DOCKET	
09-AFC-9	
DATE	JAN 25 2010
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January 25, 2010

Mr. Eric Solorio
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: Responses for Data Requests Set 1, dated December 22, 2009 and Set 2, dated January 19, 2010; Ridgecrest **Solar Power Project, Docket No. 09-AFC-9**

Dear Mr. Solorio:

Attached please find Ridgecrest Solar I, LLC's responses to the CEC's Data Requests Sets 1 and 2, dated December 22, 2009 and January 19, 2010, respectively.

If you have any questions on these responses to the Staff's Data Requests, please feel free to contact me directly.

Sincerely,

Alice L. Harron
Senior Director, Development

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Ridgecrest Solar Power Project

09-AFC-9

Responses to CEC Data Requests

Sets 1 & 2 (#1-262)

Submitted to:
California Energy Commission
January 2010

Prepared by:
AECOM Environment

Submitted by:
Ridgecrest Solar I, LLC

Ridgecrest Solar Power Project
09-AFC-9
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Introduction to Data Requests

The Application for Certification (AFC) was filed by Solar Millennium, LLC. Since filing of the AFC, in order to facilitate the permitting of the Ridgecrest Solar Power Project (RSPP or Project), a project company was created and therefore the Applicant should now be Ridgecrest Solar I, LLC (RSI), a wholly owned subsidiary of Solar Millennium, LLC. The following data requests have been prepared reflecting this change in applicant structure.

In addition to the minor modification of the applicant name, and in order to avoid another round of data requests, these data responses reflect the new configuration of the proposed Project. Specifically, the description of the reconfiguration is provided below.

To address resource management agencies' comments regarding habitat values, the RSPP site plan has been reconfigured to avoid the impacts to natural stormwater flows across the El Paso Wash. South of Brown Road, this avoidance will be accomplished by shifting the south solar field slightly to the north and west, placing it entirely out of and to the west of the Wash. This adjustment results in an approximate 4% reduction in the area of disturbance of the southern solar field. The reconfiguration also includes relocation of the power block to the north of Brown Road. The main site access road and main office are also moved to north of Brown Road. The reduced footprint of the south solar field requires the number of solar collector array loops, which individually have dimensions of approximately 1,300 feet long by 140 feet wide, to be decreased from 133 to 119. A new site plan is provided as Figure DR-ALT-49-1 and -2 in the Alternatives section of this document.

The design of the 230 kV switchyard has been optimized, resulting in a reduction of the footprint to 3.2 acres (425 ft x 325 ft) from 5.5 acres (600 ft x 400 ft). The new location of the switchyard is such that its western boundary limit will be contiguous with the eastern boundary line of the proposed SCE permanent easement. Modifications to the planned reroute of the existing SCE lines west of the south solar field are consistent with the original intent to closely follow the western limits of the field. The length of the existing lines that will need to be relocated (through a shift to the west) is now 8,600 feet (compared to 8,000 ft in the original site configuration. The length of the proposed realigned segments of the existing SCE 115 kV and 230 kV transmission lines will run 9,060 ft around the southwest corner of the south solar field.

North of Brown Road, the north solar field is shifted north and east to move the field entirely out of the El Paso Wash. The area of disturbance associated with the north solar field has increased by approximately 25% to offset the reduction of the south solar field. The number of solar collector array loops in the north solar field has increased from 145 to 167. In order to contain the entire field between the east side of the El Paso Wash and US Highway 395, the east-west dimensions of the two original segments of the north solar field are reduced and the field is reconfigured into a total of six segments, with some segments of the field shifted east. The reconfiguration of the RSPP results in a slight increase in the ROW to 3,995 acres. Engineered drainages along the perimeters of both the north and south solar fields are being redesigned to accommodate the new solar field configuration. Total disturbed acreage for the project will be increased from approximately 1,760 acres to 1,944 acres (a 10% increase).

Several factors contributed to the increase in disturbance area of the north field. The greatest factor is more unused space within the fence lines of the solar fields due to segmentation of the field to avoid the wash and fit into the remaining available area. The new design is not as efficient as the previous design,

in both use of land area and conversion of solar radiation into electricity. Process efficiency is reduced, requiring approximately 3% more solar loops due to the heat transfer requirements associated with the solar collection and pumping inefficiencies that occur with the staggered field configuration.

