. This section also includes indirect reporting costs, such as preparing an annual budget and maintenance of GIS and photographic databases.

6. Contingency. A contingency amount of 10% is included with annual operating costs for most items to account for unforeseen events and/or challenges associated with monitoring the preserve, as well as the uncertainty of cost estimation over perpetuity.

7. Administration. Costs of running payroll, benefits, accounting, and other tasks in support of employees and the Preserve are included in this section. The overhead rate used by CNLM is 24% (as a percentage of annual operational costs).

8. Legal and Research/Development Funds. There is a one-time contribution to CNLM's Legal Defense Fund (at 1% of the Endowment) that will be set aside for any future legal disputes that may arise. There is a one-time contribution (at 1% of the Endowment) to CNLM's Research and Development Fund that can be used for technological updates and support as new technologies become available that would enhance or facilitate easement monitoring, or other types of information development that directly support the Preserve. As both are one-time contributions, they are included in the "Initial & Capital" (I&C) but not the ongoing costs. A contingency fee is not assessed on these two payments.

E. Cost Estimates

The PAR cost estimate has two components: (1) an I&C amount to cover the first three years of operating expenses, purchase of an emergency satellite phone, portion of vehicle acquisition costs, and payments to CNLM's Legal Fund and Research and Development Fund; and (2) an endowment amount to cover perpetual compliance monitoring and reporting costs. The endowment must be sufficient to provide income to cover the cost of monitoring the Preserve, inflation, and trust management fees in perpetuity. The I&C amount provides a source of funds for CNLM's CE-related activities on the Preserve in the first years of operation, allowing the endowment time to begin accumulating investment income to support monitoring expenses after the I&C period elapses, as well as protecting the value of the endowment during the first three years following establishment, buffering against any temporary downward trend in the market.

To determine the drawdown rate to use in calculating the endowment, CNLM, in consultation with its financial advisors, uses a 40-year history of changes in the consumer price index, bond returns, stock appreciation and yields (assuming a balanced portfolio) as its basis for assuming an annual average drawdown rate, after inflation, of 4.5% (the growing perpetual annuity). Other managers of the endowment might have substantially different rates of investment return and consequently different initial endowment values for supporting the required growing perpetual annuity.

Assuming that CNLM holds and manages the endowment and conducts the conservation easement responsibilities in perpetuity as detailed in the attached PAR, the following funding amounts will be required for the Preserve:

Funding Requirements	
Initial & Capital Costs	$128,454
Held in Trust (Endowment)	$823,554
Total Amount	**$952,008**

The endowment for conservation easement activities will enable experienced and professional CNLM staff to provide appropriate activities designed to protect the Conservation Values of this Preserve in perpetuity.

Please understand that these costs are based on the assumption that CNLM will hold the CE and the endowment in perpetuity. Should any of these assumptions change, the funding needed—either the annual budget or the amount needed for the endowment, or both—may change.

Further, please understand that this letter represents staff due diligence regarding the initial and perpetual monitoring and reporting CE responsibilities and costs only. It does not represent a commitment by CNLM to accept these responsibilities. Consideration of such acceptance by CNLM will be contingent on development of a mutually acceptable legal instrument (Endowment Management Agreement) and; appropriate response to conditions illuminated in Section B, PAR conditions. These, and related activities and discussions are currently taking place.

The time lag between this cost estimate (as represented by the date of this letter) and the actual establishment of the endowment will influence the final cost. **The terms and conditions of this proposal are valid for a period of six (6) months from the date of this letter**.

Please sign the duplicate copy of the final page of this letter acknowledging receipt of this PAR and return it to our office.

If you have any questions or comments regarding this PAR analysis, please do not hesitate to contact me.

Sincerely,

David R. Brunner
Executive Director
Center for Natural Lands Management

Attachment: Property Analysis Record: Panoche Valley Preserve, CE MED dated September 9, 2015

ACKNOWLEDGMENT RECEIPT

CE MED PAR (MB077) FROM CNLM

Please sign, date, and return this acknowledgment page to our office, along with any payments due if applicable. An executed acknowledgment page confirms you have received from CNLM a Property Analysis Record and corresponding cover letter explaining the contents of your report.

Thank you.

____
Eric Cherniss
Panoche Valley Solar, LLC

____
Date

PAR

Habitat Planning In Perpetuity

The Property Analysis Record

Title:	Panoche Valley Preserve CE MED
Par Code:	MB077
Prepared by:	Greg Warrick
	CNLM
Date:	09/09/2015

Section 1 - Property Information

Property Title: Panoche Valley Preserve CE MED PAR ID: MB077 Last Modified: 09/09/2015

Location/Jurisdiction	E-San Benito/W-Fresno Co.
County	SanBenitoFresno
Address	
City, State, Zip	
Conserved Acres	24146
Management type	Contract
Date Created	08/07/2015 11:26:39 AM
Prepared for	PVS Energy LLC
Prepared by	Greg Warrick CNLM

Project Management Information		Developer/Proponent Information	
Contact	Greg Warrick	Contact	Eric Cherniss
Company	CNLM	Company	PVS Energy LLC
Address	27258 Via Industria, Suite B	Address	845 Oak Grove Ave., Suite B
City, State, Zip	Temecula, CA 92590	City, State, Zip	Menlo Park, CA 94025
Phone	661-829-4181	Phone	408-460-8200
Fax		Fax	
E-Mail address	gwarrick@cnlm.org	E-Mail address	eric@pv2energy.com

Cost Year	2015
Date of site visit:	
Development Project	
Project Name	
Total Project Acres	0
Stage of planning	

Notes

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Contacts List

Name:	Cherniss, Eric	Phone:	408-460-8200
Position:	Vice President	Mobile:	- -
Company/Agency:	PV2 Energy LLC	Fax:	- -
Address:	854 Oak Grove Ave, Suite 202	Email:	eric@pv2energy.com
City, State & Zip:	Menlo Park, CA 94025		

Name:	Elizando, Trisha	Phone:	512-222-1125
Position:	Owner/COO	Mobile:	- -
Company/Agency:	Energy Renewal Partners	Fax:	- -
Address:	305 Camp Craft Road	Email:	telizondo@energyrenewalpartners.com
City, State & Zip:	West Lake Hills, TX 78746		

Name:	Greg, Warrick	Phone:	661-829-4181
Position:	Preserve Manager	Mobile:	- -
Company/Agency:	CNLM	Fax:	- -
Address:	27258 Via industria, Suite B	Email:	gwarrick@cnlm.org
City, State & Zip:	Temecula, CA, CA 95290		

Name:	Kaminsky, Jennifer	Phone:	858-320-2941
Position:		Mobile:	- -
Company/Agency:	Burns & McDonnell Engineering Co.	Fax:	- -
Address:	4225 Executive Square, Suite 500	Email:	jkaminsky@burnsmcd.com
City, State & Zip:	La Jolla, CA 92037		

Name:	Little, Cathy	Phone:	530-666-4297
Position:	Regional Preserve Manager	Mobile:	- -
Company/Agency:	CNLM	Fax:	- -
Address:	27258 Via Industria, Suite B	Email:	clittle@cnlm.org
City, State & Zip:	Temecula, CA 92590		

Name:	McCollum, Mike	Phone:	916-688-2040
Position:		Mobile:	- -
Company/Agency:	McCollum Associates	Fax:	- -
Address:	10196 Clover Ranch Drive	Email:	mccollum@mccollum.com
City, State & Zip:	Sacramento, CA 95829		

Contacts List

Name:	McCormick, Randi	Phone:	661-589-4065
Position:		Mobile:	- -
Company/Agency:	McCormick Biological, Inc.	Fax:	- -
Address:	P.O. Box 80983	Email:	randi@mccormickbiologicalinc.com
City, State & Zip:	Bakersfield, CA 93380		

Name:	Pimentel, John	Phone:	408-460-8200
Position:	President	Mobile:	- -
Company/Agency:	PV2 Energy LLC	Fax:	- -
Address:	845 Oak Grove Ave., Suite 202	Email:	john@pv2energy.com
City, State & Zip:	Menlo Park, CA 94025		

Name:	Rogers, Deborah	Phone:	510-799-7701
Position:	DCSS	Mobile:	- -
Company/Agency:	CNLM	Fax:	- -
Address:	27258 Via Industria, Suite B	Email:	drogers@cnlm.org
City, State & Zip:	Temecula, CA 92590		

Section 5 - Purpose of Preservation

Property Title: Panoche Valley Preserve CE MED   PAR ID: MB077   09/09/2015

Purpose of Preservation	Prioritize	Goals and Objectives
Agricultural Preservation	Not	The Conservation Lands would protect 24,146 acres of grazing lands.
Endangered Species	Not	The Conservation Lands would protect habitat for the following listed species among others: San Joaquin kit fox (Vulpes macrotis mutica), giant kangaroo rat (Dipodomys ingens), blunt-nosed leopard lizard (Gambelia sila), San Joaquin antelope squirrel (Ammospermophilus nelsoni), California tiger salamander (CTS; Ambystoma californiense), California condor (Gymnogyps californianus), and several branchiopods species such as Vernal Pool Fairy Shrimp (Branchinecta lynchi), Conservancy Fairy Shrimp (Branchinecta conservatio), Longhorn Fairy Shrimp (Branchinecta longiantenna), and Vernal Pool Tadpole Shrimp (Lepidurus packardi)
Open Space	Not	The Conservation Lands would protect 24,146 acres of open space land.
Watershed Protection	Not	The Conservation Lands would protect a portion of the Panoche/Silver Creek Watershed.
Wetlands	Not	The Conservation Lands would protect wetland habitats including ephemeral spring or seasonal spring, perennial spring, seasonal stream, wash, drainage, riparian, ponds, and vernal pools.
Wildlife Corridor	Not	The Conservation Lands would protect wildlife corridors throughout the large Conservation Land properties and through the project footprint.

Section 6 - Site Conditions

Property Title: Panoche Valley Preserve CE MED PAR ID: MB077 09/09/2015

Hydrological Features

Hydrological Features	Problem	Location	Notes
Down-cut Stream Channel	Medium	Both	Most of the larger stream channels show moderate erosion.
Water Storage	None	Both	Several water tanks on site for livestock water storage.
Wells, Sumps	None	Both	Several wells found on and off site provide livestock water.

Structures

Structures	Permitted/ Legal	Future Permitted	Problem	Location	Notes
Buildings, Outbuildings	No	No	None	Both	Barns and storage sheds on and off site.
Existing Structures	No	No	None	Both	Houses and outbuildings on Silver Creek Ranch. Not currently used.
Power or Utility Lines	No	No	None	Both	Power lines cross portions of the conservation lands.
Utility Facilities	No	No	None	Both	One PG&E gas line crosses the conservation lands (Silver Creek Ranch).

Section 7 - Land Use

Property Title: Panoche Valley Preserve CE MED PAR ID: MB077 09/09/2015

Recreation	Permitted	Future Permitted	Problem	Location	Notes
Hiking	No	No	Not Selected	Not Selected	
Passive Recreation	No	No	Not Selected	Not Selected	
Shooting/Hunting	No	No	Low	Adjacent	Permitted uses on adjacent BLM land.

Resource Use	Permitted	Future Permitted	Problem	Location	Notes
Livestock Grazing	Yes	Yes	Low	Both	Cattle grazing on conservation lands and adjacent lands. Sheep grazing on BLM allotments in Panoche Hills.

ANIMALS

Common Name: / Scientific Name:	Ranking: Status:			Acreage:	Individual:	Notes:
AMPHIBIANS						
California Tiger Salamander *(Ambystoma californiense)*	Global: G2	National: N2N3	State: S2S3			Observed in one pond on the Valadeao Ranch Conservation Area and there are historical occurrences in two ponds on the Valley Floor Conservation Area.
BIRDS						
Burrowing Owl *(Athene cunicularia)*	Global: G4	National: N4B,N4	State: S2			Observed during surveys on the project footprint and Valley Floor Conservation Area.
California Condor *(Gymnogyps californianus)*	Global: G1	National: N1	State: S1			Was not observed on the Conservation Lands during surveys. However, suitable foraging habitat exists, and one of the active release sites is located at Pinnacles National Monument, approximately 16 flight miles southwest of the Conservation Lands.
Tricolored Blackbird *(Agelaius tricolor)*	Global: G2	National: N2N3	State: S2			Species observed during surveys on the project footprint and Valey Floor conservation Area.
FAIRY, CLAM, AND TADPOLE SHRIMPS						
Conservancy Fairy Shrimp *(Branchinecta conservatio)*	Global: G1	National: N1	State: S1			Was not observed on the Valley Floor or Valadeao Ranch Conservation Area during surveys. No vernal pools were identified during summer surveys on the Silver Creek Ranch, so no vernal pool branchiopod surveys were conducted in the Conservation Area.
Longhorn Fairy Shrimp *(Branchinecta longiantenna)*	Global: G1	National: N1	State: S1			Was not observed on the Valley Floor or Valadeao Ranch Conservation Area during surveys. No vernal pools were identified during summer surveys on the Silver Creek Ranch, so no vernal pool branchiopod surveys were conducted in that Conservation Area.
Vernal Pool Fairy Shrimp *(Branchinecta lynchi)*	Global: G3	National: N3	State: S2S3			Observed in one pool on the project footprint. Was not observed on the Valley Floor or Valadeao Ranch Conservation Area during

				surveys. No vernal pools were identified during summer surveys on the Silver Creek Ranch, so no vernal pool branchiopod surveys were conducted in that Conservation Area.
MAMMALS				
Giant Kangaroo Rat *(Dipodomys ingens)*	Global: G2	National: N2	State: S2	Observed on the Valadeao Ranch, Silver Creek Ranch, and Valley Floor Conservation Lands.
Kit Fox - San Joaquin Valley Population *(Vulpes macrotis mutica)*	Global: T2	National: N2N3	State: S2S3	Observed on the Valadeao Ranch, Silver Creek Ranch, and Valley Floor Conservation Lands.
Nelson's Antelope Squirrel *(Ammospermophilus nelsoni)*	Global: G2	National: N2	State: S2	Observed on the Valadeao Ranch, Silver Creek Ranch, and Valley Floor Conservation Lands.
REPTILES				
Blunt-nosed leopard lizard *(Gambelia sila)*	Global:	National:	State:	Observed on the Valley Floor Conservation Area and the Silver Creek Ranch Conservation Area.

INVASIVE/EXOTIC

Common Name: / Scientific Name:	Ranking: / Status:			Acreage:	Individual:	Notes:
FLOWERING PLANTS						
Compact Brome *(Bromus madritensis)*	Global: GNR	National: NNA	State: SNA			Dominant herbacesous species at times within the Conservation Lands.
Pin Clover *(Erodium cicutarium)*	Global: GNR	National: NNA	State: SNA			Commonly found throughout the Conservation Lands.
Salt-cedar *(Tamarix ramosissima)*	Global: GNR	National: NNA	State: SNA			Some Tamarix sp. individuals have been observed in or near Silver Creek.
Small-flower Tamarisk *(Tamarix parviflora)*	Global: GNR	National: NNA	State: SNA			Some Tamarix sp. individuals have been observed within or near Silver Creek.

NATURAL COMMUNITIES

Common Name: / Scientific Name:	Ranking: / Status:		Acreage:		Individual:	Notes:
CALIFORNIA						
Barrens *()*	Global:	National:	575 575	State:		
Blue Oak and Juniper Woodland *()*	Global:	National:	68 68	State:		
California Ephedra Shrubland *(Ephedra californica Shrubland [Placeholder])*	Global: GNR	National:	4964 4964	State:		
Drainage/Stream *()*	Global:	National:	88 88	State:		
Introduced Annual Grassland *()*	Global:	National:	17407 17407	State:		
Ponds *()*	Global:	National:	4 4	State:		
Saltbush Shrubland *()*	Global:	National:	476 476	State:		
Vernal Pools *()*	Global:	National:	3.1 3.1	State:		
Wetlands *()*	Global:	National:	235.1 235.1	State:		

PLANTS

Common Name: / Scientific Name:	Ranking: / Status:			Acreage:	Individual:	Notes:
FLOWERING PLANTS						
Benitoa *(Benitoa occidentalis)*	Global: G3	National: N3	State: S3.3			Observed on the Valadeao Ranch Conservation Area.
Chaparral Groundsel *(Senecio aphanactis)*	Global: G3	National: N1	State: S1.2			Observed on the Valadeao Ranch Conservation Area.
Naked Buckwheat *(Eriogonum nudum var. indictum)*	Global: T3	National: N3	State: S3.2			Observed in the Ephedra shrubland alliance on the conservation lands.
Salinas Milk-vetch *(Astragalus macrodon)*	Global: G3	National: N3	State: S3.3			Observed on the Valadeao Ranch Conservation Area
Santa Clara Thornmint *(Acanthomintha lanceolata)*	Global: G3	National: N3	State: S3.2			Observed on the Valadeao Ranch Conservation Area.
Serpentine Leptosiphon *(Leptosiphon ambiguus)*	Global: G3	National: N3	State: S3.2			Observed on the Valadaeo Ranch Conservation Area.

Section 9 - Documents and Maps

Property Title: Panoche Valley Preserve CE MED | PAR ID: MB077 | 09/09/2015

Document Path & Name	Contact/Affiliation	Phone/Fax/Email	Date Added
Description: Draft Conservation Management Plan \	Eric Cherniss/PVS Energy LLC/	408-460-8200	12/10/2015
Description: Final Environmental Impact Report \	Eric Cherniss/PVS Energy LLC/	408-460-8200	12/10/2014
Description: Biological Assessment \	Eric Cherniss/PVS Energy LLC/	408-460-8200	12/10/2014
Description: Incidental Take Permit Application \	Eric Cherniss/PVS Energy LLC/	408-460-8200	12/10/2014
Description: LSAA Application and Addendum \	Eric Cherniss/PVS Energy LLC/	408-460-8200	12/10/2014
Description: BNLL Abbreviated Survey Results \	Eric Cherniss/PVS Energy LLC/	408-460-8200	12/10/2014
Description: Wetlands Mitigation Monitoring Plan \	Eric Cherniss/PVS Energy LLC/	408-460-8200	01/29/2015

Section 10 - Permits and Agreements

Property Title: Panoche Valley Preserve CE MED   PAR ID: MB077   09/09/2015

Permit or Agreement	Date Issued	Expiration Date	Permit Number
Army Corp of Engineers	/ /	/ /	

Agency/Division/Type: USACE

Permit Purpose: Clean Water Act 404, revised application submitted December 2014. Completed in coordination with NEPA process expected June-Sept 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
County	/ /	/ /	

Agency/Division/Type: County of San Benito

Permit Purpose: CEQA Authorization. Final EIR released in 2010. Draft Supplemental EIR released in December 2014. Final SEIR expected April 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
County Requirement	/ /	/ /	

Agency/Division/Type: County of San Benito

Permit Purpose: Conditional Use Permit. Approved October 2010. Revised application submitted in November 2014. Revised CUP expected April 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Other	/ /	/ /	

Agency/Division/Type: SHPO, State Historic

Permit Purpose: Section 106 Consultation. Section 106 consultation initiated (again) by USACE March 2015. Completed in coordination with NEPA process; expected June-Sept 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
Regional Water Quality Control Board	/ /	/ /	

Agency/Division/Type: Central Coast RWQCB

Permit Purpose: Section 401 Certification. Revised application submitted February 2014. Public notice of 401 on Feb. 20, 2015. Expected April 2015. Also, Construction General Storm Water Permit. Not yet developed.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

State Dept. of Fish and Game	/ /	/ /	

Agency/Division/Type: CDFW

Permit Purpose: Incidental Take Permit. Revised application submitted March 2015. Expected June 2015. Also, Lake and Streambed Alteration Agreement. Revised application submitted March 2015. Expected June 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Permit or Agreement	Date Issued	Expiration Date	Permit Number
US Fish and Wildlife	/ /	/ /	

Agency/Division/Type: USFWS

Permit Purpose: Section 7 Consultation, Endangered/Threatened Species Take Permit. Biological Assessment submitted; accepted by USFWS as complete on Nov. 18, 2014. Expected June 2015.

Issued: No

Habitat Management Responsibilities: No

Performance Standards: No

Responsible Party:

Manager's Responsibilities Entered into PAR as Tasks and Reporting: No

Details:

Restoration Required: No

Monitoring Required: No

Report Required: No

Section 14 - Initial & Capital Tasks and Costs

Property Title: Panoche Valley Preserve CE MED PAR ID: MB077 09/09/2015

Task List	Specific Description	Unit	Quantity	Cost / Unit	Annual Cost	Times Years	Cont %	Total Cost
BIOTIC SURVEYS								
Conservation Easement	CE Monitoring hotel/meals	Annual	1.00	1,775.00	1,775.00	3.0	10.0	5,857.50
Conservation Easement	Compl. Monitoring- formal	L. Hours	48.00	52.50	2,520.00	3.0	0.0	7,560.00
Conservation Easement	Compl. Monitoring- observ	L. Hours	80.00	52.50	4,200.00	3.0	0.0	12,600.00
Conservation Easement	Compliance Management	L. Hours	40.00	52.50	2,100.00	3.0	0.0	6,300.00
Science Director	Coordination/Oversight	L. Hours	15.00	72.50	1,087.50	3.0	0.0	3,262.50
Science Director	Site vist	L. Hours	15.00	72.50	1,087.50	3.0	0.0	3,262.50
Sub-Total								38,842.50
FIELD EQUIPMENT								
Binoculars	Binoculars 10 X 50	Pair	0.13	195.00	25.35	1.0	10.0	27.88
Camera - Digital	Low-end Camera	Item	0.13	300.00	39.00	1.0	10.0	42.90
GPS, Rover & Base Unit	Gps/corrected	Item	0.13	4,000.00	520.00	1.0	10.0	572.00
Protective Clothing	hat, gloves, CNLM shirt	Not	0.13	90.00	11.70	3.0	10.0	38.61
Vehicle	Mileage -PM	Mile	3,340.00	0.90	3,006.00	3.0	10.0	9,919.80
Vehicle	Mileage -Science Director	Mile	403.00	0.90	362.70	3.0	10.0	1,196.91
Vehicle	Pickup 4x4- Initial Purchase	Item	0.13	35,000.00	4,550.00	1.0	10.0	5,005.00
Sub-Total								16,803.10
OFFICE MAINTENANCE								
Computer, PC Color	Laptop and periperals	Item	0.13	1,700.00	221.00	1.0	10.0	243.10
Furniture	Assorted items	Item	0.13	500.00	65.00	1.0	10.0	71.50
GIS ARC/INFO	GIS, Pc Based	Item	0.13	600.00	78.00	1.0	10.0	85.80
Organization	Resupply, repairs	L. Hours	5.00	52.50	262.50	3.0	0.0	787.50
Preserve Office	Reimbursement	Year	0.13	3,504.00	455.52	3.0	10.0	1,503.21
Telephone	Emergency Satellite Phone	Item	1.00	1,100.00	1,100.00	1.0	10.0	1,210.00
Telephone Charges,	Phone Charges	Person	1.00	600.00	600.00	3.0	10.0	1,980.00
Telephone Charges,	Phone Charges	Person	0.13	1,200.00	156.00	3.0	10.0	514.80
Sub-Total								6,395.91
OPERATIONS								
Audit	Audit-cost share	Annual	1.00	500.00	500.00	3.0	10.0	1,650.00
Conferences	Room and food	Annual	0.13	3,500.00	455.00	3.0	10.0	1,501.50
Conferences	Travel	Item	0.13	750.00	97.50	3.0	10.0	321.75
Employee Training	Classes, CE updates	L. Hours	8.00	52.50	420.00	3.0	0.0	1,260.00
Insurance	LTA CE legal fund	Fee	1.00	48.00	48.00	3.0	10.0	158.40
Insurance	Liability/fee	Acre	24,156.00	0.15	3,623.40	3.0	10.0	11,957.22
Legal & Emergency Fund	Establish Fund 1%	1% endow.	1.00	8,236.00	8,236.00	1.0	0.0	8,236.00
Project Accounting	Setup And Maintain	Item	1.00	375.00	375.00	1.0	0.0	375.00
Research &	Establish Fund 1%	1% endow.	1.00	8,236.00	8,236.00	1.0	0.0	8,236.00
Supervisor Site Visit	Lodging, meals	Item	1.00	78.00	78.00	3.0	10.0	257.40
Sub-Total								33,953.27
PUBLIC SERVICES								
Website	Content development	L. Hours	5.00	52.50	262.50	3.0	0.0	787.50
Website	LTA and CCLT	Annual	1.00	75.00	75.00	3.0	10.0	247.50
Sub-Total								1,035.00
REPORTING								
Agency Report	Annual Report	L. Hours	20.00	52.50	1,050.00	3.0	0.0	3,150.00
Annual Reports	Review	L. Hours	5.00	72.50	362.50	3.0	0.0	1,087.50

Section 14 - Initial & Capital Tasks and Costs

Property Title: Panoche Valley Preserve CE MED   PAR ID: MB077   09/09/2015

Task List	Specific Description	Unit	Quantity	Cost / Unit	Annual Cost	Times Years	Cont %	Total Cost
Annual Work Plan	Schedule and budget	L. Hours	5.00	52.50	262.50	3.0	0.0	787.50
Database Management	Data Input, photo mgmt	L. Hours	15.00	52.50	787.50	3.0	0.0	2,362.50
GIS/CAD Management	Data Management	L. Hours	15.00	52.50	787.50	3.0	0.0	2,362.50
Sub-Total								9,750.00
Subtotal								106,779.79
Administration								21,673.86
Total								128,453.66

Task List	Specific Description	Unit	Number of Units	Cost / Unit	Annual Cost	Years Divide	Cont %	Total Cost
BIOTIC SURVEYS								
Conservation Easement	CE Monitoring hotel/meals	L. Hours	1.00	1,775.00	1,775.00	1.0	10.0	1,952.50
Conservation Easement	Compl. Monitoring- formal	L. Hours	48.00	52.50	2,520.00	1.0	10.0	2,772.00
Conservation Easement	Compl. Monitoring- observ	L. Hours	80.00	52.50	4,200.00	1.0	10.0	4,620.00
Conservation Easement	Compliance Management	L. Hours	40.00	52.50	2,100.00	1.0	10.0	2,310.00
Science Director	Coordination/Oversight	L. Hours	15.00	72.50	1,087.50	1.0	10.0	1,196.25
Science Director	Site vist	L. Hours	15.00	72.50	1,087.50	1.0	10.0	1,196.25
Sub-Total								14,047.00
FIELD EQUIPMENT								
Binoculars	Binoculars 10 X 50	Pair	0.13	195.00	25.35	8.0	10.0	3.48
Camera - Digital	Low-end Camera	Item	0.13	300.00	39.00	8.0	10.0	5.36
GPS, Rover & Base	Gps/corrected	Item	0.13	4,000.00	520.00	8.0	10.0	71.50
Protective Clothing	hat, gloves, CNLM shirt	Not	0.13	90.00	11.70	1.0	10.0	12.87
Vehicle	Mileage -PM	Mile	3,340.00	0.90	3,006.00	1.0	25.0	3,757.50
Vehicle	Mileage -Science Director	Mile	403.00	0.90	362.70	1.0	25.0	453.37
Sub-Total								4,304.09
OFFICE MAINTENANCE								
Computer, PC Color	Laptop and periperals	Item	0.13	1,700.00	221.00	5.0	10.0	48.62
Furniture	Assorted items	Item	0.13	500.00	65.00	10.0	10.0	7.15
GIS ARC/INFO	GIS, Pc Based	Item	0.13	600.00	78.00	5.0	10.0	17.16
Organization	Resupply, repairs	L. Hours	5.00	52.50	262.50	1.0	10.0	288.75
Preserve Office	Reimbursement	Year	0.13	3,504.00	455.52	1.0	10.0	501.07
Telephone	Emergency Satellite	Item	1.00	1,100.00	1,100.00	8.0	10.0	151.25
Telephone Charges,	Phone Charges	Person	1.00	600.00	600.00	1.0	10.0	660.00
Telephone Charges,	Phone Charges	Person	0.13	1,200.00	156.00	1.0	10.0	171.60
Sub-Total								1,845.60
OPERATIONS								
Audit	Audit-cost share	Annual	1.00	500.00	500.00	1.0	10.0	550.00
Conferences	Room and food	Annual	0.13	3,500.00	455.00	1.0	10.0	500.50
Conferences	Travel	Item	0.13	750.00	97.50	1.0	10.0	107.25
Employee Training	Classes, CE updates	L. Hours	8.00	52.50	420.00	1.0	10.0	462.00
Insurance	LTA CE legal fund	Fee	1.00	48.00	48.00	1.0	10.0	52.80
Insurance	Liability/fee	Acre	24,156.00	0.15	3,623.40	1.0	10.0	3,985.74
Supervisor Site Visit	Lodging, meals	Item	1.00	78.00	78.00	1.0	10.0	85.80
Sub-Total								5,744.09
PUBLIC SERVICES								
Website	Content development	L. Hours	5.00	52.50	262.50	1.0	10.0	288.75
Website	LTA and CCLT	Annual	1.00	75.00	75.00	1.0	10.0	82.50
Sub-Total								371.25
REPORTING								
Agency Report	Annual Report	L. Hours	20.00	52.50	1,050.00	1.0	10.0	1,155.00
Annual Reports	Review	L. Hours	5.00	72.50	362.50	1.0	10.0	398.75
Annual Work Plan	Schedule and budget	L. Hours	5.00	52.50	262.50	1.0	10.0	288.75
Database Management	Data Input, photo mgmt	L. Hours	15.00	52.50	787.50	1.0	10.0	866.25
GIS/CAD Management	Data Management	L. Hours	15.00	52.50	787.50	1.0	10.0	866.25

Task List	Specific Description	Unit	Number of Units	Cost / Unit	Annual Cost	Years Divide	Cont %	Total Cost
Sub-Total								3,575.00
Subtotal								29,887.03
Administration								7,172.88
Total								37,059.92

Section 16 - Financial Summary

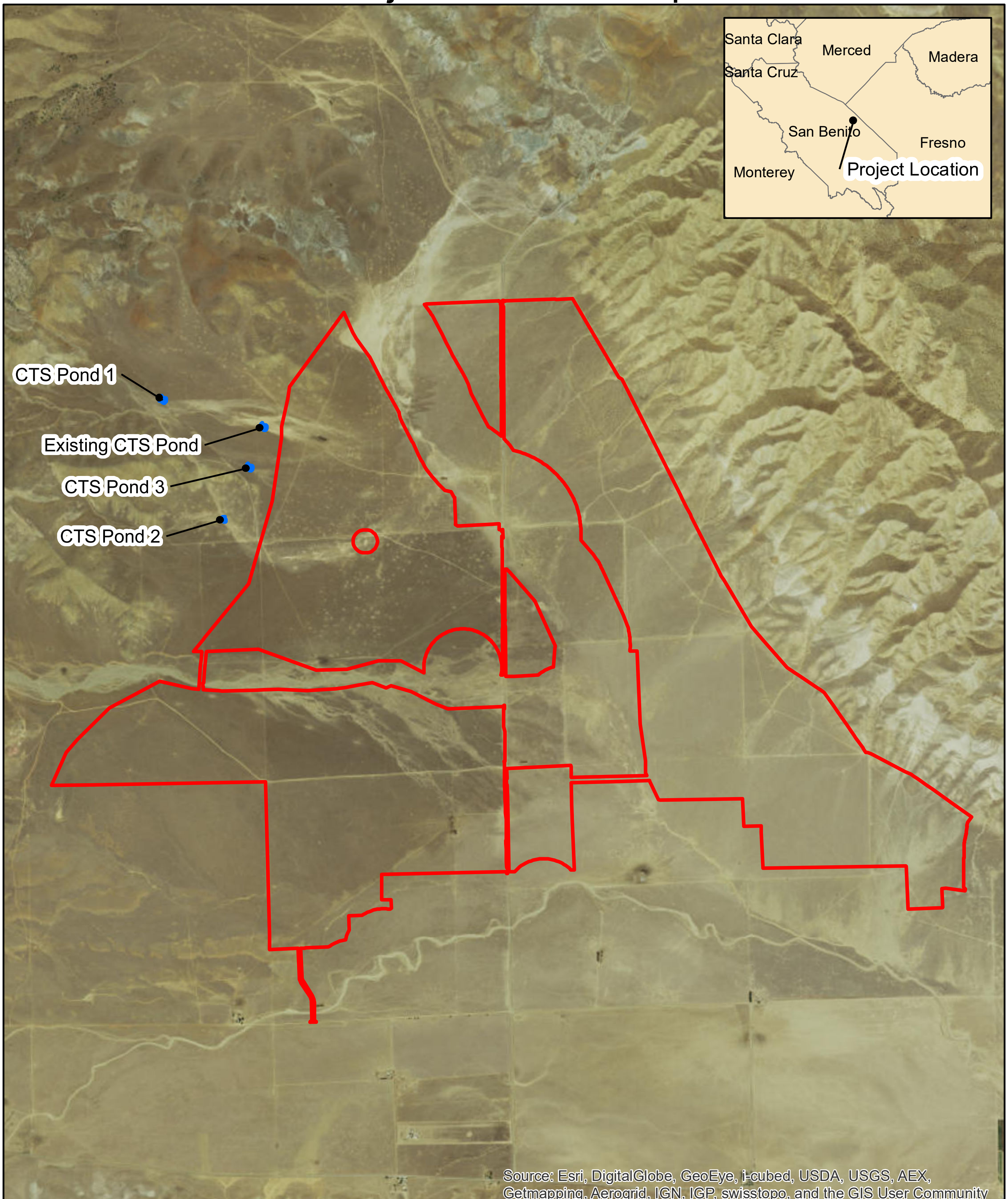
Property Title: Panoche Valley Preserve CE MED Date: 09/09/2015

1st Budget Year: 2015 ***State: CA*** ***PAR Code: MB077***

Item Descriptions	*Total*
Initial & Capital Financial Requirements	
Revenues	$0
Management Costs	$102,747
Contingency Expense	$4,033
Initial & Capital Management Total Costs	$106,780
Administrative Costs of Total Management Costs	$21,674
Initial & Capital Gross Costs	$128,454
Initial & Capital Net Costs	$128,454
Annual Ongoing Financial Requirements	
Revenues	$0
Ongoing Costs	$26,711
Contingency Expense	$3,176
Ongoing Management Total Costs	$29,887
Administrative Costs of Total Management Costs	$7,173
Ongoing Gross Costs	$37,060
Ongoing Net Costs	$37,060
Endowment Requirements for Ongoing Stewardship	
Endowment to Produce Income of $37,060	$823,554
Endowment per acre $34	
Stewardship costs are based on 4.50% of Endowment Earnings per Year	
Ongoing management funding per year is $37,060	
Resulting in a per acre per year cost of $2	
Total Funding Required	$952,008

Appendix E
Propose CTS Pond Designs

Project Location Map



CTS Ponds

PVSF Project Area

1:35,000

0 0.5 1 Miles

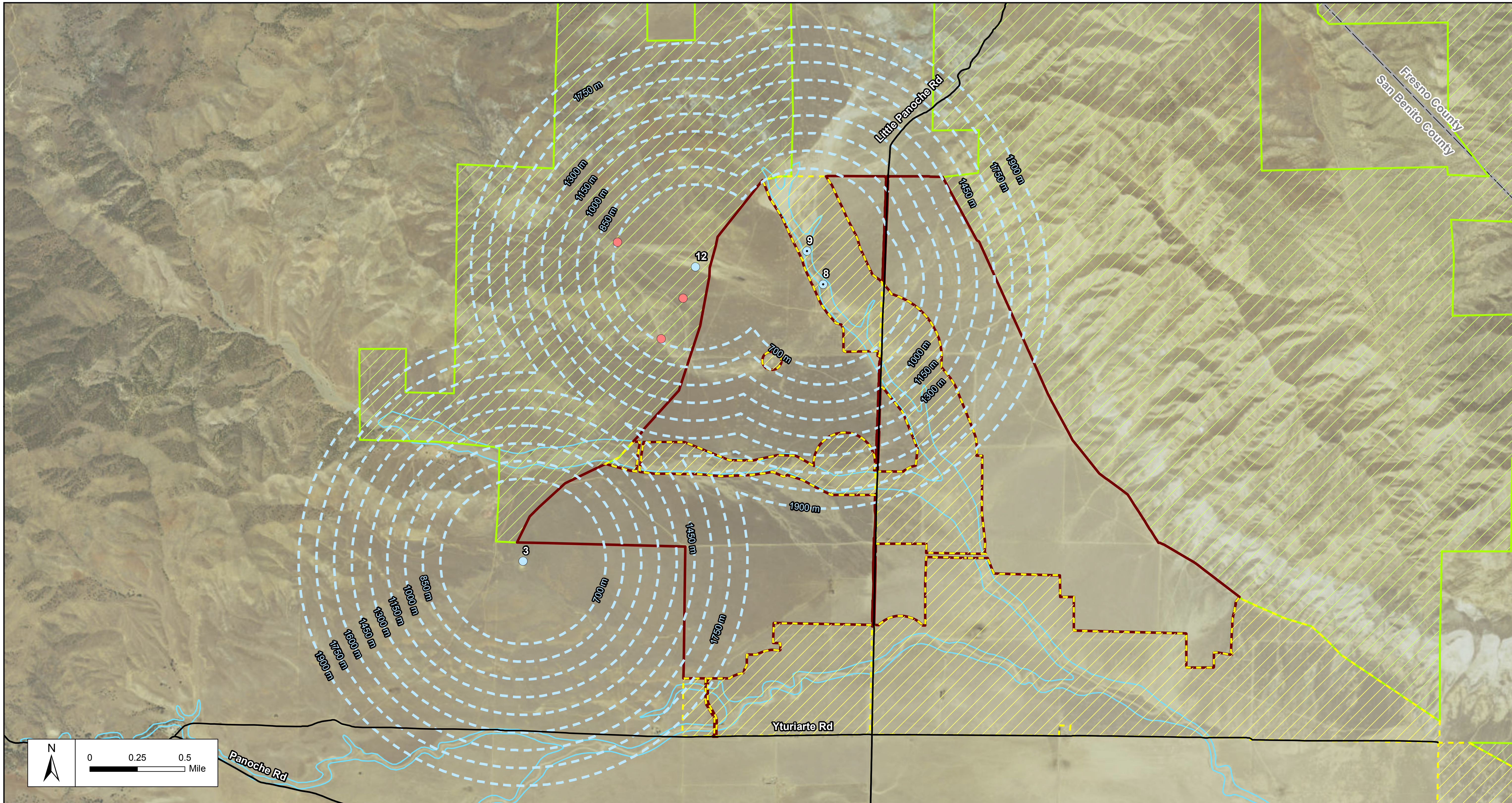
0 1 2 Kilometers

N W E S

PVSF Project
Figure 1 : Project Location

Natural Investigations Company

Map Date 8/11/2015



305 Camp Craft Road, Suite 575
West Lake Hills, Texas 78746
512-222-1125
www.energyrenewalpartners.com
Energy Renewal PARTNERS, LLC

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Historic CTS Breeding Pond
- Known CTS Breeding Pond
- Proposed CTS Pond
- CTS Pond Buffer
- 100-Year Floodplain

Panoche Valley Solar Project

California Tiger Salamander Ponds with Multiple Buffers

FIGURE

2

BFR 10/2/2015

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Monthly Precipitation[1], in	2.00	1.93	1.50	0.67	0.30	0.06	0.02	0.03	0.25	0.50	1.01	1.58	9.85
Median Monthly Precipitation[2], in	1.65	1.59	1.06	0.53	0.14	0.00	0.00	0.00	0.01	0.29	0.75	1.20	9.00
Mean Monthly Pan Evaporation[3], in	1.77	2.87	5.79	8.62	13.66	15.83	17.09	15.65	11.65	7.09	2.95	1.81	104.78

[1]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center

[2]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center. Median value calculated by WHPacific

[3]Data for Panoche Detention Dam, 1963-1975, from NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States

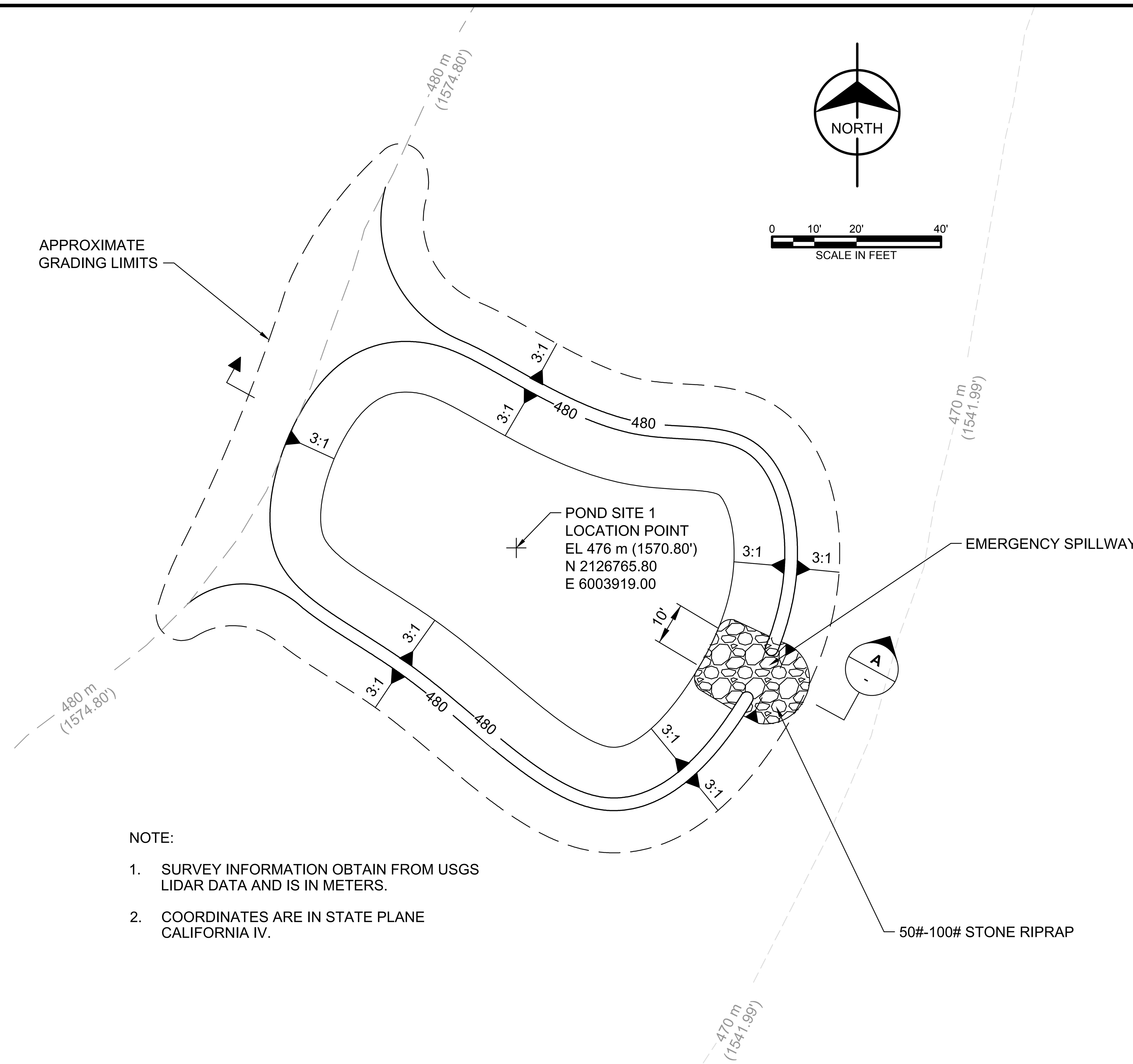
Proposed CTS Pond #1

Watershed Area =	0.44	mi^2
=	281.6	acres
Assumed fraction of rainfall that will reach pond* =	0.05	
Project pond infiltration rate** =	4.25E-02	in/hr

*Fraction based on previous water budget study performed by Powers Engineers

**In-situ infiltration rate projected by Powers Engineers in previous study

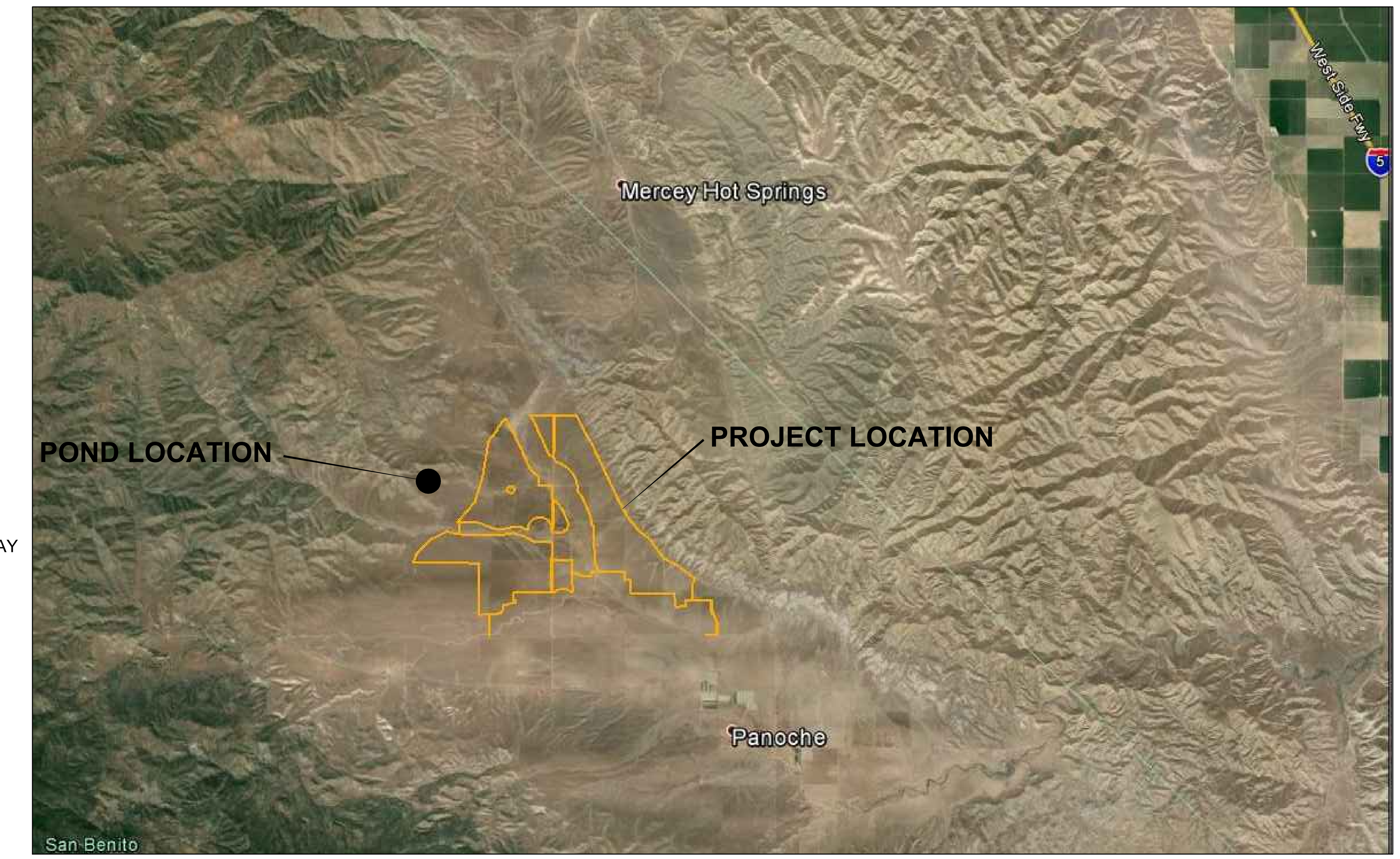
Month	Runoff Volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Exfiltration Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Cumulative Stored Volume at end of month (ac-ft)
September	0.012	0.090	0.114	0.290	0.110	0.000
October	0.340	2.480	0.164	0.419	0.097	0.000
November	0.880	3.000	0.176	0.448	0.043	0.389
December	1.408	3.000	0.176	0.448	0.026	0.429
January	1.936	3.000	0.176	0.448	0.026	0.429
February	1.866	3.000	0.176	0.448	0.042	0.429
March	1.244	3.000	0.176	0.448	0.085	0.429
April	0.622	3.000	0.176	0.448	0.126	0.429
May	0.164	1.290	0.116	0.295	0.132	0.167
June	0.000	1.310	0.139	0.355	0.184	0.000
July	0.000	0.000	0.000	0.000	0.000	0.000
August	0.000	0.000	0.000	0.000	0.000	0.000