To mitigate the overall losses in process efficiency resulting from the new configuration, the process performance of the steam cycle was improved by adding cells to the air-cooled condenser (ACC). This change approximately doubled the area occupied by this piece of equipment, from about 1.66 acres to 3.27 acres; ACC height remains at 120 feet. The increase in ACC size will reduce the steam system backpressure. To accommodate the larger ACC, the layout within the power block was rearranged somewhat, although the overall impact to the power block footprint is negligible.

In addition, regarding the less efficient use of land area, the staggered field configuration results in triangular spaces at the “offsets” in the field design that may be disturbed in the process of grading the site. These areas are currently being evaluated to minimize any impact. The segmentation in the north field has also increased the number of subfields of solar arrays from 4 to 6, resulting in additional terraces, access roads, and on-site drainage channels being required between the subfields. Also, the new SCE lines have been pushed further to the west, which also has resulted in some space inefficiencies and corresponding increase in total disturbance area. The areas of disturbance associated with the relocated SCE transmission lines are included within the total disturbance area cited above. The disturbed areas west of the south field may be able to be further reduced at such time as SCE has finalized their design for the re-alignment.

The movement of the power block to the north of Brown Road will result in a longer gen-tie line alignment and a greater number of monopoles between the power block and the switchyard. The length of the t-line alignment will increase from approximately 1,250 ft to 3,900 ft, and the number of poles will increase from 3 to 4. The reconfiguration will also result in the need for the gen-tie line to cross over Brown Road. The longer north-south dimensions of the north solar field will result in an overall longer run of in-field HTF piping, and the new relative positioning of the two solar fields will result in a longer run of out-of-field HTF piping. The major length of out-of-field piping is a 2,200-foot run from the power block, spanning over El Paso Wash via a new pipe bridge, under Brown Road via a pair of culverts, and onward into the south solar field.

Because the offsite portion of the water pipeline is shortened in the new design, total disturbed acreage for the offsite water line will be reduced from approximately 18 acres to approximately 16.3 acres. The diameter for the water pipeline has increased from 12” to 16” to accommodate a request from the Indian Wells Valley Water District.

RSI and its team have made every attempt to provide thorough answers to the data requests. However, due to the large quantity and complexity of some of the requests and the revisions to the Project to be responsive to the biological issues raised by the CEC and BLM, a small number of data requests do not have complete answers. For these data requests, we have included in some cases a partial answer and in all cases a date by which a complete answer will be provided. However, given the extensive information contained in the AFC and in these data responses, the CEC and BLM should be able to complete their Draft Staff Assessment/Draft Environmental Impact Statement without problem or delay.

DR-AIR-1

Information Required:

Please describe the types of activities that emit combustion and fugitive dust emissions on the site currently and the quantities of those emissions that occur from those activities.

Response:

The 3,995-acre Project Right-of-way is composed of undeveloped desert with naturally-vegetated areas; there are no existing structures or stationary emission sources on the Project site. Currently, there are few anthropogenic activities on this site that would create combustion or fugitive dust emissions, with the exception of off-road recreational vehicle use. The Bureau of Land Management does not currently monitor off-road recreational vehicle use, making it difficult to predict emissions from this activity. However, off-road vehicle use is believed to be frequent on this site.

The site is also subject to natural wind erosion effects which would cause fugitive dust emissions. Pre-project fugitive dust emissions from wind erosion are discussed and estimated in association with the response to DR-AIR-3.

DR-AIR-2

Information Required:

Please describe whether those activities will be permanently discontinued when the project is completed and estimate the reductions from the current onsite baseline emissions.

Response:

Off-road recreational vehicle use in the Project area is expected to decrease when the Project is completed, and any emissions associated with those activities will decrease as well. Wind erosion will continue following Project construction; however, the extent of wind erosion will decrease due to site compaction, the use of soil stabilizers, and the paving of various portions of the site. Post-project fugitive dust emissions from wind erosion are discussed and estimated in the response to DR-AIR-3.

DR-AIR-3

Information Required:

Please identify the increase or decrease in the acreage of non-stabilized disturbed land within the project site during operation and estimate the corresponding increase or decrease in wind erosion fugitive dust emissions at the site.