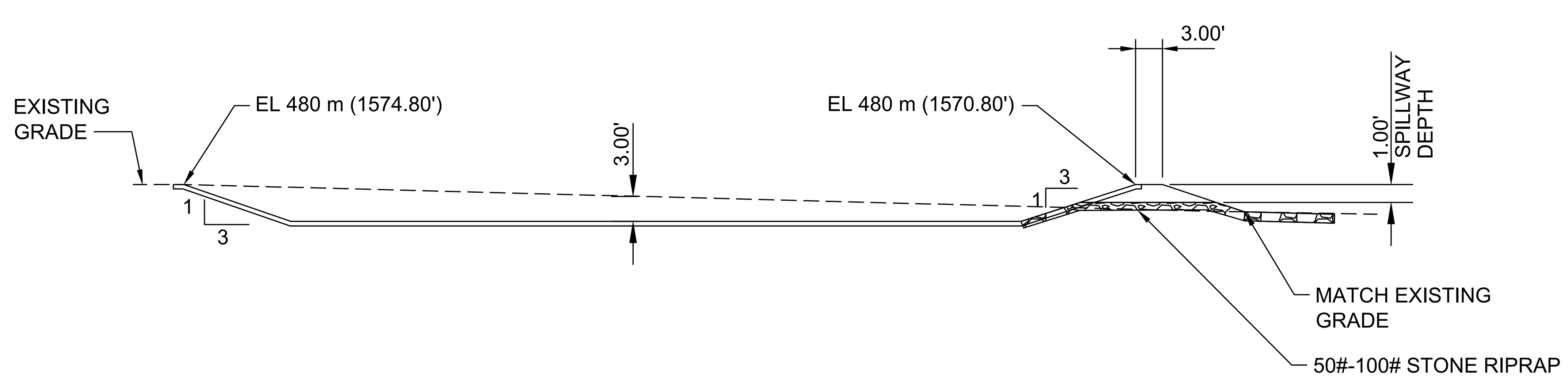
NOTE:

1. SURVEY INFORMATION OBTAIN FROM USGS LIDAR DATA AND IS IN METERS.
2. COORDINATES ARE IN STATE PLANE CALIFORNIA IV.

SITE PLAN



PROJECT LOCATION MAP
NOT TO SCALE



SECTION A
NOT TO SCALE

no.	date	by	ckd	description

BURNS McDONNELL
1111 N. 13TH STREET
SUITE 205
OMAHA, NE 68102

date	detailed
JUNE 23, 2015	C.JONES
designed	checked
A. EVANS	-

PVS Panoche Valley Solar, LLC

PROPOSED CTS
POND SITE 1

project	contract
80258	-

drawing C002 — rev. -

sheet of sheets

file drawing1.dwg

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Monthly Precipitation[1], in	2.00	1.93	1.50	0.67	0.30	0.06	0.02	0.03	0.25	0.50	1.01	1.58	9.85
Median Monthly Precipitation[2], in	1.65	1.59	1.06	0.53	0.14	0.00	0.00	0.00	0.01	0.29	0.75	1.20	9.00
Mean Monthly Pan Evaporation[3], in	1.77	2.87	5.79	8.62	13.66	15.83	17.09	15.65	11.65	7.09	2.95	1.81	104.78

[1]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center

[2]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center. Median value calculated by WHPacific

[3]Data for Panoche Detention Dam, 1963-1975, from NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States

Proposed CTS Pond #2

Watershed Area = 0.30 mi^2

= 192 acres

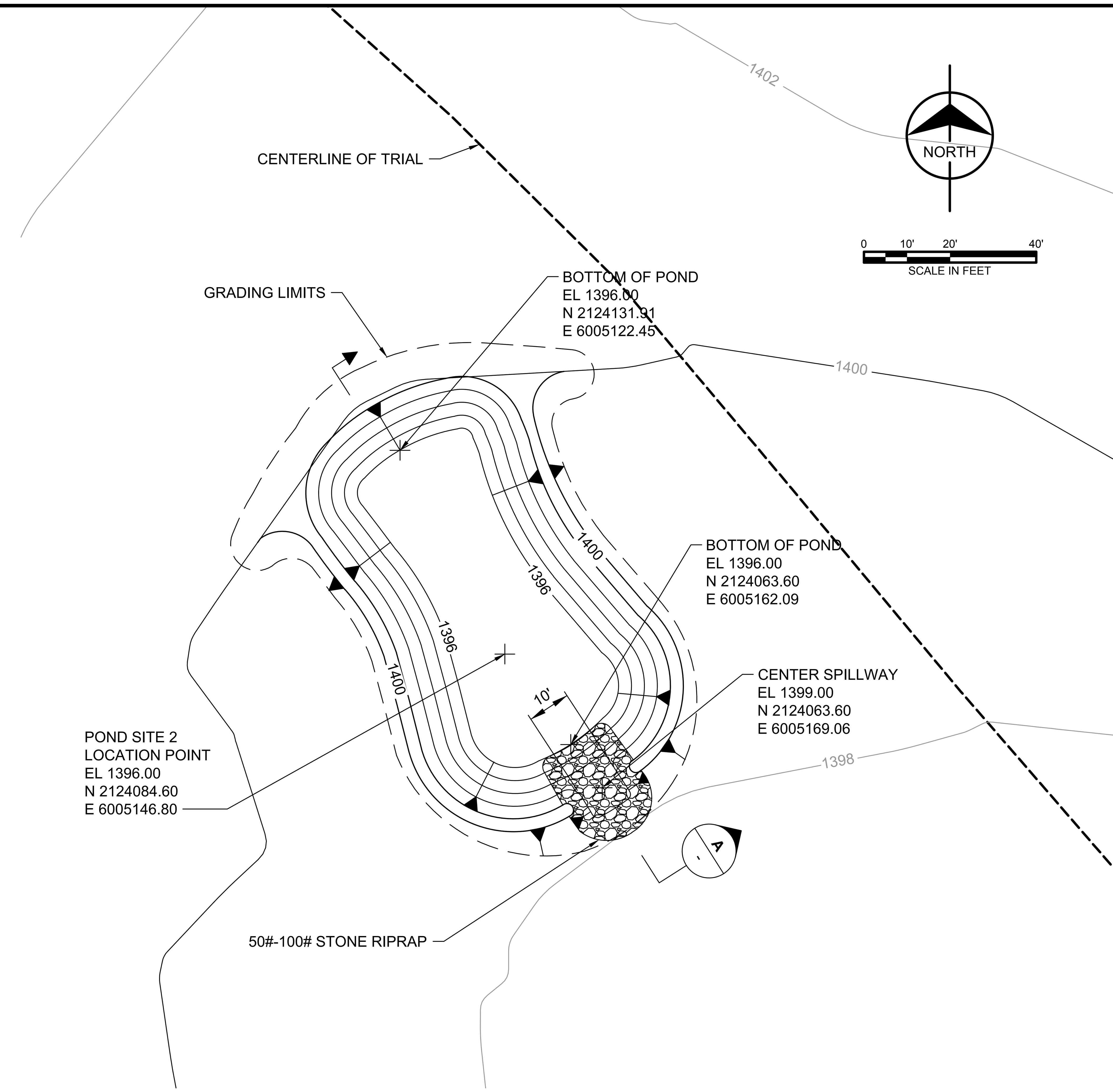
Assumed fraction of rainfall that will reach pond* = 0.00273

Project pond infiltration rate** = 0.0425 in/hr

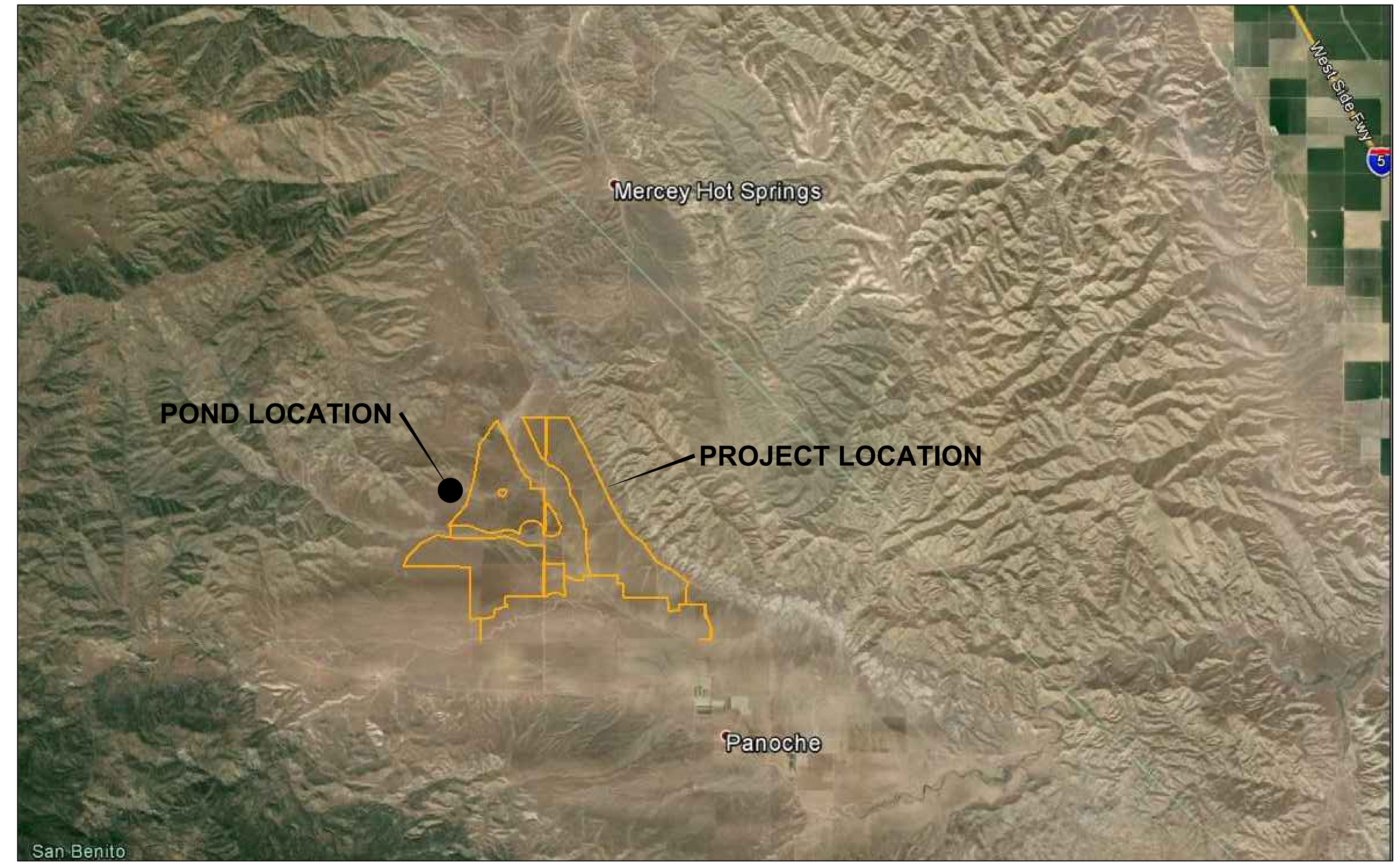
*Fraction based on previous water budget study performed by Powers Engineers

**In-situ infiltration rate projected by Powers Engineers

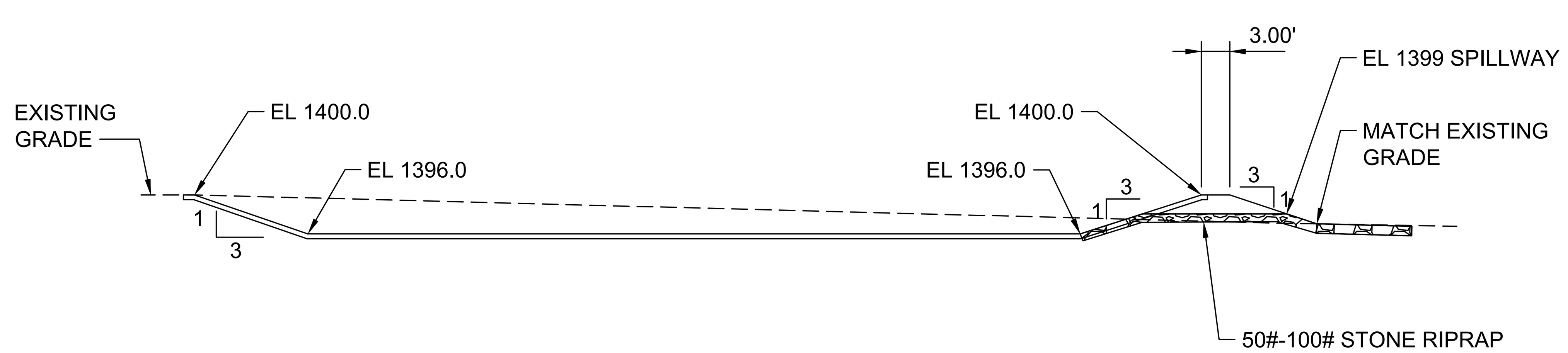
Month	Runoff Volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Exfiltration Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Cumulative Stored Volume at end of month (ac-ft)
September	0.000	0.010	0.000	0.000	0.000	0.000
October	0.013	0.150	0.004	0.000	0.002	0.000
November	0.033	0.440	0.011	0.002	0.003	0.002
December	0.052	0.700	0.017	0.006	0.003	0.006
January	0.072	0.960	0.024	0.011	0.004	0.011
February	0.069	1.030	0.026	0.013	0.006	0.013
March	0.046	0.690	0.017	0.006	0.008	0.006
April	0.023	0.340	0.008	0.001	0.006	0.001
May	0.006	0.0800	0.0020	0.0001	0.0020	0.0001
June	0.000	0.0100	0.0003	0.0003	0.0002	0.0000
July	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
August	0.000	0.0000	0.0000	0.0000	0.0000	0.0000



SITE PLAN



PROJECT LOCATION MAP
NOT TO SCALE



SECTION A
NOT TO SCALE

no.	date	by	ckd	description

BURNS McDONNELL
1111 N. 13TH STREET
SUITE 205
OMAHA, NE 68102

date	detailed
SEPTEMBER 1, 2015	C.JONES
designed	checked
A. EVANS	-

PVS Panoche Valley Solar, LLC

PROPOSED CTS
POND SITE 2

project	contract
80258	-

drawing C001 – rev. -

sheet of sheets

file drawing1.dwg

Scale For Microfilming
Millimeters
Inches

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Monthly Precipitation[1], in	2.00	1.93	1.50	0.67	0.30	0.06	0.02	0.03	0.25	0.50	1.01	1.58	9.85
Median Monthly Precipitation[2], in	1.65	1.59	1.06	0.53	0.14	0.00	0.00	0.00	0.01	0.29	0.75	1.20	9.00
Mean Monthly Pan Evaporation[3], in	1.77	2.87	5.79	8.62	13.66	15.83	17.09	15.65	11.65	7.09	2.95	1.81	104.78

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[2]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center. Median value calculated by WHPacific

[3]Data for Panoche Detention Dam, 1963-1975, from NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States

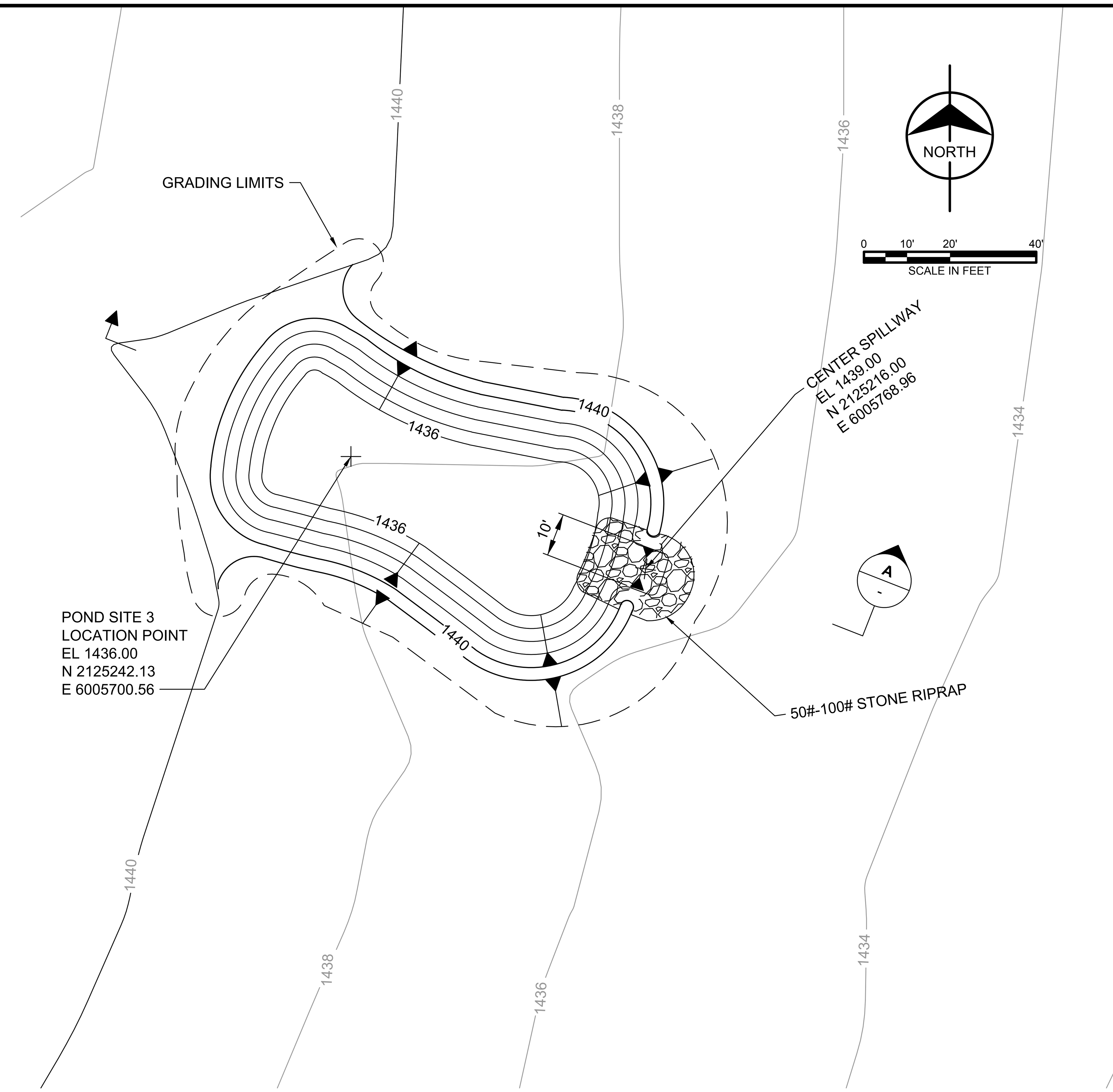
Proposed CTS Pond #3

Watershed Area = 0.65 mi^2
= 416 acres
Assumed fraction of rainfall that will reach pond* = 0.007
Project pond infiltration rate** = 4.25E-02 in/hr

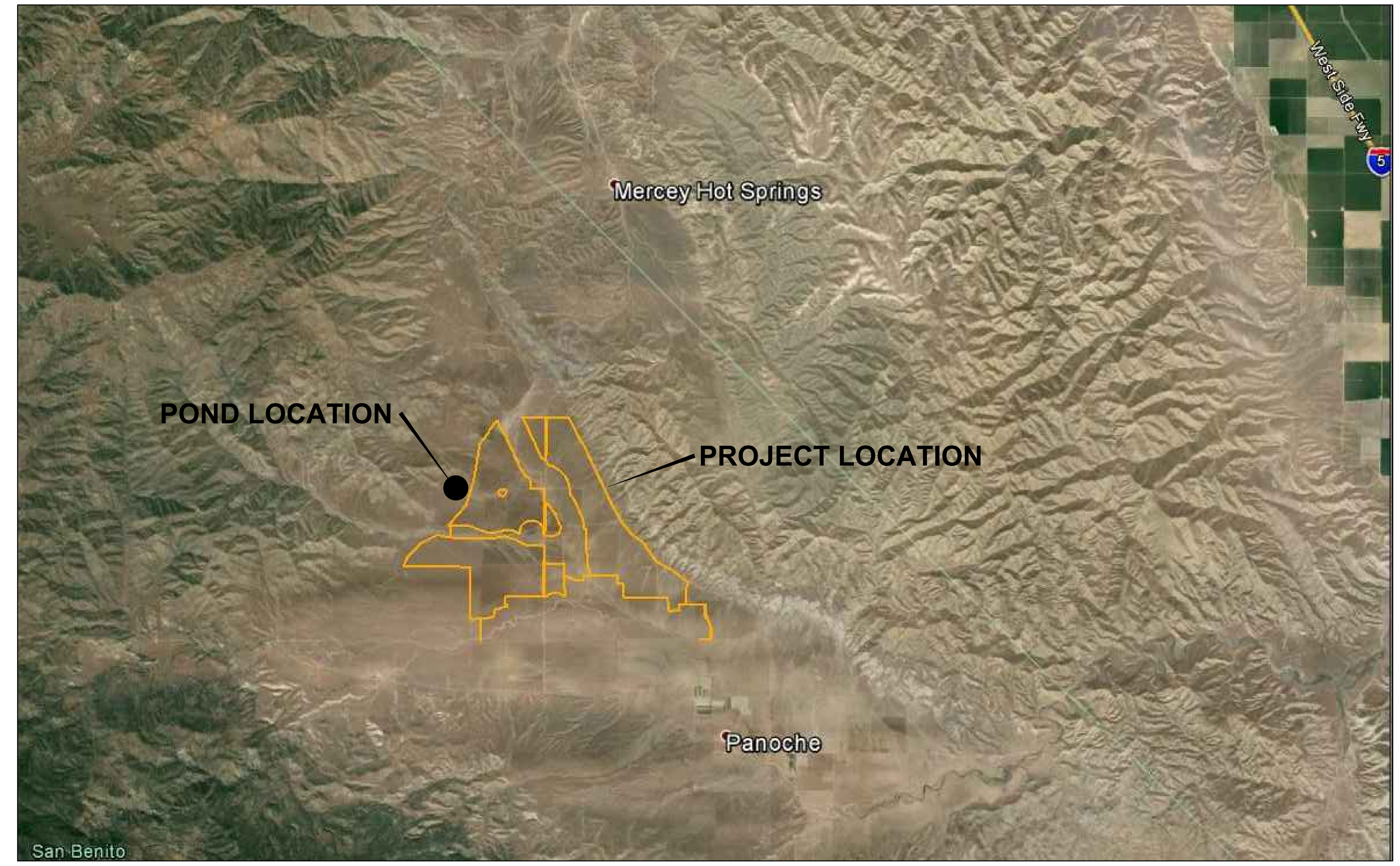
*Fraction based on previous water budget study performed by Powers Engineers, modified for change in topography of proposed location of pond

**In-situ infiltration rate projected by Powers Engineers in previous study

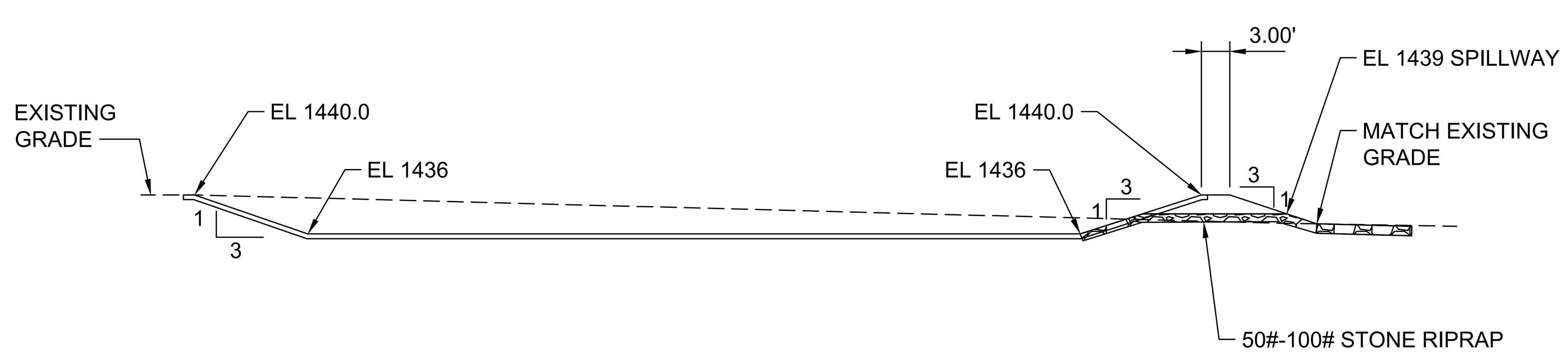
Month	Runoff Volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Exfiltration Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Cumulative Stored Volume at end of month (ac-ft)
September	0.002	0.020	0.051	0.130	0.050	0.000
October	0.070	0.560	0.059	0.151	0.035	0.000
November	0.182	1.440	0.072	0.183	0.018	0.000
December	0.291	2.170	0.086	0.219	0.013	0.059
January	0.400	2.830	0.099	0.252	0.015	0.193
February	0.386	2.730	0.097	0.247	0.023	0.309
March	0.257	1.970	0.082	0.210	0.040	0.317
April	0.129	1.040	0.067	0.170	0.048	0.228
May	0.034	0.270	0.055	0.140	0.063	0.058
June	0.000	0.220	0.059	0.150	0.077	0.000
July	0.000	0.000	0.000	0.000	0.000	0.000
August	0.000	0.000	0.000	0.000	0.000	0.000



SITE PLAN



PROJECT LOCATION MAP
NOT TO SCALE



SECTION A -
NOT TO SCALE

no.	date	by	ckd	description

BURNS McDONNELL
1111 N. 13TH STREET
SUITE 205
OMAHA, NE 68102

date SEPTEMBER 1, 2015	detailed C.JONES
designed A. EVANS	checked -

PVS Panoche Valley Solar, LLC

PROPOSED CTS
POND SITE 3

project 80258	contract -
drawing C003	rev. -
sheet	of sheets

file C003A.dwg

Scale For Microfilming
Millimeters
Inches

amec

Panoche Valley Solar Project Wind Erosion Protection and Fugitive Dust Control Plan

REGISTERED PROFESSIONAL ENGINEER
MATTHEW T. GILL
84621
CIVIL
STATE OF CALIFORNIA

12/04/15

DSN: AFK	AFK	DATE: 04DEC15
CHK: MTG	MTG	DATE: 04DEC15
APP: HRM		DATE: 04DEC15
APP: LEC		DATE: 04DEC15
APP: DRE		DATE: 04DEC15

Panoche Valley Solar LLC
AMEC Project No. 176055
AMEC Document No. C-RPT-000-003
<u>ISSUED FOR CONSTRUCTION</u>
BY Matthew T. Gill, PE 84621
December 04, 2015
Revision 0

Table of Contents

December 4, 2015

1.0 Introduction

The Panoche Valley Solar proposed project is a solar power plant located at 721 Little Panoche Road, Paicines, CA 95043. Located in the southeast corner of San Benito County the Panoche Valley Solar power plant is bisected by county road Little Panoche Road and is adjacent to USACE designated federal waters Las Aguilas Creek and Panoche Creek. Numerous other potential California Department of Fish and Wildlife jurisdictional streams and streambeds are located throughout the project site. An existing 230 kV 75-foot-wide Pacific Gas and Electric Company (PG&E) power line easement traverses the site along the southwest portion.

All construction traffic and deliveries will be along Little Panoche Road from the intersection of Little Panoche Road at interstate I-5 to the point of delivery at the project site about 1 to 2 miles north of the intersection of Little Panoche Road and Panoche Road.

The objective of the Panoche Valley Solar project is to first develop a solar power plant within the designated project boundary as defined with San Benito County Building and Planning and concurrently mitigate the impact from construction traffic along the 20.4 miles of Little Panoche Road.

A total of 592 Arraytech tracker groups, 151 power conversion skids, and one O&M trailer with a SCADA system will be installed on the site.

The total project area, excluding Little Panoche Road, is 6,212 acres. Of the total project area there is approximately 2,153 acres of development. Temporary disturbances are areas that will be restored to pre construction. Long term disturbances

The purpose of this report is to establish a plan to reduce the causes of wind erosion and control any subsequent fugitive dust from wind erosion.

2.0 Project Contact

The contact information for the individuals responsible for the preparation, submittal, and implementation of this plan is provided below.

Wind Erosion Protection Plan and Fugitive Dust Control Plan Preparation and Submittal;

Name	Matthew Gill, PE 84621
Title	Civil Engineer
Address	1979 Lakeside Parkway, Suite 400, Tucker, GA, 30084
Phone	770-688-2500
Fax	770-688-2501
Email	matthew.gill@amecfw.com

Wind Erosion Protection and Fugitive Dust Control Plan Implementation, Dust Control Monitor

Name	Nathan Featherstone
Title	Site Manager
Address	1979 Lakeside Parkway, Suite 400, Tucker, GA, 30084
Phone	648-688-9071
Fax	770-688-2500
Email	nathan.featherstone@amecfw.com

3.0 Wind Erosion and Fugitive Dust Sources from Panoche Valley Solar Project

Wind erosion and fugitive dust sources during the construction of the project are expected to result from site preparation and grading/excavation activities, on-site and offsite travel on paved and unpaved surfaces, and aggregate and soil loading and unloading operations, as well as wind erosion of areas disturbed during construction activities. The highest risk of increased wind erosion and increased fugitive dust will most likely occur during site preparation activities, when work such as vegetation clearing, grading, excavation of footings and foundations, and backfilling occurs. Other activities and construction practices such as vehicles rapidly moving throughout the site and spoil or topsoil piles provide sources for fugitive dust. This Wind Erosion Protection and Dust Control Plan are applicable to the project, as defined in Section 1 of this report.

4.0 Applicable Wind Erosion & Fugitive Dust Control Requirements

The Panoche Valley Solar project will apply, as necessary, the following recommended best management practices for dust control according to the CEQA Air Quality Guidelines of the MBUAPCD, the Final SEIR for the Panoche Valley Solar Project C.4 Air Quality, Comment Set A3 – MBUAPCD dated February 10, 2015, and the California Endagered Species Act Incidental Take Permit No. 2081-2014-035-04[1]. Site specific recommended control measures are detailed in Section 5.

(1) Limit grading to 50 acres per day, and grading and excavation to 2.2 acres per day.

(2) Water graded/excavated areas and active unpaved roadways, unpaved staging areas, and unpaved parking areas at least three times daily or apply non-toxic chemical soil stabilization materials per manufacturer's recommendations. Frequency should be based on the type of operations, soil and wind exposure.

(3) Reduction and/or prohibition of grading activities shall be required, as determined by the Dust Control Monitor, when wind speeds result in the visible transport of dust offisite.

(4) Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days).

(5) Apply non-toxic binders (e.g., latex acrylic copolymer) or water to exposed areas after cut and fill operations, and hydro-seed area.

(6) Plant vegetative ground cover compliant with County-approved Landscape Plan in disturbed areas as soon as possible.

(7) Cover, enclose, or apply soil stabilizers to inactive storage piles or water three times daily.

(8) Install track outs at the entrance to construction sites for all exiting trucks. Track outs will be a minimum of 100 feet long or twice the length of the longest vehicle entering the site. Track out pads will be a combination of corrugated steel "rumble plates" at exits of track out pads and 6 inches thick of class 150 (4" minimum diameter) stone preceding rumble pads. Rumble pads and track out stone will be maintained and cleaned as necessary to remove any deposited materials. Vehicles entering and exiting the site will be free of excessive dirt and debris and will be cleaned as necessary to satisfy fugitive dust control requirements. All on site construction equipment will be required to be washed prior to delivery to the site and washed (utilizing high pressure washers) prior to demobilizing. Construction traffic on site and between sections of the site will utilize track out devices prior to crossing paved roads. Delivery vehicles (over road tractor trailers, concrete and aggregate trucks, and all other delivery vehicles) will be required to travel on established roadways and utilize established lay down areas at the Project site. Vehicle traffic for employees will travel to established parking areas and enter and exit over the track out devices as previously described. Trackout devices will be regularly maintained and all construction equipment entering the site will be inspected and any equipment observed not to have been washed will not be permitted to enter the Project site.

(9) Use street sweepers, water trucks, or sprinkler systems in sufficient quantities to prevent airborne dust from leaving the site. Reclaimed (non-potable) water should be used whenever possible.

(10) All dirt stock pile areas shall be sprayed daily as needed.

(11) Permanent dust control measures identified in the approved project revegetation and landscape plans shall be implemented as soon as possible following completion of any soil disturbing activities; *R015-080 Panoche Valley Solar Project Habitat Restoration and Re-Vegetation Plan.*

(12) Exposed ground areas that are planned to be reworked at dates greater than one month after initial grading shall be sown with a fast germinating, non-invasive grass seed and watered until vegetation is established. Unless restricted in the biological resources mitigation measures, alternative methods for soil stabilization may be imple- mented, including but not limited to use of water to establish a crust, chemical stabilizers, and straw mulching.

(13) All disturbed soil areas not subject to revegetation shall be stabilized using approved chemical soil binders, jute netting, or gravel for temporary roads and any other methods approved in advance by the Monterey Bay Unified APCD.

(14) Gravel shall be placed on all roadways and driveways as soon as possible after grading for said roadways. In addition, building pads shall be laid as soon as possible after grading unless seeding, soil binders, or frequent water application are used.

(15) Vehicle speed for all construction vehicles shall not exceed 15 mph on any unpaved surface at the construction site. Travel along dedicated conservation areas inside the perimeter fence and 3 strand wire fence shall not exceed 5 mph.[1]

(16) All trucks hauling dirt, sand, soil, or other loose materials shall be covered or shall maintain at least 2 feet of freeboard (minimum vertical distance between top of load and top of trailer) in accordance with California Vehicle Code Section 23114.

(17) Unpaved road travel shall be limited to the extent possible, for example, by limiting the travel to and from unpaved areas, by coordinating movement between work areas rather than to central staging areas, and by busing workers where feasible.

(18) Inspect vehicle tires to ensure free of soil prior to carry-out to paved roadways.

(19) Sweep streets at the end of each day, or as needed, if visible soil material is carried onto adjacent paved roads. Water sweepers with reclaimed water shall be used where feasible.

(20) Post a publicly visible sign that specifies the telephone number and name to contact regarding dust complaints. This person shall respond to complaints and take corrective action within 48 hours. The phone number of the Monterey Bay Unified APCD shall also be visible to ensure compliance with Rule 402 (Nuisance).

(21) Permittee shall implement dust control measures during Covered Activities to facilitate visibility for monitoring of the Covered Species by the Designated Biologist. Permittee shall keep the amount of water used to the minimum amount needed, and shall not allow water to form puddles. Permittee shall not apply dust suppressant, surfactant, or soil binders or stabilizer products that may be harmful to Covered Species in upland or aquatic environments. Permittee shall obtain CDFW's written permission before applying any dust suppressant besides water or gravel. Permittee shall provide all available documentation of each product's safety or hazards to wildlife to CDFW with any such request for approval.[1]

5.0 Wind Erosion & Dust Control Measures

5.1 Dust Control Monitor and Construction Sign

A designated dust control monitor shall be chosen by the contractor to be responsible for maintaining the wind erosion and Dust Control Plan up to date and on site at all times, implementing enhancements to this Dust Control Plan if additional measures are needed, and prevent transport of dust off-site. Designated dust control monitor shall sign statement of purpose and commitment, see Appendix D. Additionally, an assistant dust control monitor is strongly recommended to be assigned to the project.

Contractor shall install a large sign (minimum 4 feet x 8 feet) that at a minimum lists the name of the project, the AMEC logo, the name and telephone number of the assigned AMEC dust control monitor, and the phone number of the MBUAPCD. The sign shall be installed in full public view at the north and south end of the project site along Little Panoche Road.

If the dust control monitor receives a dust or air quality complaint related to the construction project the monitor shall take corrective action within 48 hours. Failure to take corrective action could lead to a stop work order by MBUAPCD. The dust control monitor in conjunction with the site SWPPP monitor shall inspect the site to determine that the site is compliant with dust control plan prior to extended work stoppage for holidays or non-work days.

5.2 Paved and Unpaved Roads

The Panoche Valley Solar project will have a main perimeter road that will be majority gravel with portions of pavement. For the interior access the site will have unpaved temporary and unpaved maintenance roads for the construction of the solar farm and for the operation after construction, respectively. Contractor should enforce a 15 mph speed limit inside the project site except where otherwise noted[1]. During construction the contractor shall water unpaved roads as required (usually not less than three times daily) to control dust and reduce wind erosion. Watering of unpaved roads may be reduced or eliminated during periods of precipitation. If watering measures are not adequate contractor should consider other means and measures necessary to reduce fugitive dust to allowed levels.

The dust control monitor should inform all vendors of materials that could create nuisance dust to maintain the guidelines that “haul trucks shall maintain at least 2'0" of freeboard” or to “cover all trucks hauling dirt, sand, or loose materials”. Dust control monitor should be responsible for making sure that vendors follow the freeboard and cover guidelines. Vendors that completely ignore the freeboard and cover guidelines may be a liability to the project.

Contractor, sub-contractor, or any guest to the construction site shall not utilize unpaved roads as a main thoroughfare. All drivers shall use gravel or pavement roads to get to the closest unpaved road that will lead to intended destination. “Short Cuts” should not be allowed on site during construction.

5.3 Storage Piles

Exposed storage piles of soil and other excavated materials will be contained in a designated area within the perimeter security fence. All soil or dirt storage piles will be sprayed three times per day with water or as needed. In addition, storage piles that remain inactive for longer than four days should be covered by a mulching application (i.e. straw, hay, wood waste chips, sawdust, bark, geotextiles, etc…), other approved covering application, or at a minimum continue to be watered thrice daily for sufficient dust suppression. If stockpile is not removed and re-filled on site prior to end of construction activities contractor shall first apply hydro-seeding for final stabilization. If vegetation does not establish on stockpile contractor shall install erosion control blankets with a re-seeding or use semi-permanent mulching such as wood chips or bark. Approval from CDFW is required for dust suppression of storage piles with methods other than watering or gravel application.[1]

5.4 Paved Road Track-Out

Contractor shall utilize detail TC-1 and TC-2 for the stabilized construction entrance & exit and the stabilized construction roadway. Details for TC-1 and TC-2 can be found on the Panoche Valley Solar *Erosion and Sediment Control Typical Details,* (see Appendix A).

All vehicles that are used to transport solid bulk material will be provided with a cover or will maintain at least two feet of clearance from the top of the trailer when traveling public roads. Site manager and dust monitor will need to strictly enforce this when vehicles traverse across Little Panoche Road from each side of the project. Prior to transporting dirt, sand, and loose materials, the loads will be pre-moistened as necessary to prevent track-out and visible emissions of fugitive dust from occurring during the transportation process, this includes deliveries to site along Little Panoche Road as well. Contractor shall sweep Panoche Road directly adjacent to Little Panoche Road as required.

5.5 Earthmoving

Water will be applied by means such as trucks, water tanks, water wagons, water trailers, hoses, or sprinklers at sufficient frequency and quantity prior to, during, and after earthmoving operations. Loading activities will be executed carefully by maintaining the bucket close to the truck while dumping. Water will be applied as necessary during loading. Contractor will implement all requirements associated with earthmoving. If available in the stormwater ponds, contractor is encouraged to pump water from the ponds to watering trucks to preserve the site's natural groundwater resources.

5.6 Disturbed Surface Areas

The amount of disturbed area will be minimized wherever possible. All disturbed areas in the project and linear construction sites shall be watered until sufficiently wet. Wind erosion control techniques such as water, chemical dust suppressants, and/or vegetation will be used on all construction areas that may be disturbed. Vegetative ground cover will be placed in disturbed areas as soon as practical, but no later than NPDES regulation, following construction. If necessary contractor may also place non-vegetative stabilization measures such as decomposed granite or gravel mulch. Approval from CDFW is required for application of physical materials, such as chemical dust suppressants, etc., for dust suppression other than watering or gravel application.[1]

Site manager and dust control monitor should take special care to monitor employees for Valley Fever. Risk of Valley Fever will be highest during rough grading activities that cause dust conditions. Site manager and dust control monitor should employee best management practices such as;

- Issue a stop work during any dust storm or high winds.
    - High winds are defined by MBUAPCD as being over 15 MPH.
- Minimize hand digging to only necessary tasks.
- Employ the use of heavy earth moving equipment with a HEPA filtered cab.
- Water the soil before and while digging to minimize dust.
- Train employees to stay upwind as much as possible during digging activities.
- Have full face and half mask respirators available for employee PPE.

Failure to address the risk of Valley Fever on site could lead to employees that are sick and thus cause schedule delays. Please refer to this link for further information as is related to Valley Fever; http://www.cdph.ca.gov/programs/hesis/documents/coccifact.pdf

5.7 Inactive Areas

Disturbed lands that are unused for four consecutive days are considered inactive areas. Inactive storage piles and construction areas will be water sprayed as needed and may be applied with stabilizers. Inactive areas that are at high erosion potential either by wind or rain should be planted with vegetative cover or other approved method as soon as possible following construction activity.

6.0 Sensitive Receptors

Construction activities occurring near sensitive receptors require a higher level of planning for controlling fugitive dust. Sensitive receptors include school-aged children (schools, daycare, playgrounds), the elderly (retirement community, nursing homes), the infirm (medical facilities/hospitals), and receptors in residential areas near planned construction areas such as work sites, and access roads. The closest locations listed by the fore-mentioned category are as follows;

- School Aged Children: Panoche Elementary School, ¾ mile from the project's southeastern boundary.
- Elderly: Westside Elderly Care, approximately 30 miles northeast of project site
- Medical Facility: DOS Palos Memorial Hospital and Clinic, approximately 30 miles northeast of the project site.
- Large Residential Neighborhood: Soledad, California, approximately 28 miles southwest of project site.
- Individual Residential Properties: Several individual residential properties are within 1 mile to the project site boundary. None of the residents of these properties have been identified as sensitive receptors.

If in the case that any of the residents adjacent to the project site are identified as sensitive receptors the contractor shall take additional precautions, in addition to the standard requirements listed above, to reduce wind erosion and control fugitive dust as much as possible. Such measures would include but not be limited to additional and more frequent watering of disturbed areas, applying chemical dust suppressants, slowing the speed of construction equipment, and spacing equipment farther apart. Approval from CDFW is required for application of physical materials, such as chemical dust suppressants, etc., for dust suppression other than watering or gravel application.[1]

7.0 Monitoring and Recordkeeping Responsibilities

As the primary contractor on site, AMEC Construction is designated with implementing the Wind Erosion Protection and Fugitive Dust Control Plan. The site supervisor, listed in section 2.0, will have authority over this plan and should have a qualified backup that could also implement the plan if needed. It is the site Dust Control Monoitor's responsibility to:

- Read and understand the CEQA Air Quality Guidelines of the Monterey Bay Unified Air Pollution Control District (MBUAPCD), including but not limited to Section 8.0 mitigation measures.
- Maintain log detailing the implementation of this plan and have an up to date copy of plan available at the project site at all times. (sample log provided in Appendix B)
- Implement the Wind Erosion Protection and Fugitive Dust Control Plan and make sure that all employees and subcontractors know their responsibilities under this plan.
- Coordinate and comply with the San Benito County and the Monterey Bay Unified Air Pollution Control District in the implementation of their requirements in association with this plan.
- Implement secondary measures in the instance that the primary measures are ineffective.
- Monitor the project site to confirm compliance with this plan.

8.0 Secondary Mitigation Measures

If in the event that primary measures do not mitigate dust transfer volume to the extent necessary. The site shall take additional precautions by implementing secondary measures. Secondary measures, as described in the sections above, include but are not limited to the following:

- Using chemical dust suppressants, prior to purchase and use must get approval from Designated Biologist and CDFW[1].
- Installing additional vegetation, prior to purchase and use must get approval from Designated Biologist and CDFW[1].
- Spreading wood waste chips on disturbed areas, prior to purchase and use must get approval from Designated Biologist and CDFW[1].
- Slowing the speed of work
- Spacing working equipment farther apart
- Issuing temporary stop work order on days of high wind and/or high dust transfer volume.

Appendices

Appendix A - Daily Dust Control Log

Appendix B – CALEEMod Analysis

Appendix C – Statement of Purpose and Commitment

Appendix D – Final SEIR, Section C.4 Air Quality

Appendix E – MBUAPCD Final SEIR Comment Letter

Appendix F – CEQA Air Quality Guidelines, Section 8.0, Mitigation Measures

References

1. **California Department of Fish and Wildlife, California Endangered Species Act, Incidental Take Permit No. 2081-2014-035-04, *Panoche Valley Solar Project***

DAILY RECORDKEEPING LOG

Project Name:______________________________**Project Location:**______________________________**Date:**________________

Each time you visually check an area for dust control measure implementation, write the time in the shaded boxes at the top of the log and write a "Y", "N", or "NA", in all of the boxes below your recorded time.

Use the "Comments" column to record other pertinent information. For example, document the opacity of the fugitive dust or describe the corrective actions taken, such as placement of gravel for road cover or trackout control.

Time (indicate a.m. or p.m.)

1. Before Dust Generating Operations Occur

									Comments
A. Pre-watering to depth of cuts?									
B. Pre-watering stockpiled material?									
C. Work phased/Disturbance minimized?									
D. Water truck being operated?									
E. Water truck being filled?									
F. Other (specify in Comments column)									

2. During Dust Generating Operations

									Comments
A. Is visible dust present?									
B. Applying water?									
C. Applying dust suppressant(s) other than water?									
D. Fences or 3' – 5' high wind barriers with 50% porosity intact?									
E. Shut down operations?									
F. Checked control measures before leaving the work site for the day?									
G. Other (specify in Comments column)									

3. Unpaved Haul/Access Roads

									Comments
A. Is visible dust present?									
B. Observed vehicles travelling less than 15 miles per hour?									
C. Is road visibly moist?									
D. Is road covered with gravel, recycled asphalt, or other suitable material?									
E. Applying dust suppressant(s) other than water?									
F. Other (specify in Comments column)									

4. Loading, Unloading, And Storage Piles

									Comments
A. Is visible dust present?									
B. Pre-watering material?									
C. Water being applied during loading and unloading?									
D. Other (specify in Comments column)									

5. Trackout/Access Points

									Comments
A. Is trackout control device intact?									
B. Cleaned-up trackout?									
C. Other (specify in Comments column)									

6. Temporary Site Stabilization

									Comments
A. Applying water?									
B. Applying dust suppressant(s) other than water?									
C. Other (specify in Comments column)									

Total Number Of Gallons Applied:_________**Responsible Person's Signature And Title:**________________________________

Technical Memorandum

Date:	8 August 2014	From:	Stephen Ochs (AMEC)
To:	Panoche Valley Solar LLC		
Cc:	Chris Steves James Rustin		

Subject: **CalEEMod Analysis of Potential Particulate Emissions From Construction Activities at the Panoche Valley Solar Farm Project**

This memorandum summarizes the particulate emission modeling for earthmoving construction activities associated with the Panoche Valley Solar Farm Project in San Benito County, California. The California Emission Estimation Model (CalEEMod) version 2013.2.2 was used to estimate the maximum daily particulate matter less than 10 microns (PM-10) emissions associated with earth moving activities at the construction site. CalEEMod is a statewide land use emissions model developed in collaboration with the California Air Districts and approved for use with CEQA, NEPA, and other programs. CalEEMod was released on July 31, 2013, and most air quality districts no longer support the use of the Urbemis model in CEQA studies. CalEEMod has several advantages over Urbemis including the inclusion of CARB's EMFAC2011 emission factors, updated methods for calculating fugitive dust from grading and site preparation, and model defaults based on air district location.