Response:

As described in the Soils Report in Attachment C of the RSPP Preliminary Geotechnical Investigation Report provided as Appendix B to the RSPP AFC, submitted to the CEC on September 1, 2009, this site has a high potential for wind erosion. The Wind Erosion Prediction System (WEPS) model was used to estimate the potential for wind erosion and soil loss at the RSPP site. The WEPS model is a process-

based, continuous, daily time-step model that simulates weather, field conditions, management and erosion. The model results are highly dependent upon the input parameters, which are supplied in Appendix B, Attachment C.4.2 of the AFC (for pre-Project and post-Project scenarios) and in the Soils response of the Data Adequacy Supplement (for the operation scenario), submitted to the CEC on October 26, 2009. The model was created with climate data and surface elevations from the nearest climate and weather stations, representative soil profiles for the site, and a representative area for the Project. Since the WEPS model treats the field input as an idealized rectangle, the Project area was conservatively taken as a larger area calculated with the widest site dimensions and does not match the area of the exact Project outline.

Desert Glaze (also known as "Desert Pavement" and "Desert Varnish") was not applied to the pre-Project wind erosion estimates for the RSPP because Desert Glaze was not observed during the geologic surveys conducted at the site, and because the soils were determined to be inconsistent with this phenomenon. The average of the six textural analyses concluded that the soils on the RSPP site are predominantly characterized as sandy loam. This characterization is consistent with field observations and the published descriptions for the Wasco-Rosamond-Cajon Association, which is mapped across 95 percent of the RSPP site in the General Soil Map of California. The Wasco sandy loam is the predominant soil series present at the RSPP site and was chosen as the representative soil type in the WEPS model to predict wind erosion for RSPP. A more detailed analysis can be found in Attachment C, Water and Wind Erosion Modeling, of the Geotechnical Report in Appendix B of the AFC.

The WEPS model predicted that the fugitive Particulate Matter emissions of 10 microns or less (PM10) emission rate for the entire undisturbed site is 8.767 tons per acre-year. The WEPS model PM10 emission rate was multiplied by the total Project area of 3,995 acres to calculate the annual wind erosion of the Project site according to Equation AQ-1. This calculation yields a baseline (i.e., pre-Project) mass emission rate of 35,024 tons per year (tpy) of fugitive PM10 due to wind erosion on the currently undisturbed Project site.

$$\textbf{Total PM} = WEPS_u * Area_P \qquad \text{(Eq. AQ-1)}$$

Where: Total PM = PM10 emissions from the entire undisturbed site (Total PM = 35,024 tpy)

$WEPS_u$ = undisturbed PM10 emission factor from the WEPS model
($WEPS_u$ = 8.7 tons per acre-year)

$Area_P$ = Total Project site area ($Area_P$ = 3,995 acres)

Wind erosion will obviously continue following Project construction; however, the extent of wind erosion will decrease due to site compaction, the use of soil stabilizers and the paving of various portions of the site.

Similar to the undisturbed site, the WEPS model was used to predict the wind erosion from the planned disturbed site. Because of the reconfigured site plan, the total predicted disturbance area and the area notated as the facility footprint have slightly increased from the initial project layout submitted in the AFC. The increase of disturbed surface area will affect the emissions associated with wind erosion; only the emissions associated with the new site layout are discussed in this response. The total predicted disturbance area for the Project plant site is 1,944 acres during the construction phase of the Project, which is approximately 50 percent of the total Project area. The closest approximation to the site management practices at the RSPP available in the WEPS input parameters are the management operations that describe the conditions expected in the aftermath of grazing with complete removal of crop residue. The decrease in wind erosion due to road paving and dust suppressants are not accounted for in the WEPS

model for the planned disturbed site and no distinction was made between the total disturbance area and the facility footprint. The WEPS model used an idealized rectangle with an area of 882 acres, which is the area of one solar field array, to calculate the wind erosion from the planned disturbed area. The WEPS model predicted that the uncontrolled fugitive PM10 emission rate for the planned disturbed site is 8.409 tons per acre-year.