Project Information

A list of the proposed construction equipment was supplied and is listed in Table 1. Since specific equipment models are subject to availability at the time of the project start, CalEEMod defaults for engine size and engine loading were used for this analysis.

Table 1: Default Equipment List

Equipment Type	Quantity
Scrapers	7
Bulldozer	2
Hydraulic Excavator	2
Wheel Loader	1
Backhoe	1
Gannon Tractor	1
Grader	4
Off road dump trucks	10
Roller	2
Water truck	5
Water Pull	4

The following additional information was provided and applied to the analysis:

- All equipment engines will be Tier 2 rated or better for the project.
- Fugitive dust controls will include watering all disturbed areas at least three times per day.
- Up to 15,000 cubic yards of material is expected to be imported to the site. The maximum expected daily amount of imported material will be 1,200 tons with up to 35 haul trips per day to deliver the material.

San Benito County was selected as the site location in CalEEMod. Based on the CEC Forecast Climate Zones figure in the CalEEMod Users Guide, zone 4 was used in the model.

Site grading will be phased with an anticipated maximum disturbed area of 50 acres per day. In order to provide flexibility in the construction, CalEEMod was set up to run a single construction day to determine the maximum allowable amount of acreage that can be disturbed per day without exceeding the 82 pound per day significance threshold. For comparison a run with the maximum anticipated disturbed area of 50 acres with material import is provided in the summary of the model runs (Table 2).

Table 2: CalEEMod Results

Fill Amount per Day	Area Disturbed (acres per day)	Daily PM-10 emissions	Daily PM-10 emissions onsite only	Significance Threshold (lbs/day)
0	175	81.8 lbs	80.6 lbs	82
1,200 tons with 35 haul trips	165	80.4 lbs	76.5 lbs	82
1,200 tons with 35 haul trips	50	31.0 lbs	28.9 lbs	82

The maximum daily PM-10 emissions from on-site construction emissions which are not expected to have a significant impact on local air quality are 82 pounds per day (APCD, 2008). The three scenarios listed in Table 2 above meet the agency emission limit.

CalEEMod output files for the three scenarios are provided in the Attachment.

REFERENCES

California Emissions Estimator Model, User's Guide, Version 2013.2, Prepared for: California Air Pollution Control Officers Association (CAPCOA), Prepared by: ENVIRON International Corporation and the California Air Districts, July 2013.

CEQA Air Quality Guidelines, Monterey Bay Unified Air Pollution Control District, revised February 2008.

ATTACHMENT

Panoche Valley Solar

San Benito County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	5,000.00	0.00	0

1.2 Other Project Characteristics

Urbanization Rural **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 50

Climate Zone 4 **Operational Year** 2015

Utility Company

CO2 Intensity (lb/MWhr) 0 **CH4 Intensity (lb/MWhr)** 0 **N2O Intensity (lb/MWhr)** 0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction Emissions Only

Land Use - user defined

Construction Phase - 1 day analysis

Off-road Equipment -

Off-road Equipment - anticipated equipment with default HP and loading

Grading - daily basis

Construction Off-road Equipment Mitigation - All equipment T2 or better

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	19.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
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tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	155,000.00	1.00
tblConstructionPhase	NumDays	15,500.00	1.00
tblGrading	AcresOfGrading	10.00	175.00
tblLandUse	LotAcreage	0.00	5,000.00

tblOffRoadEquipment	HorsePower	208.00	255.00
tblOffRoadEquipment	HorsePower	122.00	80.00
tblOffRoadEquipment	LoadFactor	0.43	0.40
tblOffRoadEquipment	LoadFactor	0.44	0.50
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType	Trenchers	Off-Highway Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	7.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	OperationalYear	2014	2015
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	38.7296	452.5180	243.0720	0.4375	186.8393	19.1531	205.9925	20.3711	17.6208	37.9918	0.0000	45,650.7208	45,650.7208	13.3295	0.0000	45,930.6407
Total	**38.7296**	**452.5180**	**243.0720**	**0.4375**	**186.8393**	**19.1531**	**205.9925**	**20.3711**	**17.6208**	**37.9918**	**0.0000**	**45,650.7208**	**45,650.7208**	**13.3295**	**0.0000**	**45,930.6407**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	11.7465	334.4497	244.8518	0.4375	73.6309	8.1978	81.8287	8.1472	8.1969	16.3441	0.0000	45,650.7208	45,650.7208	13.3295	0.0000	45,930.6407
Total	**11.7465**	**334.4497**	**244.8518**	**0.4375**	**73.6309**	**8.1978**	**81.8287**	**8.1472**	**8.1969**	**16.3441**	**0.0000**	**45,650.7208**	**45,650.7208**	**13.3295**	**0.0000**	**45,930.6407**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**69.67**	**26.09**	**-0.73**	**0.00**	**60.59**	**57.20**	**60.28**	**60.01**	**53.48**	**56.98**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	6/1/2015	6/1/2015	5	1	
2	Building Construction	Building Construction	6/2/2015	6/2/2015	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 175

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Rubber Tired Dozers	0	8.00	255	0.40
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	4	8.00	174	0.41
Grading	Off-Highway Trucks	10	8.00	400	0.38
Grading	Crawler Tractors	2	8.00	255	0.40
Grading	Scrapers	7	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Off-Highway Tractors	1	8.00	80	0.50
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Grading	Rollers	2	8.00	80	0.38
Grading	Off-Highway Trucks	9	8.00	400	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	39	98.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					185.5876	0.0000	185.5876	20.0391	0.0000	20.0391			0.0000			0.0000
Off-Road	38.1632	451.6252	233.5472	0.4228		19.1435	19.1435		17.6120	17.6120		44,389.6061	44,389.6061	13.2522		44,667.9012
Total	**38.1632**	**451.6252**	**233.5472**	**0.4228**	**185.5876**	**19.1435**	**204.7310**	**20.0391**	**17.6120**	**37.6511**		**44,389.6061**	**44,389.6061**	**13.2522**		**44,667.9012**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5664	0.8928	9.5248	0.0147	1.2518	9.6700e-003	1.2614	0.3320	8.7700e-003	0.3407		1,261.1148	1,261.1148	0.0774		1,262.7395
Total	**0.5664**	**0.8928**	**9.5248**	**0.0147**	**1.2518**	**9.6700e-003**	**1.2614**	**0.3320**	**8.7700e-003**	**0.3407**		**1,261.1148**	**1,261.1148**	**0.0774**		**1,262.7395**

3.2 Grading - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					72.3792	0.0000	72.3792	7.8153	0.0000	7.8153			0.0000			0.0000
Off-Road	11.1801	333.5569	235.3270	0.4228		8.1881	8.1881		8.1881	8.1881	0.0000	44,389.60 60	44,389.60 60	13.2522		44,667.90 12
Total	**11.1801**	**333.5569**	**235.3270**	**0.4228**	**72.3792**	**8.1881**	**80.5673**	**7.8153**	**8.1881**	**16.0034**	**0.0000**	**44,389.60 60**	**44,389.60 60**	**13.2522**		**44,667.90 12**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5664	0.8928	9.5248	0.0147	1.2518	9.6700e-003	1.2614	0.3320	8.7700e-003	0.3407		1,261.114 8	1,261.114 8	0.0774		1,262.739 5
Total	**0.5664**	**0.8928**	**9.5248**	**0.0147**	**1.2518**	**9.6700e-003**	**1.2614**	**0.3320**	**8.7700e-003**	**0.3407**		**1,261.114 8**	**1,261.114 8**	**0.0774**		**1,262.739 5**

3.3 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.577 1	2,689.577 1	0.6748		2,703.748 3
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.577 1**	**2,689.577 1**	**0.6748**		**2,703.748 3**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Building Construction - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0782	23.4615	17.8156	0.0268		0.9016	0.9016		0.9016	0.9016	0.0000	2,689.577 1	2,689.577 1	0.6748		2,703.748 3
Total	**1.0782**	**23.4615**	**17.8156**	**0.0268**		**0.9016**	**0.9016**		**0.9016**	**0.9016**	**0.0000**	**2,689.577 1**	**2,689.577 1**	**0.6748**		**2,703.748 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.356697	0.036069	0.187907	0.166875	0.060838	0.008979	0.012320	0.155582	0.001385	0.001251	0.008628	0.000550	0.002919

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Panoche Valley Solar

San Benito County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	5,000.00	0.00	0

1.2 Other Project Characteristics

Urbanization Rural **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 50

Climate Zone 4 **Operational Year** 2015

Utility Company

CO2 Intensity (lb/MWhr) 0 **CH4 Intensity (lb/MWhr)** 0 **N2O Intensity (lb/MWhr)** 0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction Emissions Only

Land Use - user defined

Construction Phase - 1 day analysis

Off-road Equipment -

Off-road Equipment - anticipated equipment with default HP and load factors

Grading - daily basis

Construction Off-road Equipment Mitigation - All equipment T2 or better

Trips and VMT - max of 35 haul trucks per day

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	19.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	155,000.00	1.00
tblConstructionPhase	NumDays	15,500.00	1.00
tblGrading	AcresOfGrading	10.00	165.00

tblGrading	MaterialImported	0.00	1,200.00
tblLandUse	LotAcreage	0.00	5,000.00
tblOffRoadEquipment	HorsePower	208.00	255.00
tblOffRoadEquipment	HorsePower	122.00	80.00
tblOffRoadEquipment	LoadFactor	0.43	0.40
tblOffRoadEquipment	LoadFactor	0.44	0.50
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType	Trenchers	Off-Highway Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	7.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	OperationalYear	2014	2015
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	42.5089	498.0756	279.9338	0.5504	178.9886	19.9326	198.9211	19.9639	18.3378	38.3017	0.0000	57,132.4095	57,132.4095	13.4219	0.0000	57,414.2700
Total	**42.5089**	**498.0756**	**279.9338**	**0.5504**	**178.9886**	**19.9326**	**198.9211**	**19.9639**	**18.3378**	**38.3017**	**0.0000**	**57,132.4095**	**57,132.4095**	**13.4219**	**0.0000**	**57,414.2700**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	15.5258	380.0073	281.7136	0.5504	72.1664	8.9772	81.1436	8.4260	8.9139	17.3399	0.0000	57,132.4095	57,132.4095	13.4219	0.0000	57,414.2700
Total	**15.5258**	**380.0073**	**281.7136**	**0.5504**	**72.1664**	**8.9772**	**81.1436**	**8.4260**	**8.9139**	**17.3399**	**0.0000**	**57,132.4095**	**57,132.4095**	**13.4219**	**0.0000**	**57,414.2700**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**63.48**	**23.70**	**-0.64**	**0.00**	**59.68**	**54.96**	**59.21**	**57.79**	**51.39**	**54.73**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	6/1/2015	6/1/2015	5	1	
2	Building Construction	Building Construction	6/2/2015	6/2/2015	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 165

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Rubber Tired Dozers	0	8.00	255	0.40
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	4	8.00	174	0.41
Grading	Off-Highway Trucks	10	8.00	400	0.38
Grading	Crawler Tractors	2	8.00	255	0.40
Grading	Scrapers	7	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Off-Highway Tractors	1	8.00	80	0.50
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Grading	Rollers	2	8.00	80	0.38
Grading	Off-Highway Trucks	9	8.00	400	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	39	98.00	0.00	150.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					175.1183	0.0000	175.1183	18.9146	0.0000	18.9146			0.0000			0.0000
Off-Road	38.1632	451.6252	233.5472	0.4228		19.1435	19.1435		17.6120	17.6120		44,389.6061	44,389.6061	13.2522		44,667.9012
Total	**38.1632**	**451.6252**	**233.5472**	**0.4228**	**175.1183**	**19.1435**	**194.2617**	**18.9146**	**17.6120**	**36.5266**		**44,389.6061**	**44,389.6061**	**13.2522**		**44,667.9012**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.7793	45.5577	36.8618	0.1128	2.6185	0.7794	3.3979	0.7173	0.7171	1.4344		11,481.6887	11,481.6887	0.0924		11,483.6293
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5664	0.8928	9.5248	0.0147	1.2518	9.6700e-003	1.2614	0.3320	8.7700e-003	0.3407		1,261.1148	1,261.1148	0.0774		1,262.7395
Total	**4.3457**	**46.4505**	**46.3866**	**0.1276**	**3.8703**	**0.7891**	**4.6594**	**1.0493**	**0.7258**	**1.7751**		**12,742.8035**	**12,742.8035**	**0.1698**		**12,746.3688**

3.2 Grading - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					68.2961	0.0000	68.2961	7.3767	0.0000	7.3767			0.0000			0.0000
Off-Road	11.1801	333.5569	235.3270	0.4228		8.1881	8.1881		8.1881	8.1881	0.0000	44,389.6060	44,389.6060	13.2522		44,667.9012
Total	**11.1801**	**333.5569**	**235.3270**	**0.4228**	**68.2961**	**8.1881**	**76.4842**	**7.3767**	**8.1881**	**15.5648**	**0.0000**	**44,389.6060**	**44,389.6060**	**13.2522**		**44,667.9012**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.7793	45.5577	36.8618	0.1128	2.6185	0.7794	3.3979	0.7173	0.7171	1.4344		11,481.6887	11,481.6887	0.0924		11,483.6293
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5664	0.8928	9.5248	0.0147	1.2518	9.6700e-003	1.2614	0.3320	8.7700e-003	0.3407		1,261.1148	1,261.1148	0.0774		1,262.7395
Total	**4.3457**	**46.4505**	**46.3866**	**0.1276**	**3.8703**	**0.7891**	**4.6594**	**1.0493**	**0.7258**	**1.7751**		**12,742.8035**	**12,742.8035**	**0.1698**		**12,746.3688**

3.3 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Building Construction - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0782	23.4615	17.8156	0.0268		0.9016	0.9016		0.9016	0.9016	0.0000	2,689.577 1	2,689.577 1	0.6748		2,703.748 3
Total	**1.0782**	**23.4615**	**17.8156**	**0.0268**		**0.9016**	**0.9016**		**0.9016**	**0.9016**	**0.0000**	**2,689.577 1**	**2,689.577 1**	**0.6748**		**2,703.748 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.356697	0.036069	0.187907	0.166875	0.060838	0.008979	0.012320	0.155582	0.001385	0.001251	0.008628	0.000550	0.002919

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Panoche Valley Solar

San Benito County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	5,000.00	0.00	0

1.2 Other Project Characteristics

Urbanization Rural **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 50

Climate Zone 4 **Operational Year** 2015

Utility Company

CO2 Intensity (lb/MWhr) 0 **CH4 Intensity (lb/MWhr)** 0 **N2O Intensity (lb/MWhr)** 0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction Emissions Only

Land Use - user defined

Construction Phase - 1 day analysis

Off-road Equipment -

Off-road Equipment - anticipated equipment with default HP and load factors

Trips and VMT - max of 35 haul trucks per day

Grading - daily basis

Construction Off-road Equipment Mitigation - All equipment T2 or better

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	19.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	155,000.00	1.00
tblConstructionPhase	NumDays	15,500.00	1.00
tblGrading	AcresOfGrading	10.00	50.00

tblGrading	MaterialImported	0.00	1,200.00
tblLandUse	LotAcreage	0.00	5,000.00
tblOffRoadEquipment	HorsePower	208.00	255.00
tblOffRoadEquipment	HorsePower	122.00	80.00
tblOffRoadEquipment	LoadFactor	0.43	0.40
tblOffRoadEquipment	LoadFactor	0.44	0.50
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	7.00
tblProjectCharacteristics	OperationalYear	2014	2015
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	119.00	35.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	39.6114	463.1481	251.6731	0.4638	54.9951	19.3350	74.3301	6.2411	17.7881	24.0291	0.0000	48,329.7815	48,329.7815	13.3511	0.0000	48,610.1542
Total	**39.6114**	**463.1481**	**251.6731**	**0.4638**	**54.9951**	**19.3350**	**74.3301**	**6.2411**	**17.7881**	**24.0291**	**0.0000**	**48,329.7815**	**48,329.7815**	**13.3511**	**0.0000**	**48,610.1542**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	12.6283	345.0798	253.4529	0.4638	22.5844	8.3796	30.9640	2.7386	8.3642	11.1028	0.0000	48,329.7815	48,329.7815	13.3511	0.0000	48,610.1542
Total	**12.6283**	**345.0798**	**253.4529**	**0.4638**	**22.5844**	**8.3796**	**30.9640**	**2.7386**	**8.3642**	**11.1028**	**0.0000**	**48,329.7815**	**48,329.7815**	**13.3511**	**0.0000**	**48,610.1542**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**68.12**	**25.49**	**-0.71**	**0.00**	**58.93**	**56.66**	**58.34**	**56.12**	**52.98**	**53.79**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	6/1/2015	6/1/2015	5	1	
2	Building Construction	Building Construction	6/2/2015	6/2/2015	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 50

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Crawler Tractors	2	8.00	255	0.40
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	4	8.00	174	0.41
Grading	Off-Highway Tractors	1	8.00	80	0.50
Grading	Off-Highway Trucks	10	8.00	400	0.38
Grading	Off-Highway Trucks	9	8.00	400	0.38
Grading	Rollers	2	8.00	80	0.38
Grading	Rubber Tired Dozers	0	8.00	255	0.40
Grading	Scrapers	7	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	39	98.00	0.00	35.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

3.2 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					53.1324	0.0000	53.1324	5.7417	0.0000	5.7417			0.0000			0.0000
Off-Road	38.1632	451.6252	233.5472	0.4228		19.1435	19.1435		17.6120	17.6120		44,389.6061	44,389.6061	13.2522		44,667.9012
Total	**38.1632**	**451.6252**	**233.5472**	**0.4228**	**53.1324**	**19.1435**	**72.2758**	**5.7417**	**17.6120**	**23.3537**		**44,389.6061**	**44,389.6061**	**13.2522**		**44,667.9012**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.8818	10.6301	8.6011	0.0263	0.6110	0.1819	0.7929	0.1674	0.1673	0.3347		2,679.0607	2,679.0607	0.0216		2,679.5135
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5664	0.8928	9.5248	0.0147	1.2518	9.6700e-003	1.2614	0.3320	8.7700e-003	0.3407		1,261.1148	1,261.1148	0.0774		1,262.7395
Total	**1.4483**	**11.5229**	**18.1259**	**0.0410**	**1.8628**	**0.1915**	**2.0543**	**0.4993**	**0.1761**	**0.6754**		**3,940.1755**	**3,940.1755**	**0.0989**		**3,942.2530**

3.2 Grading - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					20.7216	0.0000	20.7216	2.2393	0.0000	2.2393			0.0000			0.0000
Off-Road	11.1801	333.5569	235.3270	0.4228		8.1881	8.1881		8.1881	8.1881	0.0000	44,389.6060	44,389.6060	13.2522		44,667.9012
Total	**11.1801**	**333.5569**	**235.3270**	**0.4228**	**20.7216**	**8.1881**	**28.9097**	**2.2393**	**8.1881**	**10.4274**	**0.0000**	**44,389.6060**	**44,389.6060**	**13.2522**		**44,667.9012**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.8818	10.6301	8.6011	0.0263	0.6110	0.1819	0.7929	0.1674	0.1673	0.3347		2,679.0607	2,679.0607	0.0216		2,679.5135
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5664	0.8928	9.5248	0.0147	1.2518	9.6700e-003	1.2614	0.3320	8.7700e-003	0.3407		1,261.1148	1,261.1148	0.0774		1,262.7395
Total	**1.4483**	**11.5229**	**18.1259**	**0.0410**	**1.8628**	**0.1915**	**2.0543**	**0.4993**	**0.1761**	**0.6754**		**3,940.1755**	**3,940.1755**	**0.0989**		**3,942.2530**

3.3 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.577 1	2,689.577 1	0.6748		2,703.748 3
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.577 1**	**2,689.577 1**	**0.6748**		**2,703.748 3**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Building Construction - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0782	23.4615	17.8156	0.0268		0.9016	0.9016		0.9016	0.9016	0.0000	2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**1.0782**	**23.4615**	**17.8156**	**0.0268**		**0.9016**	**0.9016**		**0.9016**	**0.9016**	**0.0000**	**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.356697	0.036069	0.187907	0.166875	0.060838	0.008979	0.012320	0.155582	0.001385	0.001251	0.008628	0.000550	0.002919

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Panoche Valley Solar

Wind Erosion Protection and Dust Control Plan – Statement of Purpose

I ________________________________, as Dust Compliant Monitor, for Panoche Valley Solar hereby do commit to implement and execute the Wind Erosion Protection and Dust Control Plan to the best of my abilities.

____________________________	____________________________
Dust Compliant Monitor Signature	*Date*
____________________________	____________________________
Dust Compliant Monitor Name	*Telephone Number*
____________________________	
Email	

I _________________________________, as Assistant to the Dust Compliant Monitor, for Panoche Valley Solar Wind Erosion Protection and Dust Control Plan hereby do commit to assist the Dust Compliant Monitor in implementing and executing the plan to the best of my abilities. I also commit to taking primary lead of the Wind Erosion and Dust Control Plan when the Dust Compliant Monitor is absent from the project site, except when construction is stopped for holidays and non-work days.

____________________________	____________________________
Assistant to the Dust Compliant Monitor, Signature	*Date*
____________________________	____________________________
Assistant to the Dust Compliant Monitor, Name	*Telephone Number*
____________________________	
Email	

C.4 Air Quality

This section analyzes whether the Revised Project and PGE Upgrades result in any new significant air quality impacts that were not previously identified and disclosed in the 2010 Final EIR or a substantial increase in the severity of any previously identified Air Quality impacts. As part of this analysis, the section considers changes to the existing ambient air quality in the study area, changes to the emissions of the Approved Project, and changes to potential air quality impacts and mitigation measures.

An updated Air Quality Technical Report, prepared by the Applicant's consultant (AMEC, 2014) was used to evaluate the Revised Project.

C.4.1 Environmental Setting

This section describes changes to the environmental setting that have occurred since 2010. Section C.4.1.1 describes any changes to the environmental setting that was presented in the 2010 Final EIR. Section C.4.1.2 describes the environmental setting for the area surrounding the PG&E transmission system upgrades.

The United States Environmental Protection Agency (U.S. EPA), California Air Resources Board (CARB), and the local air districts classify an area as attainment, unclassified, or nonattainment depending on whether or not the monitored ambient air quality data show compliance, insufficient data available, or non-compliance with the ambient air quality standards, respectively. The National and California Ambient Air Quality Standards (NAAQS and CAAQS, respectively) relevant to the Revised Project are provided in Table C.4-1.

Table C.4-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards
Ozone (O_3)	1-hour	0.09 ppm	—
	8-hour	0.070 ppm	0.075 ppm
Respirable particulate matter (PM10)	24-hour	50 µg/m^3	150 µg/m^3
	Annual mean	20 µg/m^3	—
Fine particulate matter (PM2.5)	24-hour	—	35 µg/m^3
	Annual mean	12 µg/m^3	12 µg/m^3
Carbon monoxide (CO)	1-hour	20 ppm	35 ppm
	8-hour	9.0 ppm	9.0 ppm
Nitrogen dioxide (NO_2)	1-hour	0.18 ppm	100 ppb
	Annual mean	0.030 ppm	0.053 ppm
Sulfur dioxide (SO_2)	1-hour	0.25 ppm	75 ppb
	24-hour	0.04 ppm	0.14 ppm
	Annual mean	—	0.030 ppm

ppm = parts per million; ppb= parts per billion
µg/m^3 = micrograms per cubic meter
— = no standard
Source: CARB, 2013.

C.4.1.1 Revised Solar Project

The air quality environmental setting for the Revised Project site has remained substantially unchanged since approval of the Final EIR. Panoche Valley remains generally undeveloped and pastoral in character. No new development has occurred, and no major new structures have been built in the Valley. Grazing remains the primary land use in the area.

The North Central Coast Air Basin remains designated as nonattainment with respect to the ozone and PM10 CAAQS, and the North Central Coast Air Basin is designated as being in attainment or as unclassified for all other pollutants. Since 2012, the North Central Coast Air Basin has been in attainment for all pollutants with respect to the NAAQS.

Table C.4-2 summarizes the current federal and State attainment status of criteria pollutants for the region as provided by Monterey Bay Unified Air Pollution Control District (APCD), based on the NAAQS and CAAQS, respectively.

Table C.4-2. Attainment Status for the North Central Coast Air Basin

Pollutant	Attainment Status Federal	Attainment Status State
Ozone	Attainment/Unclassified	Nonattainment
PM10	Attainment	Nonattainment
PM2.5	Attainment/Unclassified	Attainment
CO	Attainment/Unclassified	Unclassified
NO_2	Attainment/Unclassified	Attainment
SO_2	Attainment	Attainment

Source: Monterey Bay Unified APCD, 2013.

C.4.1.2 PG&E Upgrades

The portions of the PG&E Upgrades that would occur within Fresno County and the San Joaquin Valley Air Basin are under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). Table C.4-3 summarizes the federal and State attainment status of criteria pollutants for the region as provided by SJVAPCD, based on the NAAQS and CAAQS, respectively.

Table C.4-3. Attainment Status for the San Joaquin Valley Air Basin

Pollutant	Attainment Status Federal	Attainment Status State
Ozone	Nonattainment (Extreme)	Nonattainment
PM10	Attainment	Nonattainment
PM2.5	Nonattainment	Nonattainment
CO	Attainment/Unclassified	Attainment/Unclassified
NO_2	Attainment/Unclassified	Attainment
SO_2	Attainment/Unclassified	Attainment

Source: SJVAPCD, 2014.

C.4.2 Applicable Regulations, Plans, and Standards

The applicable regulations, plans, and standards that apply to the assessment of air quality impacts of that portion of the Revised Project within San Benito County are presented in Section C.4.2 of the Final

EIR. Since 2010, the Monterey Bay Unified APCD adopted on April 17, 2013 a new Triennial Plan Revision (2009-2011) for the region's Air Quality Management Plan that builds on past plans and continues to focus on achieving attainment of the State ozone standard. Regulatory changes by the Monterey Bay Unified APCD since 2010 do not substantially alter the regulatory setting for air quality within San Benito County.

However, as noted above, the Revised Project also includes the PG&E Upgrades that affect land within Fresno County that is under the jurisdiction of the SJVAPCD, which is the agency responsible for monitoring and regulating air pollutant emissions from stationary, area, and indirect sources within Fresno County and throughout the San Joaquin Valley Air Basin. Like the MBUPCD, the SJVAPCD has adopted regulations to implement air quality plans for ozone, PM10, and PM25.

Regulation VIII – Fugitive PM10 Prohibitions. Regulation VIII is comprised of District Rules 8011 through 8081, which are designed to reduce PM10 emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, landfill operations, etc.

Rule 8021 – Construction, Demolition, Excavation, and Other Earthmoving Activities. District Rule 8021 requires owners or operators of construction projects to submit a Dust Control Plan to the District if at any time the project involves non-residential developments of five or more acres of disturbed surface area or moving, depositing, or relocating of more than 2,500 cubic yards per day of bulk materials on at least three days of the project. The proposed project will meet these criteria and will be required to submit a Dust Control Plan to the District in order to comply with this rule.

Rule 4641 – Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations. If asphalt paving will be used, then paving operations of the proposed project will be subject to Rule 4641. This rule applies to the manufacture and use of cutback asphalt, slow cure asphalt and emulsified asphalt for paving and maintenance operations.

Rule 9510 – Indirect Source Review (ISR). District Rule 9510 is designed for the purposes of reducing emissions of NOx and PM10 from new development projects. In general, new development contributes to the air-pollution problem in the Valley by increasing the number of vehicles and vehicle miles traveled. In 2005, on-road vehicles generated approximately 200 tons per day of NOx and direct PM10 pollution in the Valley. The ISR rule will apply to future development along the Golden State Boulevard corridor.

C.4.3 Environmental Impacts and Mitigation Measures

This section addresses whether the changes to the Approved Project would result in a new significant impacts to air quality or increase the severity of previously identified air quality impacts. Section C.4.3.1 restates the significance criteria used in 2010 to determine whether any project changes result in any new or more severe significant impacts. Section C.4.3.2 summarizes the impacts and mitigation measures presented in the 2010 Final EIR for ease of reference. Section C.4.3.3 presents the updated impact analysis for the Revised Project, and Section C.4.3.4 addresses changes to two adopted mitigation measures and two APMs. Section C.4.3.5 addresses the environmental impacts that would occur as a result of the PG&E Upgrades, and Section C.4.3.6 describes cumulative impacts.

C.4.3.1 Significance Criteria

Monterey Bay Unified APCD

The following significance criteria for air quality were derived from the Monterey Bay Unified APCD's *2008 CEQA Air Quality Guidelines* (APCD, 2008).

Significance Criteria for Construction-Related Emissions. Short-term construction emission thresholds, as stated in the Monterey Bay Unified APCD's *2008 CEQA Air Quality Guidelines* (APCD, 2008), involve identifying the level of construction activity that could result in significant temporary impacts if not mitigated. Construction activities (e.g., excavation, grading, on-site vehicles) that directly exceed the APCD criterion for PM10 would have a significant impact on local air quality when they are located nearby and upwind of sensitive receptors (APCD, 2008). Regarding ozone, construction projects using typical construction equipment that temporarily emit ozone precursors are accommodated in the emission inventories of State and federally required air quality management plans and would not have a significant impact on ozone concentrations (APCD, 2008).

If construction-related activities exceed the PM10 threshold of 82 pounds (Table C.4-4), the project would be characterized as contributing substantially to existing violations of the State-level ambient air quality standards for PM10.

Table C.4-4. Significance Thresholds for Construction Emissions

Pollutant of Concern	Threshold
Fugitive Particulate Matter (PM_{10})	82 lbs

Source: Monterey Bay Unified APCD, 2008.

The APCD also offers the following as examples of the level of construction activity that could exceed threshold in Table C.4-4:

- Construction site with minimal earthmoving exceeding 8.1 acres per day.
- Construction site with earthmoving (grading, excavation) exceeding 2.2 acres per day.

Significance Criteria for Operational Emissions. The threshold criteria established by the Monterey Bay Unified APCD's *2008 CEQA Air Quality Guidelines* to determine the significance and appropriate mitigation level for long-term operational emissions from a project are presented in Table C.4-5.

Table C.4-5. Significance Thresholds for Operational Emissions

Pollutant of Concern	Daily Threshold
Ozone Precursors (NO_x as NO_2)	137 lbs/day (direct + indirect)
Fugitive Particulate Matter (PM10), Dust	82 lbs/day (on-site)[1]
	AAQS exceeded along unpaved roads (off-site)
Carbon Monoxide (CO)	LOS at intersection/road segment degrades from D or better to E or F or V/C ratio at intersection/road segment at LOS E or F increases by 0.05 or more or delay at intersection at LOS E or F increases by 10 seconds or more or reserve capacity at unsignalized intersection at LOS E or F decreases by 50 or more[2]
	550 lbs/day (direct)[2]
SO_x as SO_2	150 lbs/day (direct)

1 - The District's 82 lb/day operational phase threshold of significance applies only to on-site emissions and project-related exceedances along unpaved roads. These impacts are generally less than significant. On large development projects, almost all travel is on paved roads (0%) unpaved), and entrained road dust from vehicular travel can exceed the significance threshold. District approved dispersion modeling can be used to refute (or validate) a determination of significance if modeling shows that emissions would not cause or substantially contribute to an exceedance of State and national AAQS;
2 - Modeling should be undertaken to determine if the project would cause or substantially contribute (550 lb/day) to exceedance of CO AAQS. If not, the project would not have a significant impact;
Source: Monterey Bay Unified APCD, 2008.

In addition to the tabulated thresholds, a project may also have significant adverse impacts on air quality if the project individually or cumulatively results in any of the following:

- Exceedance of a State or federal ambient air quality standard for any criteria pollutant (as determined by modeling).
- Exposure of sensitive receptors to substantial pollutant concentrations of toxic air contaminants.
- Exposure of a substantial number of people to objectionable odors.
- Inconsistency with applicable Monterey Bay Unified APCD air quality management plans, polices, or regulations.

The criteria for assessing cumulative impacts on localized air quality (i.e., carbon monoxide, PM10) are identical to those for individual project operation (Table C.4-5). The criteria for determine a project's cumulative impact on regional ozone levels depends on consistency with the applicable air quality management plan. Consistency with the AQMP does not mean that a project will not have a significant project-specific adverse air quality impact. However, inconsistency with the AQMP is considered a significant cumulative adverse air quality impact. The Association of Monterey Bay Area Governments provides consistency determinations for population-related projects, which the Revised Project is not. As a non-residential project, with little attributable population growth (see Section C.12, Population and Housing), the APCD could make a consistency determination for this project.

San Joaquin Valley Air Pollution Control District (SJVAPCD)

The SJVAPCD has identified PM10 as the pollutant of greatest concern for construction-related emissions. In the Guide for Assessing and Mitigating Air Quality Impacts, the SJVAPCD recommends that construction PM10 impacts be evaluated based on implementation of effective and comprehensive dust control measures rather than detailed quantification (SJVAPCD, 2002b).

SJVAPCD has established CEQA significance thresholds of 15 tons per year (tpy) for both PM10 and PM2.5. Additionally, SJVAPCD has established CEQA thresholds for carbon monoxide (100 tpy), nitrogen oxides (10 tpy), Reactive Organic Gases (10 tpy), and sulphur oxides (27 tpy). ~~SJVAPCD has not established a CEQA significance threshold for PM10 or PM2.5 emissions associated with construction activities. The SJVAPCD has also not established quantitative CEQA thresholds for ozone precursors associated with construction activities. In lieu of CEQA significance thresholds for construction emissions of ozone precursors, projected emissions can be compared to the SJVAPCD's operational CEQA threshold of 10 tons per year for both NOx and Reactive Organic Gases (ROG). Regarding construction emissions of CO and SO2, the SJVAPCD has not developed quantitative thresholds for these pollutants either.~~

Conclusions regarding the significance of each identified air quality impact are made per the significance classification system provided in Section C.1 (Introduction to Environmental Analysis).

C.4.3.2 Approved Project Impacts and Mitigation Measures

The Air Quality impacts of the Approved Project were analyzed in Sections C.4 and E.3.1.A of the 2010 Final EIR. Table C.4-6 presents a summary of the impacts and mitigation measures applicable to the Approved Project.

Table C.4-6. Summary of Impacts and Mitigation: Air Quality

Impact No. and Text	Mitigation Required	CEQA Conclusion
Impact AQ-1: Construction activities would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants.	AQ-1.1: Reduce fugitive dust AQ-1.2: Designate a dust complaint monitor	Class II
Impact AQ-2: Operation, maintenance, and inspections would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants.	None	Class III
Impact AQ-3: Power generated by operation of the solar power plant would indirectly affect operations and emissions from other power plants.	None	Class IV
Impact AQ-4: Project-related emissions may be inconsistent with relevant air quality management plans.	AQ-1.1: Reduce fugitive dust AQ-1.2: Designate a dust complaint monitor	Class II
Impact AQ-5: Contribute to cumulatively considerable air quality impacts.	None	Class III

C.4.3.3 Revised Solar Project Impacts

As discussed below, overall, the air quality impacts of the Revised Project would be incrementally greater than the Approved Project during the temporary construction period due to the accelerated construction schedule; however, pollutant emissions would not exceed thresholds identified in Section 3.4.3.1 above and emissions would be either less severe or not substantially different from the conclusions of the Final EIR.

Impact AQ-1: Construction activities would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants (Class II)

Like the Approved Project, the Revised Project would emit fugitive dust, reactive organic gases (ROGs), NOx, CO, PM10, PM2.5, SOx, and toxic diesel particulate matter (DPM) during the construction phase that would contribute to regional and localized degradation of air quality. Emissions from construction would result from fuel combustion and exhaust from construction equipment and vehicle traffic, grading, and use of materials that contain volatile and/or toxic compounds (e.g., paints and lubricants).

The Revised Project, while about 78% of the fenced area of the Approved Project, would result in a more intense construction period due to the compressed construction schedule for the Revised Project (approximately 18 months compared to the Approved Project schedule of approximately 5 years). As a result, the Revised Project would have increased daily use of typical construction equipment such as dump trucks, graders, scrapers, bulldozers, compactors, and front end loaders that emit precursors of ozone (ROG and NOx) and fugitive dust-generating activities when compared with the Approved Project. Note that the construction of the microwave tower at the switching station will be performed by the Applicant; therefore, air emissions associated with construction of this component were included in the air emissions calculations for the Revised Project. The Revised Project also requires an increase in the amount of daily ground disturbance activities. Although construction of the Revised Project would result in a shorter period during which construction emissions would occur, the compressed construction schedule would result in higher average daily emissions levels; however, as demonstrated in the August 8, 2014 Technical Memorandum including a "CalEEMod Analysis of Potential Particulate Emissions from Construction Activities at the Panoche Valley Solar Farm Project" the construction emissions would not exceed the significance thresholds with implementation of mitigation measures. The modified Mitigation Measure AQ-1.1 (Reduce fugitive dust) for the Revised Project would allow for an increase in the grading limits from 8.1 to 50 acres per day. The Air Quality Technical Report (AMEC, 2014) prepared for the Revised Project demonstrates that the daily significance threshold for fugitive dust emissions would not be exceeded if the frequency of watering is increased from two times per day to three times per day. Therefore, Mitigation Measure AQ-1.1 has also been revised to require watering three times per day to ensure that daily significance thresholds are not exceeded.

As with the Approved Project, temporary construction-phase VOC and NOx emissions caused by construction of the Revised Project would contribute to existing ozone violations. The contribution would not be considered significant because temporary construction emissions are accommodated in the AQMP inventory of construction emissions that are assumed to occur by the Monterey Bay Unified APCD in demonstrating maintenance of the ozone standards. As such, based on Monterey Bay Unified APCD guidance (Monterey Bay Unified APCD, 2013a), construction-phase ozone precursors would not cause violations of or disrupt the attainment and maintenance of ozone ambient air quality standards.

Like the Approved Project, emissions of other criteria pollutants, including PM10, PM2.5, CO, and NO_2 from construction activities would not be expected cause a violation of any ambient air quality standard beyond the project boundary due to the relatively large land area of the Revised Project and the widespread distribution of construction emissions (SCEC, 2010).

Emissions of fugitive dust would be subject to mitigation measures and applicant proposed measures for dust control and activity management. Specific and feasible dust control measures identified in the 2010 Final EIR would remain required to reduce the impact of dust emissions: Mitigation Measure AQ-1.1 includes specific requirements for reducing fugitive dust, and Mitigation Measure AQ-1.2 requires designation of a dust complaint monitor. As explained above, Mitigation Measure AQ-1.1 has been revised to require watering for dust suppression three times per day. Based on updated emissions forecasting by the Applicant (AMEC, 2014), increasing the dust control frequency to include watering three times daily would ensure that PM10 and fugitive dust emissions of the Revised Project are less than significant (Class II).

Impact AQ-2: Operation, maintenance, and inspections would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants (Class III)

The Revised Project would include fewer panels and a smaller site footprint than the Approved Project. Operation, maintenance, and inspection activities would be largely the same, but of a lower intensity. This impact would remain less than significant (Class III).

Impact AQ-3: Power generated by operation of the solar power plant would indirectly affect operations and emissions from other power plants (Class IV)

The Revised Project would generate about 62% of the electrical energy of the Approved Project, and therefore would have a lower potential to indirectly affect operations and emissions from other fossil fuel-fired California and western U.S. power plants. However, the Revised Project would still offset fossil fuel-fired emissions, and this impact would remain beneficial (Class IV).

Impact AQ-4: Project-related emissions may be inconsistent with relevant air quality management plans (Class II)

Emissions from the Revised Project would require mitigation similar to that identified for the Approved Project, and with the recommended mitigation, these emissions would be consistent with the regional air quality management plan. With sufficient control required by mitigation measures for construction, the project impacts would be managed sufficiently to ensure fugitive dust and construction equipment emissions remain consistent with regional plans, resulting in a less than significant impact (Class II).

C.4.3.4 Changes to Adopted Mitigation Measures

The Applicant proposed changes to each of the air quality mitigation measures for the Approved Project and to the Applicant Proposed Measures (APM AQ-2 and APM AQ-3). These revised measures are shown below.

Changes to Mitigation Measures

Proposed changes to MM AQ-1.1. The changes presented in the text of the measure would not increase the severity of the impact and are acceptable. While the applicant is proposing in AQ-1.1, Item (1) to increase the grading limits from 8.1 to 50 acres per day, the Air Quality Technical Report (AMEC, 2014) prepared for the Revised Project demonstrates that the daily significance threshold for fugitive dust emissions would not be exceeded if the frequency of watering is increased from two times per day to three times per day. Therefore, Mitigation Measure AQ-1.1, (Item 2) has also been revised to require watering three times per day to ensure that daily significance thresholds are not exceeded.

The proposed modification of item (12) allows a range of common alternative methods for soil stabilization to be implemented. These methods are frequently used alternatives to revegetation, and when properly applied, would not increase amounts of fugitive dust.

Accordingly, the proposed changes to AQ-1.1 would not result in any new significant air quality impact or substantially increase the severity of any previously identified impact.

MM AQ-1.1 **Reduce fugitive dust.** The Applicant shall implement the following measures to minimize nuisance impacts and to significantly reduce fugitive dust emissions, and the Applicant shall require all of the following measures to be shown on grading and building plans:

(1) Limit grading to 50 acres per day, and grading and excavation to 2.2 acres per day;

(2) Water graded/excavated areas and active unpaved roadways, unpaved staging areas, and unpaved parking areas at least three times daily or apply non-toxic chemical soil stabilization materials per manufacturer's recommendations. Frequency should be based on the type of operations, soil and wind exposure;

(3) Prohibit all grading activities during periods of high wind (sustained over 15 mph);

(4) Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days);

(5) Apply non-toxic binders (e.g., latex acrylic copolymer) or water to exposed areas after cut and fill operations, and hydro-seed area;

(6) Plant vegetative ground cover compliant with County-approved Landscape Plan in disturbed areas as soon as possible;

(7) Cover, enclose, or apply soil stabilizers to inactive storage piles or water three times daily;

(8) Install wheel washers or track outs at the entrance to construction sites for all exiting trucks. Track outs will be a minimum of 100 feet long or twice the length of the longest vehicle entering the site. Track out pads will be a combination of corrugated steel "rumble plates" at exits of track out pads and 6 inches thick of class 150 (4" minimum diameter) stone preceding rumble pads. Rumble pads and track out stone will be maintained and cleaned as necessary to remove any deposited materials. Vehicles entering and exiting the site will be free of excessive dirt and debris and will be cleaned as necessary to satisfy fugitive dust control requirements. All on site construction equipment will be required to be washed prior to delivery to the site and washed (utilizing high pressure washers) prior to demobilizing. Construction traffic on site and between sections of the site will utilize track out devices prior to crossing paved roads. Delivery vehicles (over road tractor trailers, concrete and aggregate trucks, and all other delivery vehicles) will be required to travel on established roadways and utilize established lay down areas at the Project site.

Vehicle traffic for employees will travel to established parking areas and enter and exit over the track out devices as previously described. Trackout devices will be regularly maintained and all construction equipment entering the site will be inspected and any equipment observed not to have been washed will not be permitted to enter the Project site.

(9) Use street sweepers, water trucks, or sprinkler systems in sufficient quantities to prevent airborne dust from leaving the site. Reclaimed (non-potable) water should be used whenever possible;

(10) All dirt stock pile areas shall be sprayed daily as needed;

(11) Permanent dust control measures identified in the approved project revegetation and landscape plans shall be implemented as soon as possible following completion of any soil disturbing activities;

(12) Exposed ground areas that are planned to be reworked at dates greater than one month after initial grading shall be sown with a fast germinating, non-invasive grass seed and watered until vegetation is established. Unless restricted in the biological resources mitigation measures, alternative methods for soil stabilization may be implemented, including but not limited to use of water to establish a crust, chemical stabilizers, and straw mulching.

(13) All disturbed soil areas not subject to revegetation shall be stabilized using approved chemical soil binders, jute netting, or gravel for temporary roads and any other methods approved in advance by the Monterey Bay Unified APCD;

(14) Gravel shall be placed on all roadways and driveways as soon as possible after grading for said roadways. In addition, building pads shall be laid as soon as possible after grading unless seeding, soil binders, or frequent water application are used;

(15) Vehicle speed for all construction vehicles shall not exceed 15 mph on any unpaved surface at the construction site;

(16) All trucks hauling dirt, sand, soil, or other loose materials shall be covered or shall maintain at least 2 feet of freeboard (minimum vertical distance between top of load and top of trailer) in accordance with California Vehicle Code Section 23114;

(17) Unpaved road travel shall be limited to the extent possible, for example, by limiting the travel to and from unpaved areas, by coordinating movement between work areas rather than to central staging areas, and by busing workers where feasible;

(18) Install wheel washers where vehicles enter and exit unpaved roads onto streets, or wash off trucks and equipment leaving the site, and inspect vehicle tires to ensure free of soil prior to carry-out to paved roadways. Alternatively, use track outs as defined in (8) above.

(19) Sweep streets at the end of each day, or as needed, if visible soil material is carried onto adjacent paved roads. Water sweepers with reclaimed water shall be used where feasible.

Proposed change to MM AQ-1.2. The minor language changes would not create a new air quality impact or substantially increase the severity of an air quality impact.

MM AQ-1.2 **Designate a dust complaint monitor.** The Applicant shall require the contractor(s) or builder(s) to designate a person or persons to monitor the fugitive dust emissions and enhance the implementation of the measures as necessary to minimize dust complaints, reduce visible emissions below 20 percent opacity, and to prevent transport of dust off-site. Their duties shall include monitoring during holidays and weekend periods only when work is in progress. The name and telephone number of such persons shall be provided to the Monterey Bay Unified APCD Compliance Division prior to the start of any grading, earthwork, or demolition. The Applicant shall provide and post a publicly visible sign that specifies the telephone number and name to contact regarding dust complaints. This person shall respond to complaints and take corrective action within 48 hours. The phone number of the Monterey Bay Unified APCD shall also be visible to ensure compliance with Rule 402 (Nuisance).

Changes to Applicant Proposed Measures

Changes to APM AQ-2. The minor language changes below would not create a new air quality impact or substantially increase the severity of an air quality impact.

APM AQ-2: The Applicant shall implement the following BMPs to further reduce construction vehicle emissions (NOx, VOC, and Diesel Particulate Matter) during project construction:

- Maintain all construction equipment in proper tune according to manufacturer's specifications;
- Use diesel construction equipment, including portable equipment, rated more than 50 horsepower meeting the California Air Resources Board's (CARB's) Tier 2 standards for certified engines or cleaner off-road heavy-duty diesel engines (e.g., Tier 3 and Tier-4, where feasible), and comply with the State In-Use Off-Road Diesel Vehicle Regulation (California Code of Regulations [CCR] Title-13, Article 4.8, Chapter-9, Section 2449);
- Prohibit on and off-road diesel equipment idling for more than 5 minutes, or within time necessary to comply with Title-13, CCR, Section 2485 (c) (1) regarding idling of commercial vehicles. Signs shall be posted in the designated queuing areas and or job sites to remind drivers and operators of all idling limits;

- Staging and queuing areas shall not be located within 1,000 feet of sensitive receptors;
- Electrify off-road construction equipment when feasible; and
- Provide incentives for workers to use project-sponsored shuttle bus service or carpooling, where feasible.
- Use alternatively fueled construction equipment on-site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, biodiesel, or electric.

For purpose of this mitigation, "sensitive receptors" shall be defined as occupied residences, senior living centers, parks and recreation areas, medical facilities and schools.

Changes to APM AQ-3. The revised APM below would not result in any new significant air quality impact or substantially increase the severity of any previously identified impact. Gravel track systems are as effective as wheel washers, when properly implemented and when inspections occur.

APM AQ-3: The Applicant shall reduce fugitive dust emissions during construction through implementation of the following best management practices to be shown on grading and building plans:

- Water graded/excavated areas and active unpaved roadways, unpaved staging areas, and unpaved parking areas at least three times daily or apply chemical soil stabilizers per manufacturer recommendations. Frequency should be based on the type of operations, soil and wind exposure
- Apply chemical soil stabilizers or water on inactive construction areas (disturbed lands, including dirt stockpiles;
- All disturbed soil areas not subject to revegetation shall be stabilized using approved chemical soil binders, jute netting, or gravel for temporary roads;
- Gravel shall be placed on all perimeter roadways and driveways as soon as possible after grading for said roadways.
- All trucks hauling dirt, sand, soil, or other loose materials shall be covered or shall maintain at least two feet of freeboard (minimum vertical distance between top of load and top of trailer) in accordance with California Vehicle Code Section 23114;
- Install gravel track systems where vehicles enter and exit unpaved roads onto streets, and inspect equipment tires to ensure free of soil prior to carry-out to paved roadways.

C.4.3.5 PG&E Upgrades Impacts

The temporary and permanent air quality impacts of the PG&E Upgrades are analyzed in this section. This analysis is based on the impact statements defined for the solar project, but not all of the air quality impacts apply to the PG&E Upgrades. Impact AQ-3 (Power generated by operation of the solar power plant would indirectly affect operations and emissions from other power plants), addressed for the solar project would not occur as a result of construction or operation of the PG&E Upgrades, and is not analyzed further.

Impact AQ-1: Construction activities would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants (Class III)

Installation of the OPGW along the 17-mile upgraded section of the Moss Landing–Panoche transmission line would involve use of helicopters and construction equipment generating exhaust emissions of criteria pollutants and toxic air contaminants and airborne dust from soil disturbance for preparation of pulling/stringing sites as well as for minor improvements to existing access roads. ~~Table C.4-7 lists the equipment anticipated to be utilized by PG&E during the approximately 16 week construction period for installation of the OPGW.~~

~~Table C.4-7. PG&E Equipment for OPGW Installation~~

~~Equipment Type~~	~~Fuel Type~~	~~Quantity~~
~~Dump Truck / Line Truck~~	~~Diesel~~	~~2~~
~~Excavator/ Back Hoe~~	~~Diesel~~	~~1~~
~~Skid Steer (Hauling Puller)~~	~~Diesel~~	~~1~~
~~Pick-up Truck~~	~~Gasoline/Diesel~~	~~2~~
~~Manlift / Bucket Truck~~	~~Diesel~~	~~2~~
~~Crawler Cranes <200T~~	~~Diesel~~	~~1~~
~~Crawler drill rig~~	~~Diesel~~	~~1~~
~~Helicopter*~~	~~Jet Fuel~~	~~1~~

Construction of two ~~to three~~ new microwave communication towers would utilize construction equipment that would generate exhaust emissions and dust emissions. ~~, with the c~~ Construction of the new microwave tower at the project switching station ~~activity~~ would occur within the MBUAPCD and emissions are included with the solar project emissions. Construction at the Helm Substation would occur within the SJVAPCD. The Helm Substation work would take place ~~occurring primarily~~ within the fence line~~s~~ of the existing ~~proposed~~ substation ~~and other communication tower sites~~. Although these activities would generate exhaust and dust emissions, only approximately two-thirds of PG&E Upgrade construction activities will be completed in the SJVAPCD. As shown in Table C.4-7 below, emissions for all PG&E Upgrade work will remain below the construction thresholds as described in Section C.4.3.1 above.

Table C.4-7. PG&E Upgrades Construction Emissions Summary (by activity)

	Emissions (lbs)					
Activity	ROG	CO	NOx	SOx	PM10	PM2.5
Survey	0.1	1.0	0.1	0.0	8.4	1.8
ROW Clearing	47.3	171.3	370.4	0.8	320.8	76.5
Guard Structure Installation	24.9	94.2	173.6	0.4	254.0	57.7
Install OPGW	311.7	670.7	920.7	1.7	744.7	181.4
Guard Structure Removal	13.8	47.8	98.0	0.2	124.2	28.6
Restoration	13.7	51.2	102.6	0.3	157.4	35.5
Total (lbs per year)	411.59	1036.21	1665.42	3.30	1609.58	381.46
Total (tons per year)	0.206	0.518	0.833	0.002	0.805	0.191

Detailed calculations are presented in Attachments 4A-1 and 4A-2 to the FSEIR. ~~construction related emissions would not contribute substantially because the ambient levels for these pollutants in the San Joaquin Valley APCD are well below State and Federal ambient air quality standards, and the emission of CO and SO2 from construction of the PG&E work would be negligible and of short duration.~~

As demonstrated in Table C.4-7, the construction emissions would not occur at significant levels~~ due to the short construction period, the limited extent of equipment use, and the small footprint of the proposed upgrades~~. Detailed emissions calculations for the PG&E Upgrades included as Attachments 4A.1 and 4A.2 provides estimated hours of use per day, horsepower, emissions factors and total days used. As shown in the calculations tables, all equipment will not be running simultaneously and to calculate maximum peak daily emissions, activities that could occur contemporaneously were grouped to provide a conservative estimate of emissions from all equipment would be running simultaneously. The conservative estimate resulted in calculations that were determined to have less than significant impacts to air quality with incorporation of AMMs.

~~As described in the August 8, 2014 Technical Memorandum including a CalEEMod Analysis of Potential Particulate Emissions from Construction Activities at the Panoche Valley Solar Project, PM10 emissions would not be exceeded if ground disturbance is limited to 50 acres per day and water is applied for dust suppression three times daily. As depicted in Table B-10, approximately 5.62 acres are anticipated to be disturbed as a result of PG&E upgrade activities.~~

Therefore, PG&E activities, occurring partially in Fresno County and partially in San Benito County, would not result in an exceedance of Monterey Bay Unified APCD or SJVAPCD PM10 thresholds. ~~Similarly, the amount of equipment that will be used for a short duration will not generate emissions of criteria pollutants above applicable significance thresholds.~~

PG&E's AMMs AQ-1 (Minimize fugitive dust) and AQ-2 (Limit idling time) would be implemented to ensure that impacts remain less than significant (Class III).

Impact AQ-2: Operation, maintenance, and inspections would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants (Class III)

Operation, maintenance, and inspections of the PG&E Upgrades would cause very minor dust, criteria air pollutant and toxic air contaminant emissions from the use of transportation fuels for maintenance and inspection vehicles. However, these inspections would be completed as a component of the transmission line inspections; there would be no separate inspection of the OPGW. These emissions would not occur in quantities notably different from those already occurring as the existing systems are inspected and maintained. The impact would be less than significant (Class III).

Impact AQ-4: Project-related emissions may be inconsistent with relevant air quality management plans (Class III)

Emissions from the PG&E Upgrades would generally be limited to construction sources that would be consistent with the regional air quality management plans of both the Monterey APCD and the Fresno County portion of the San Joaquin Valley Air Basin and Fresno County General Plan (County of Fresno, 2000; SJAPCD, 2014b).

In April 2013, MBUAPCD adopted the 2012 Triennial Plan Revision (MBUAPCD, 2013b), which assesses and updates elements of the 2008 AQMP, including the air quality trends analysis, emission inventory, and mobile source programs. The 2012 AQMP Revision only addresses attainment of the state ozone standard. In 2012, EPA designated the NCCAB as attainment of the current national 8-hour ozone standard of 0.075 ppm. Projects that result in an increase in population that is inconsistent with local community plans would be considered inconsistent with the AQMP. The proposed PG&E Upgrades would not conflict with or otherwise obstruct the implementation of the AQMP as there would be no permanent population increases or new stationary sources of emissions associated with the PG&E Upgrades.

The Fresno County General Plan includes policies addressing air quality issues in its Open Space and Conservation Element. The following goal and policy would be applicable to the PG&E Upgrades:

- Goal OS-G: To improve air quality and minimize the adverse effects of air pollution in Fresno County.
- Policy OS-G.2: The County shall ensure that air quality impacts identified during the CEQA review process are fairly and consistently mitigated. The County shall require projects to comply with the County's adopted air quality impact assessment and mitigation procedures.

The SJVAPCD's most recent AQMP for ozone attainment is the 1-hour Extreme Ozone Attainment Demonstration Plan which was adopted in September 2013. The District's 2013 Plan for the Revoked 1-Hour Ozone Standard demonstrates how the Valley will attain the revoked 1-hour ozone standard by 2017. In April 2008, The SJVAPCD Board adopted the 2008 PM2.5 Plan. This plan was designed to attain the federal and State PM2.5 standards in the SJVAB as soon as possible. Through implementation of AMMs AQ-1 (Minimize fugitive dust) and AQ-2 (Limit idling time), the fugitive dust and construction equipment emissions would meet applicable regulatory standards, would not occur at a significant level, and would be consistent with regional plans, resulting in a less than significant impact (Class III).

C.4.3.6 Cumulative Impacts

No significant additional sources of emissions would be caused by cumulative projects near the Revised Project site or the areas surrounding the PG&E Upgrades. Emissions caused by the Revised Project with recommended mitigation measures would be reduced to minimize the project's cumulative air quality impacts. Although emissions caused by construction, operation, and maintenance of the Revised Project could combine with emissions from other projects in the area of cumulative effects to cause a cumulatively considerable impact, the level of air pollutants emitted not be significant. Any contribution to a cumulatively considerable impact to air quality would be less than significant (Class III).

C.4.4 Summary of Impacts.

The significance of impacts for air quality for the Revised Project and for the PG&E Upgrades is summarized in Sections C.4.4.1 through C.4.4.3.

C.4.4.1 Revised Solar Project

There are no changes to the significance of impacts from the conclusions of the 2010 Final EIR. The impacts summarized in Table C.4-6 remain accurate. The Revised Project, with mitigation, would result in less than significant (Class II or III) impacts on air quality due to the generation of exhaust emissions during construction, operations, and maintenance. Mitigation Measures AQ-1.1 and AQ-1.2 would ensure that impacts are not significant. Operation of the Revised Project would result in a beneficial (Class IV) impact through the avoidance of emissions from fossil fuel-fired power plants.

C.4.4.2 PG&E Upgrades

The PG&E Upgrades would result in less than significant (Class III) impacts on air quality due to the generation of exhaust and dust emissions during construction, operations, and maintenance. Emissions would be reduced with implementation of PG&E's Avoidance and Minimization Measures.

C.4.4.3 Overall Significance of Impacts

The combined impacts of the Revised Project and those of the PG&E Upgrades would be less than significant, when compared with the standards of the two different APCDs.

C.4.5 References

AMEC. 2014. Technical Memorandum to: Panoche Valley Solar LLC. Subject: CalEEMod Analysis of Potential Particulate Emissions from Construction Activities at the Panoche Valley Solar Farm Project. August 8, 2014.

CARB (California Air Resources Board). 2013. Ambient Air Quality Standards Chart. Revised: June 4, 2013.

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Comment Set A3 – Monterey Bay Unified Air Pollution Control District

MBUAPCD
Monterey Bay Unified Air Pollution Control District
Serving Monterey, San Benito, and Santa Cruz Counties

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Monterey, CA 93940
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February 10, 2015

San Benito County Planning Department
2301 Technology Parkway
Hollister, CA 95023
Attention: Michael Krausie

Email: panochesolar@aspeneg.com

Re: Panoche Solar Project Supplemental Environmental Impact Report (SEIR)

Dear Mr. Krausie:

Thank you for providing the Monterey Bay Unified Air Pollution Control District (Air District) with the opportunity to comment on the above-referenced document. The Air District has reviewed the document and has the following comments:

- Increasing watering to three times per day should reduce fugitive dust emissions from the expanded construction area of 50 acres per day. However, every effort should be made to apply additional water or surface treatment, as necessary based on site conditions, before fugitive dust becomes visible in order to reduce overall PM10 emissions and potential non-compliance with Air District Rule 400, Visible Emissions. **A3-1**

- The PG&E improvement portion of the project may be subject to the San Joaquin Valley Air Pollution Control District's (SJVAPCD) Indirect Source Review, Rule 9510. Please contact SJVAPCD prior to starting construction to confirm applicability of Rule 9510. **A3-2**

- If any part of the area to be disturbed is located in a Geographic Ultramafic Rock Unit as identified by the California Department of Conservation or if the area to be disturbed has, or is later discovered to have, naturally-occurring asbestos, serpentine, or ultramafic rock, the requirements of the State Asbestos Air Toxic Control Measure (ATCM) must be followed. Please see Section 93105 of the California Code of Regulations for more information on the ATCM (http://www.arb.ca.gov/toxics/atcm/asb2atcm.htm). **A3-3**

- Although construction related emissions are included in the Air District's emissions inventory, the NOx daily emission rate as calculated in the CalEEMod output is more than three times the Air District's NOx threshold for operational emissions. The project is also located within 18 miles of the air monitoring station at Pinnacles National Monument which is where the highest concentrations of ozone are recorded in the North Central Coast Air Basin. Therefore, the Air District is concerned the more intense construction project schedule may contribute to increases in regional ozone concentrations due to the high amount of NOx precursor emissions. In addition to the mitigation identified in the SEIR, the following measures are recommended in order to reduce the effects of construction emissions on regional air quality: **A3-4**

Richard A. Stedman, Air Pollution Control Officer

Comment Set A3 – Monterey Bay Unified Air Pollution Control District (cont.)

- During the ozone season (May to October), expand the use of Tier 3 and Tier 4 rated off-road equipment and on-road engines meeting the 2010 standards; A3-4 cont.
- During the ozone season (May to October), use portable equipment with engines rated at least Tier 3 or higher;
- Use alternatively fueled construction equipment on-site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, biodiesel, or electric.

Please let me know if you have any questions. I can be reached at (831) 647-9418 ext. 227.

Best Regards,

Amy Clymo
Supervising Air Quality Planner

cc: David Frisbey/MBUAPCD

Richard A. Stedman, Air Pollution Control Officer

8.0 MITIGATION MEASURES

8.1 CRITERIA FOR MITIGATION MEASURES

An environmental impact report (EIR) or Mitigated Negative Declaration (MND) should identify each significant air quality impact and propose one or more feasible mitigation measures that could reasonably be expected to reduce impacts below significance and quantify the effectiveness of each measure.[1] A Mitigated Negative Declaration (MND) should identify measures included as part of the project to reduce impacts on air quality to a less than significant level. If a mitigation measure would create a new significant impact, its effect should be evaluated, though in less detail than the project analysis.

The analysis should distinguish between proposed measures and those which have been incorporated and addressed as part of the project. For example, bicycle facilities designed into a proposed office building should be analyzed in the discussion of project impacts. Conversely, an EIR that recommends adding shower facilities based on the project's impacts should address the benefits in the mitigation analysis.

The EIR should conclude whether the proposed mitigation measure(s) would reduce each significant impact to a less than significant level. If not, the project would have an unavoidable significant impact on air quality; the EIR should explain why other mitigation measures are deemed infeasible. In addition, if an alternative design could reduce impacts below significance, the document should address the implications of the significant impacts and why the lead agency chooses to accept them rather than require the environmentally superior alternative.

This chapter recommends feasible measures that can reasonably be expected to reduce air quality impacts from construction, stationary sources, indirect sources, localized carbon monoxide impacts, and cumulative impacts. Tables 8-2 through 8-6 summarize the estimated effectiveness of these measures. Emission reductions should be quantified based on the same assumptions used to forecast project emissions, e.g., maximum daily emissions should be mitigated by measures that achieve maximum daily emission reductions.

8.2 MITIGATING CONSTRUCTION EMISSIONS

Inhalable Particulates

There are several feasible mitigation measures that address the many sources of PM_{10} during the construction phase of a project (e.g., grading, wind erosion, entrained dust). Common measures

[1] NEPA does not require separate discussion of mitigation measures of growth inducing impacts. However, this discussion must be added before an EIS can be used as an EIR.

include watering, chemical stabilization, or reducing surface wind speeds with windbreaks. Table 8-2 summarizes feasible mitigation measures for PM_{10}, the source of emissions that would be affected, the effectiveness of the measure in mitigating emissions, and the source of assumptions.

The impact of a mitigation measure can be quantified by identifying the source of PM_{10} that would be affected, estimating emissions from the source, and applying a mitigation effectiveness factor to those emissions. For example, watering active, unpaved construction areas with full coverage can reduce fugitive PM_{10} from construction equipment and other mobile sources by 50%, reducing daily emissions from 70 lb/day/acre to 35 lb/day/acre.

When quantifying two or more mitigation measures, avoid double-counting of emission reductions, as the impact of two or more mitigation measures is not necessarily additive. In fact, multiple measures applied to the same source of PM_{10} will not be additive. For example, installing wheel washers and paving roads may reduce on-road entrained PM_{10} by 50% and 90%, respectively. However, the combined impact of both is not a 140% reduction in PM_{10} (or 100%, for that matter). Instead, the impact of a second measure would be based on the amount of PM_{10} that remains after implementing the first or primary mitigation measure.

Because construction-related emissions of PM_{10} vary based on a number of factors (e.g., activity types, area of activity, silt content), the level of mitigation necessary to reduce impacts below significance will vary. In general, mitigation measures that address larger sources of PM_{10} during construction (e.g., grading, excavation, entrained dust from unpaved roads) have the greatest potential to substantially reduce fugitive dust.

Feasible Mitigation Measures

- Water all active construction areas at least twice daily. Frequency should be
- based on the type of operation, soil, and wind exposure.
- Prohibit all grading activities during periods of high wind (over 15 mph).
- Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days).
- Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydro seed area.
- Haul trucks shall maintain at least 2'0" of freeboard.
- Cover all trucks hauling dirt, sand, or loose materials.
- Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land.
- Plant vegetative ground cover in disturbed areas as soon as possible.
- Cover inactive storage piles.
- Install wheel washers at the entrance to construction sites for all exiting trucks.
- Pave all roads on construction sites.
- Sweep streets if visible soil material is carried out from the construction site.
- Post a publicly visible sign which specifies the telephone number and person to contact regarding dust complaints. This person shall respond to complaints and take corrective action within 48 hours. The phone number of the Monterey Bay

Unified Air Pollution Control District shall be visible to ensure compliance with Rule 402 (Nuisance).

- Limit the area under construction at any one time.

8.3 MITIGATING STATIONARY SOURCE EMISSIONS

Stationary sources that comply with District rules and regulations generally, but not conclusively, do not create a significant impact on air quality. However, if a project's total emissions (permitted and nonpermitted) are significant, stationary source emissions can be reduced by limiting activity (e.g., quantity, type of equipment, process throughput). In addition, mitigation measures can be applied to stationary sources that are unregulated by the District. Mitigation measures for such stationary sources can include Reasonably Available Control Technology (RACT) or Best Available Control Technology (BACT) that is above-and-beyond District rules and requirements. In addition, off-site mitigation measures can be used to reduce emissions of ozone precursors [i.e., volatile organic compounds (VOC) and oxides of nitrogen (NO_x)]. For example, a stationary source may mitigate its emissions by retrofitting off-site sources of VOC or NO_x.

Feasible Mitigation Measures

- Limit the quantity of equipment.
- Limit the type of equipment.
- Limit the rate and quantity of fuel consumption and/or process throughput.
- Limit the number of hours of operation per day.
- Apply RACT or BACT to stationary sources unregulated by the District.
- Off-site mitigation

For specific control technologies, please refer to CAPCOA's BACT Clearinghouse, the South Coast Air Quality Management District's BACT Clearinghouse, or EPA's AP-42 Com-pilation of Air Pollutant Emission Factors (Volume I). These sources can be used to quantify the effectiveness of mitigation measures. The District can also be contacted for assistance.

Odors

Odors from stationary sources can be mitigated by modifying processes that generate emissions associated with odors (e.g., sulfur compounds, methane). This can usually be accomplished through a process change or additional control equipment. If quantitative methods (e.g., American Society of Testing Materials Standard Method E679 or E1432) were used to predict odor impacts, a similar analysis should be done for the post-mitigation scenario to determine if impacts would be reduced below significance.

8.4 MITIGATING OFF-ROAD MOBILE SOURCE EMISSIONS

For some industrial facilities (e.g., quarries, landfills), emissions of VOC and NO_x from heavy duty equipment can be mitigated through controls on equipment and activity. This includes limits on the number of vehicles, type of fuel used, hours of daily operation, or duration of use. Table 8-3 summarizes recommended mitigation measures and identifies the estimated effectiveness of each measure, based on EPA emission factors.

The net impact of a mitigation measure can be quantified by multiplying an efficiency factor by the unmitigated emissions from the affected equipment.

Feasible Mitigation Measures

- Limit the pieces of equipment used at any one time.
- Minimize the use of diesel-powered equipment (i.e., wheeled tractor, wheeled loader, roller) by using gasoline-powered equipment to reduce NO_x emissions.
- Limit the hours of operation for heavy-duty equipment.
- Undertake project during non-zone season (November 1 – April 30).
- Off-site mitigation

8.5 MITIGATING INDIRECT SOURCE EMISSIONS

Emissions from motor vehicles that travel to and from residential, commercial, institutional, and some industrial land uses (i.e., indirect sources) can generally be mitigated by reducing vehicle activity or using cleaner fuels. The mitigation measures in this section are intended to reduce emissions of VOC, NO_x, and CO.

Indirect source emissions can be reduced by implementing transportation demand management (TDM) measures that reduce vehicle travel. Some TDM measures shorten the length of a trip without eliminating it, resulting in fewer vehicle miles traveled (VMT). For example, a new telecommute center will often shorten, but not eliminate, a commute trip. This reduces running emissions, which make up about 44% of VOC emissions and 72% of NO_x emissions from cars and small trucks. However, most of the following measures eliminate an entire vehicle trip and the emissions associated with starting and stopping a car (start-up and hot soak); thus, they are more effective in reducing emissions than those that only reduce running emissions. In addition, the following measures reduce vehicle congestion and idling, which can reduce carbon monoxide (CO) levels near roadways (Section 8.6).

Commercial, Industrial, and Institutional Projects

Demand-based mitigation measures are often implemented at commercial, industrial, and institutional worksites where the travel patterns of employees on standard work schedules can be modified.[2] The following discussion focuses on feasible options for reducing commute travel by developing facility improvements that can be built into a new project. This is the preferred approach to mitigating commute-based emissions because the implementation of "hardware"

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[2] While TDM measures can be used to reduce non-work-related travel (e.g., shopping trips, travel to sporting events), they are much more difficult to implement and rarely elicit substantial results. The District should be contacted regarding quantification of such mitigation measures.

improvements can be assured and monitored. In addition, employer-based measures (e.g., telecommuting) are identified. However, because requirements on future tenants may not be enforceable, these should only be used if implementation can be assured (e.g., single tenant that is building the project agrees to enforceable requirements).

Feasible Mitigation Measures

Facility Improvements

- Provide preferential carpool/vanpool parking spaces
- Implement a parking surcharge for single occupant vehicles
- Provide for shuttle/mini bus service
- Provide bicycle storage/parking facilities
- Provide shower/locker facilities
- Provide onsite child care centers
- Provide transit design features within the development
- Develop park-and-ride lots
- Off-site mitigation

Employer-Based Measures

- Employ a transportation/rideshare coordinator
- Implement a rideshare program
- Provide incentives to employees to rideshare or take public transportation
- Implement compressed work schedules
- Implement telecommuting program

Quantifying TDM Mitigation Measures

The impact of a TDM measure can be quantified by: 1) estimating the reduction in travel (i.e., vehicle trips and/ or VMT), and 2) converting it into equivalent emissions.

Estimating Reduction in Travel. Table 8-4 summarizes the potential reduction in commute travel (i.e., trips and/or miles traveled) to and from a project site after implementing a mitigation measure at that site. These conservative estimates were based on published case studies and literature; these site-specific default values do not reflect the impact of transit and trip reduction programs on regional, subregional, or even areawide travel characteristics.[3]

These estimates of travel reductions are conservative for several reasons. First, the effectiveness of demand-based measures is variable and highly site-specific, influenced by numerous off-site factors and local parameters (e.g., climate, terrain, accessibility of transit) that can not be fully

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[3] JHK & Associates, Inc. Transportation-Related Land Use Strategies to Minimize Motor Vehicle Emissions (1995), prepared for the Air Resources Board, notes that "[i]t is difficult to quantify reductions in vehicle use and emissions from individual transportation-related land use strategies applied separately or on a site-specific basis, as opposed to community-wide."

captured in this simplified approach. Second, program design is also critical in the success of a site-specific TDM strategy, and the numerous parameters of designing a program can not be captured in this approach. Third, because these reductions in travel would be applied to trip generation rates, they are reductions above-and-beyond normal mode shares that are inherent to ITE rates. Thus, reductions in travel from each mitigation measure are above-and-beyond "average" participation rates for ridesharing, transit, bicycling, or walking. Finally, CEQA discourages undue speculation and reliance on mitigation measures of unknown efficacy in concluding that significant effects will be substantially lessened.

Thus, the mitigation estimates, which apply to generic programs in the absence of favorable external factors, should be used as defaults in lieu of site-specific information. Because many factors increase the efficacy of a mitigation measure, the District encourages air quality analyses to justify higher reductions by identifying favorable conditions. Similarly, packages of mitigation measures that may yield synergistic benefits should also be recognized.

A mitigation measure's impact in reducing commute vehicle trips can be estimated by using the following approach:

Commute Trips Reduced = Average Daily Commute Trips x Mitigation Effectiveness Factor

The number of average daily commute trips to and from a land use can be estimated in two ways: average daily trips (ADT) to and from a development can be multiplied by the percentage of trips that are made for commute purposes (see Table 8-1 for defaults), or the estimated number of employees can be multiplied by a per capita daily travel factor (e.g., 2 trips/employee/day). For example, 10 employees x 2 trips per day = 20 commute trips/day.

Similarly, a mitigation measure's impact in reducing commute VMT (without reducing vehicle trips) can be quantified using the following approach:

Commute VMT Reduced = Average Daily Commute VMT x Mitigation Effectiveness Factor

Example

Based on ITE rates, a 20,000 square foot government office building would generate 1,378 ADT (68.9 ADT per 1,000 sq. ft.). Based on Table 8-1, 10% of these trips (137 ADT) to and from the government office use are commute trips. Assume that bicycle storage and parking facilities would be developed in the proposed project. These facilities can reduce 2% of work trips from employees once the building is occupied (Table 8-4), or 2% of 138 ADT. Thus, implementing this mitigation measure could reduce 3 trips per day from the facility.

Commute Trips Reduced: 138 ADT x 2% = 2.8 ADT reduced

Converting Travel Reductions to Emission Reductions Using URBEMIS. URBEMIS can convert the mitigated number of vehicle trips into equivalent emissions by editing the original file for the unmitigated project and modifying the trip rate for the appropriate land use(s) using a "dummy" trip rate that reflects the number of vehicle trips after mitigation.[4] The following instructions explain how to address non-residential projects:

1. After loading the URBEMIS file from the Main Menu, modify the description of the land use.

2. From the menu of land uses, edit the land use(s) affected by the mitigation measure(s) by entering a "dummy" value of 1 at the "Size" input.

3. Enter the number of vehicle trips after mitigation at the "Trips Per" input. This allows URBEMIS to calculate emissions based on an adjusted number of trips.

   Example: A 10,000 sq. ft. discount store would generate 900 ADT (employee and customer trips). If a mitigation measure would reduce ADT from 900 to 895, the following illustrates how the screen should look before and after (note that ADT for the "BEFORE" scenario is 10 x 90 ADT = 900 ADT):

	Unit Type	Size	Trips Per	%Work Type
BEFORE	Discount Store	10	90/ 1000 sq.ft.	7.0 C
AFTER	Discount Store	1	895/ 1000 sq.ft.	7.0 C

4. End modifications to the project description and return to the Main Menu.

5. Recalculate emissions. Note that the trip rate that was input in Step 3 is reflected in the estimate of "Total Trips."

[4] URBEMIS multiplies the trip rate by a project's size to calculate ADT. Multiplying a "dummy" trip rate (i.e., ADT) by a "dummy" project size (i.e., 1) achieves the same result.

TABLE 8-1
[To be Updated in Next Update per URBEMIS 2007]
PERCENT WORK TRIPS BY LAND USE

Land Use	Percent Work Trips
General Light Industrial	50%
General Heavy Industrial	90%
Industrial Park	41.5%
Manufacturing	48%
Warehousing	2%
Hotel	5%
Motel	5%
Resort Hotel	5%
Racquet Club	5%
Elementary School	20%
High School	10%
College	5%
University	5%
Church/Synagogue/Temple	3%
Day Care Center	5%
Library	
Hospital	25%
General Office 10,000 - over 800,000 sq. ft.	%
Medical Office	7%
Government Office	10%
Office Park	48%
Discount Store	
Shopping Center 10,000 - over 1,600,000 sq. ft.	2%
Quality Restaurant	8%
High Turnover Restaurant	5%
Fast Food	5%
Service Station	2%
Supermarket	%
Convenience Store	2%
Bank	2%

Sources: URBEMIS 2002

Residential Projects

Mitigation measures implemented at residential projects can enhance the effectiveness of work-based TDM measures by addressing the "other" end of a commute trip. These measures can also reduce vehicle usage for non-work purposes (e.g., shopping, recreation), which represent 48% of trips made in the region.[5] As such, they represent a potentially significant source of travel reductions.

While many feasible mitigation measures could apply to residential projects, the District limits its guidance to two quantifiable, facility-based measures and off-site mitigation.. This is due to the lack of quantified research on facility-based measures in residential projects.

Feasible Mitigation Measures

Provide bicycle paths within major subdivisions that link to an external network
Provide pedestrian facilities within major subdivisions
Off-site mitigation

Quantifying TDM Mitigation Measures

While TDM mitigation measures for residential development can reduce travel of all types, their effectiveness is assumed to be minimal for two reasons. First, non-work travel behavior from the home is generally difficult to influence. Unlike commuting, non-work travel (e.g., shopping, personal) is usually non-recurrent, unscheduled, or impulsive. Second, while transportation facilities within a residential development may induce some shifts to alternative modes, travel behavior is equally, if not more, influenced by off-site facilities (e.g., workplace, shopping destination, areawide bicycle facilities).

Thus, an air quality analysis should use conservative assumptions. The values in Table 8-5 are based on the assumption that TDM measures minimally reduce travel from a residential project. These assumptions can be applied to all ADT from a residential project. If a mitigation measure is anticipated to be more effective, the assumptions should be justified.

Other Indirect Source Measures

Indirect source emissions can be reduced by replacing vehicles that use gasoline or diesel fuel with cleaner burning alternative fuels such as methanol, compressed natural gas, and electricity. Emission reductions would be based on the extent to which clean-fuel vehicles replace conventional vehicles (i.e., number of vehicles, activity levels). Table 8-6 summarizes potential emission reductions by fuel type.

Feasible Mitigation Measure

Utilize clean burning fuels in fleet vehicles

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[5] Three County Travel Model Documentation Report, Association of Monterey Bay Area Governments.

8.6 MITIGATING LOCALIZED CARBON MONOXIDE IMPACTS

Mitigating localized CO impacts on existing or reasonably foreseeable sensitive receptors can be accomplished by improving traffic circulation at intersections or roadway links impacted by the project. This can be done by: a) reducing travel to and from the project site, b) shifting travel away from peak periods, and c) increasing roadway capacity with traffic flow improvements. In many cases, these types of measures may already be required to mitigate traffic impacts and improve levels of service. This section describes how to determine if CO concentrations near roadways would be reduced below levels of significance.

Transportation Demand Management (TDM)

The following TDM mitigation measures from Section 8.5 reduce traffic volumes on roadways that serve the project. Reducing congestion reduces vehicle idling, increases traffic speeds, and allows vehicles to operate more efficiently, reducing CO levels near roadways.

Feasible Mitigation Measures

- Provide preferential carpool/vanpool parking spaces
- Implement a parking surcharge for single occupant vehicles
- Provide for shuttle/mini bus service
- Provide bicycle storage/parking facilities
- Provide shower/locker facilities
- Provide onsite child care centers
- Provide transit design features within the development
- Develop park-and-ride lots
- Employ a transportation/rideshare coordinator
- Implement a rideshare program
- Provide incentives to employees to rideshare or take public transportation
- Implement compressed work schedules
- Implement telecommuting program

In addition, the following employer-based mitigation measure can reduce congestion by shifting travel demand out of peak commute periods. As with other employer-based measures, this should only be required when implementation from future tenant(s) is assured.

Feasible Mitigation Measure

- Implement flexible work schedules <u>that do not reduce transit ridership</u>

Quantifying TDM Mitigation Measures

The benefit of TDM measures on congestion can be quantified with the CALINE or CAL3QHC models. If peak hour traffic speed through an intersection or roadway would increase, the appropriate running exhaust factor should be used. Any changes in traffic volume and/or speed should be based on output from a traffic model. After revising the assumption for either variable, CALINE or CAL3QHC should be run again to determine mitigated concentrations. The difference between the modeled concentrations with and without mitigation measures is the reduction in ambient CO levels attributable to mitigation.

Transportation Systems Management (TSM)

TSM mitigation measures such as synchronized traffic lights and dedicated turn pockets can improve traffic circulation by increasing vehicle capacity on a roadway or at an intersection given the same volume of traffic. Such "hardware" improvements are often required to mitigate impacts of a project's traffic to acceptable levels of service. This can often reduce CO levels near affected roadways and eliminate potential exceedances of AAQS.

Quantifying TSM Mitigation Measures

The benefit of TSM improvements can be quantified with the CALINE or CAL3QHC model based on the improvement in circulation (e.g., traffic speed, increased capacity) on each link. Any changes in assumed speed should be based on traffic data from a model. If peak hour speeds through an intersection or roadway would increase, the appropriate running exhaust factor should be used. After revising the emission factor, CALINE or CAL3QHC should be run again to estimate mitigated concentrations. The difference between the modeled concentrations with and without mitigation is the reduction in ambient CO levels.

8.7 MITIGATING CUMULATIVE IMPACTS

Projects which are not consistent with the AQMP have not been accommodated in the AQMP and will have significant cumulative impacts on the attainment and maintenance of ozone standards. This section identifies feasible mitigation measures, by project type, that can substantially reduce cumulative impacts on regional ozone levels by ensuring consistency.

Residential Projects

Because residential projects directly influence population growth, their cumulative impact can be mitigated by reducing the number of dwelling units and/or phasing the development so that the project's population is consistent with growth projections in future years. The following measures can reduce cumulative impacts below levels of significance if the reduction in population results in consistency with forecasts in the AQMP.

Feasible Mitigation Measures

- Phase development of residences so that population growth from the project is consistent with projections for forecast years in the AQMP.
- Ensure that the jurisdiction's population forecasts are updated in the next AQMP by working with AMBAG or the appropriate local agency.

- Reduce number of residences to ensure growth is consistent with the AQMP.[6]

- Implement sufficient transportation control measures to fully offset any increase in emissions related to future population in excess of AQMP forecasts.

Population Related Commercial, Industrial and Institutional Projects

Commercial, industrial or institutional projects are intended to meet the needs of a population forecasted in the AQMP. If a project is located in a county that already exceeds projected growth, its indirect emissions would also be inconsistent with the AQMP and cannot be mitigated by revising the project. Instead, the District recommends the following measure, which would mitigate long-term cumulative impacts on ozone levels below significance.

Feasible Mitigation Measure

Ensure that the jurisdiction's population forecasts are updated in the next AQMP by working with AMBAG or the appropriate local agency.

Non-Population Related Commercial, Industrial and Institutional Projects

Mitigating cumulative impacts from non-residential population related activities (e.g., hotels, motels) that are inconsistent with the AQMP should be discussed with the District.

Stationary and Area Source Emissions

Because stationary and area sources subject to District permit authority are consistent with the AQMP if they comply with District rules, mitigation measures are unnecessary provided the project complies with District rules and regulations. This determination only applies when all emissions from a stationary sources are regulated under by the permit.

Wastewater Treatment Projects

District Rule 216 requires that new or modified wastewater treatment facilities are consistent with the adopted AQMP. Therefore, mitigation measures are unnecessary provided the project complies with District Rule 216.

Transportation Projects

A transportation project that is inconsistent with the emissions budget in the State-mandated AQMP can be mitigated if net emissions are totally offset. The efficacy of a mitigation measure will vary and should be quantified based on improvements in circulation derived from a model (e.g., DTIM). An EIR or MND should conclude whether mitigation measures would reduce impacts below significance by eliminating net increases in emissions.

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[6] Per PRC §21085, this can only be implemented if the lead agency finds that there are no other feasible measures or alternatives that would provide comparable levels of mitigation.

Feasible Mitigation Measures

- Revise the scope of the project to fully offset any increase in emissions.
- Implement sufficient transportation control measures to fully offset any increase in emissions related to future population in excess of AQMP forecasts.

8.8 MITIGATION MONITORING AND REPORTING

State law requires a lead agency to adopt a mitigation monitoring plan to enforce the implementation of mitigation measures (PRC §21081.6). This must occur when the lead agency adopts CEQA findings in conjunction with approving a project with significant impacts for which an EIR or MND was prepared.[7].

The mitigation monitoring plan should include the following information:

Agency/entity responsible for implementing mitigation measure
Source of funding for mitigation measure (e.g., capital improvements)
Timeframe for implementing mitigation measure
Agency responsible for monitoring
Specific criteria for judging compliance
Enforcement mechanism (e.g., condition on tenant leases, property title)

Reporting mechanism

If a responsible or trustee agency calls for a mitigation measure, the lead agency can require it to submit a monitoring program for the proposed measure [PRC §21081.6(a)].

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[7] The State's Office of Planning and Research finds that "it makes sense to design the program at the same time mitigation measures are being drafted and to circulate the draft program and the Draft EIR concurrently...Ideally, the program would be available along with the project environmental document" (Tracking CEQA Mitigation Measures Under AB3180. April 1989).

TABLE 8-2
[To be Updated in Next Update per URBEMIS 2007]

MITIGATION MEASURES CONSTRUCTION EMISSIONS
Pollutant: PM_{10} (Fugitive Dust)

Mitigation Measure	Source Category	Effectiveness	Source
Water all active construction sites at least twice daily. Frequency should be based on the type of operation, soil, and wind exposure.	Fugitive emissions from active, unpaved construction areas	50%	U.S. EPA, "AP-42, Vol. I." Pg 11.2.4-1.
Prohibit all grading activities during periods of high wind (over 15 mph).	Grading emissions	Reduces potential for exceedance	SCAQMD, "SIP for PM_{10} in the Coachella Valley" 1990. Pg 5-15
Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days).	Wind erosion from inactive areas	Up to 80%	U.S. EPA, "AP-42, Vol. I." Pg. 11.2.4-1.
Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydro seed area.	Wind erosion from inactive areas	Up to 80%	U.S. EPA, "AP-42, Vol. I." Pg. 11.2.4-1. 90%
Haul trucks shall maintain at least 2'0" of freeboard.	Spills from haul trucks	90%	MBUAPCD
Cover all trucks hauling dirt, sand, or loose materials.		90%	MBUAPCD
Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land.	Wind erosion from inactive areas	4% (15% for mature trees)	SCAQMD, "SIP for PM_{10} in the Coachella Valley" 1990. Pg 5-15
Plant vegetative ground cover in disturbed areas as soon as possible.	Wind erosion from inactive areas	5%-99% (based on planting plan)	SCAQMD, "SIP for PM_{10} in the Coachella Valley" 1990. Pg 5-15
Cover inactive storage piles.	Wind erosion from storage piles	Up to 90%	U.S. EPA "AP-42, Vol. I." Page 11.2.3-4)

TABLE 8-2 – Continued

MITIGATION MEASURES CONSTRUCTION EMISSIONS
Pollutant: PM_{10} (Fugitive Dust)

Mitigation Measure	Source Category	Effectiveness	Source
Install wheel washers at the entrance to construction sites for all exiting trucks.	On-road entrained PM_{10}	50%	SCAQMD, "SIP for PM_{10} in the Coachella Valley" 1990. Pg 4-11
Pave all roads at construction sites.	On-road entrained PM_{10}	90%	SCAQMD, "SIP for PM_{10} in the Coachella Valley" 1990. Pg 4-12
Sweep streets if visible soil material is carried out from the construction site.	On-road entrained PM_{10}	34%	SCAQMD, "SIP for PM_{10} in the Coachella Valley" 1990. Pg 5-18.
Post a publicly visible sign with the telephone number and person to contact regarding dust complaints. This person shall respond and take corrective action within 48 hours. The phone number of the MBUAPCD shall also be visible to ensure compliance with Rule 402 (Nuisance).	All emissions	Minimizes nuisance levels	MBUAPCD
Limit the area under construction at any one time.	Fugitive emissions from active, unpaved construction areas	71 lb/acre/day	MBUAPCD based on U.S. EPA "AP-42," Vol. I

Note: These effectiveness estimates are not additive within a source category (i.e., the benefit of 2 or more mitigation measures that address the same source of emissions would not be the sum of both measures).

TABLE 8-3

MITIGATION MEASURES
HEAVY DUTY EQUIPMENT
Pollutant: NO_x and PM10

Mitigation Measure	NOx Effectiveness	PM Effectiveness	Source
Limit use of equipment	See Tables 7-3 and 7-4 for hourly emission saving by type		
Replace diesel- powered equipment with gasoline-powered.	See U.S. EPA, "AP-42, Volume II." 1985.		
Use PuriNOx emulsified diesel fuel in existing engines.	14% reduction	63% reduction	ARB interim verification of 1/31/01
Modify engine with ARB verified retrofit	Up to 25 % reduction	Up to 85 % reduction	Table 8-4
Repower with current standard diesel technology.	Up to 91% reduction	Up to 69% reduction	Table 7-3
Repower with CNG/ LNG technology.	Up to 73% reduction if new engine cert. is 0.5 g. NOx, 23% if new engine cert. is 1.5 g. NOx.	75-80% reduction	ARB, 2004 MV Fees guidelines, Table 5.

Note: These effectiveness estimates are not additive within a source category (i.e., the benefit of 2 or more mitigation measures that address the same source of emissions would not be the sum of both measures).

TABLE 8-4

MITIGATION MEASURES
RETROFITS AND/OR REPOWERS FOR HEAVY DUTY DIESEL ENGINES
Pollutant: NO_x and PM_{10}

Applicable Engine Model Years; Manufacturers, or Use	Mitigation Measure[1]	Percent Reductions NO_x	Percent Reductions PM_{10}
1993-2002; specific 4-stroke diesel engines– contact manufacturer	Retrofit with DPF from Lubrizol,Cleaire, Donaldson	0-25%	85%
1993-2003; specific 4-stroke diesel engines without EGR– contact manufacturer	Retrofit with an ARB Level 3 verified DPF from ECS-Lubrizol	0%	85%
1993-2002; Caterpillar with PSA bi-fuel system.	Retrofit with an ARB Level3 verified DPF from Clean Air Power	0%	85%
1993-2002; specific 4-stroke diesel engines used as emergency generators --contact manufacturer	Retrofit with an ARB Level3 verified DPF retrofit from Clean Air systems	0%	85%
1991-2002; many 4-stroke diesel engines over 150 Bhp – contact manufacturer	Retrofit with an ARB Level1 verified DOC from Cleaire, Donaldson or Lubrizol	0-25%	25%
Any. Older baseline engines result in greater reductions.	Repower with new current Tier 1 or 2 diesel engine	25-69%	25-86%

TABLE 8-5
MITIGATION MEASURES
COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL LAND USES

Mitigation Measure	Est. Reduction in Commute Activity		Assumptions	Source
	Trips	VMT		
Provide preferential carpool/vanpool parking spaces	0.5%	Same	SOV rate ↓ 1%, of which 50% is net ↓ in trips (assumes shift to 2 person HOV), or 1% x 50% = 0.5%	Orski, Kenneth, Can Management of Transportation Demand Work?, 1990.
Implement a parking surcharge for single occupant vehicles	2.0%	1.5%	Surcharge of $3/day/employee SOV	Harvey, Greig, Pricing as a Transportation Control Measure, 1991
Provide for shuttle/mini bus service	2.0%	Same	None	Orski, Kenneth, Can Management of Transportation Demand Work?, 1990.
Provide bicycle storage/parking facilities and shower/locker facilities.	1.0%	0.5%	Mode share ↑ 1% (trips ↓ 1%). Avg. bicycle trip length 50% of avg. work trip length (5 vs. 10 miles), or 1% ↓ trips x 50% trip length = 0.5% ↓ VMT	U.S. EPA, TCM Information Documents, 1991 and Calif. Energy Commission, Energy-Aware Planning Guide, 1993.
Provide onsite child care centers	N/A	2.0%	7% use daycare, avg. work trip length 10 miles + 5 mile diverted linked trip to child care ctr. Reduces diverted linked trips (33% of VMT), or 7% x 33% ↓ VMT ≈ 2% ↓ VMT	Calif. Energy Commission, Energy-Aware Planning Guide, 1993 and Association for Commuter Transportation, Case Study Series, 1990.
Provide transit design features within the development	0.05%	0.1%	None	The Planning Center/JHK Assoc., TCM Effectiveness, 1992.

TABLE 8-5 -Continued

MITIGATION MEASURES
COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL LAND USES

Mitigation Measure	Est. Reduction in Commute Activity		Assumptions	Source
	Trips	VMT		
Develop park-and-ride lots	10% per space occupied	89% per space occupied	4 mile avg. to lot, 11% of avg. home-work distance for park-n-riders (35 miles); 10% of VT to lot by bike/walk	Weant and Levinson, Parking, 1990.
Employ a transportation/ rideshare coordinator	2.0%	Same	Exposes 25% to ridesharing; of 17% that take part, 50% ↓ net trips (assumes SOV shift to 2-person HOV), or 25% x 17% x 50% ↓ trips ≈ 2% ↓ trips and VMT	Multisystems, Paratransit Options, 1990.
Implement a rideshare program	.0%	Same	Availability of rideshare material and information 50% as effective as program with rideshare coordinator	See above
Provide incentives to employees to rideshare or take public transportation	1.0%	Same	Subsidies/incentives ↓ SOV by 2%, with 50% ↓ net trips (assumes SOV shift to 2-person HOV), or 2% trips x 50% ↓ trips = 1% trips and VMT	Orski, Kenneth, Can Management of Transportation Demand Work?, 1990.
Implement compressed work schedules	2.0%	Same	9/80 schedule ↓ 10% of trips, with 20% employee participation per day (staggered days off), or 10% ↓ in trips x 20% = 2% trips and VMT	California Energy Commission, Energy-Aware Planning Guide, 1993.
Implement telecommuting program	1.5%	3%	10% of employees ↓ 15% of trips, or 10% x 15% = 1.5% ↓ trips. Avg. trip length for telecommuter 20 miles (200% of 10 mile avg.), or 1.5% ↓ trips x 200% = 3% ↓ VMT	Cambridge Systematics, TCM Info. Documents, 1991 and Kitamura, et al, Telecommuting & Travel Demand 1990.

TABLE 8-6 **MITIGATION MEASURES RESIDENTIAL LAND USES**			
Mitigation Measure	**Estimated Reduction in All Travel**		**Source**
	Trips	**VMT**	
Provide bicycle paths within major subdivisions that link to an external network	0.1%	Negl.	MBUAPCD, 1991 AQMP Appendix A, TCM Measure 9
Provide pedestrian facilities within major subdivisions	0.1%	Negl	MBUAPCD, 1994.

TABLE 8-7

MITIGATION MEASURES
ALTERNATIVE FUELS
Pollutants: VOC, NO_x

Mitigation Measure	Emission Reductions vs. Conventional Vehicle		Assumptions	Source
	VOC	NO_X		
Utilize electric fleet vehicles	100%	100%	No on-road emissions	ARB MV Fees Table 7 for passenger cars
Utilize Ultra Low-Emission fleet vehicles	82%	64%		ARB MV Fees Table 7 for passenger cars
Utilize methanol fleet vehicles	71%	64%	85 (85% methanol, 15% gas)	ARB MV Fees Table 7 for passenger cars
Utilize liquid propane gas fleet vehicles	71%	64%	LPG vehicles are LEV	ARB MV Fees Table 7 for passenger cars
Utilize compressed natural gas fleet vehicles				

This table compares running exhaust emission factors for Light Duty Passenger Vehicles(up to 3,750 lbs). Factors do not apply to retrofitted vehicles; these efficiencies will decrease over time. Assumes that clean-fuel vehicles meet State Certification Standards for Low Emission Vehicles (Passenger Cars and Light-Duty Trucks under 3,750 lbs):

2000 baseline emissions for Light Duty Passenger Vehicles in grams/mile: VOC 0.28; NO_x 0.7; Source: ARB MV Fees Table 7 for passenger cars.

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