To predict controlled emissions, the total area of the solar field and power block for both units was taken as the controlled area. This is a total area of 1,448 acres that is paved, covered with gravel, or treated with soil stabilizers. This area is notated as the facility footprint. Soil stabilizers (dust suppressants) are assumed to provide 80 percent control efficiency compared to untreated soil. Gravel and paving would have a higher control efficiency; however, the lower value of 80 percent is used in the calculations to ensure that emissions are not underestimated. With these two assumptions, the controlled PM10 emissions from the Project site following construction can be calculated using Equation AQ-2.

$$\textbf{Project PM}_{\mathbf{C}} = (WEPS_u * (Area_P - Area_d)) + (WEPS_d * (Area_d - Area_F)) + (WEPS_d * Area_F\,(1 - CE)) \qquad \text{(Eq. AQ-2)}$$

Where: Project PM_C = Controlled, Post Project PM10 emissions from the Project site (tpy)

$WEPS_u$ = undisturbed PM10 emission factor from the WEPS model
($WEPS_u$ = 8.7 tons per acre-year)

$WEPS_d$ = disturbed site PM10 emission factor from the WEPS model
($WEPS_d$ = 8.4 tons per acre-year)

$Area_P$ = Total Project site area ($Area_P$ = 3,995 acres)

$Area_d$ = Total disturbed facility footprint area ($Area_d$ = 1,944 acres)

$Area_F$ = Total controlled area of the solar fields and power blocks ($Area_F$ = 1,448 acres)

CE = Control Efficiency of soil stabilizer (CE = 80 percent)

Controlled, post-Project PM10 emissions are calculated to be 24,587 tpy. The net change in fugitive dust emissions due strictly to wind erosion is calculated by subtracting the controlled, post-Project emissions from the pre-Project, undisturbed emissions using Equation AQ-3.

$$\textbf{Emission Change} = \text{Total PM} - \text{Project } PM_C \qquad \text{(Eq. AQ-3)}$$

As shown in Table DR-AIR-3-1, there is a net reduction in fugitive PM10 emissions due to wind erosion following construction of the Project of 10,437 tpy. Note that this calculation does not include the emissions associated with operations of the solar facility (please see DR-AIR-5 for those calculations). The detailed wind erosion fugitive dust emission calculations are provided in Table E.2-18b in the spreadsheet with filename *Ridgecrest DR Operating Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

Table DR-AIR-3-1 Fugitive PM10 Emissions from Wind Erosion

Site Condition	Annual PM10 Emissions (tpy)
Pre-Project Undisturbed Site	35,024
Controlled Post-Project	24,587
Net Emission Change	(10,437)

As noted, the wind erosion estimates for before and after construction of the RSPP were developed using WEPS, a sophisticated numerical model developed by the U.S. Department of Agriculture's Agricultural Research Service. The WEPS model was designed to simulate wind erosion potential in an agricultural setting. Because soil conditions would be different in an industrial setting such as a solar thermal power plant, the model was run making conservative assumptions to ensure that estimates of wind erosion were not underestimated. When used to estimate emissions during the operational phase of the Project, the model is expected to significantly overestimate the amount of particulate matter emissions from the solar field due to wind erosion. If the mass emission levels estimated by WEPS during operations were to actually occur, the blowing sand and dust would quickly pit the mirror surfaces, and would significantly degrade the efficiency of power production to unacceptable levels. However, the control measures to be implemented at the site, including initial site compaction, application of dust suppressant as needed, and regular application of water during mirror washing are sufficient to lower potential wind erosion to acceptable levels.

Several features of the RSPP compared to the scenario modeled point to a significant overestimate in estimated operational wind erosion. These attributes include:

- The whole solar array field is compacted during construction to a significant depth that will significantly alter the native soil characteristics assumed in the model. A 40 percent increase in soil density was assumed in the model run but this is only an unsupported assumption not based on any empirical data.

- Ongoing operations involving mirror washing, dust suppressant application, and water/dust suppressant trucks traffic through the solar array field will produce additional compaction and cementation of the soil, further altering the soil characteristics to become less erodible, compared to the soil simulated in the model.

Given the above differences between what was modeled and what is actually expected in the operation phase of the RSPP, the WEPS model estimates of wind erosion are expected to significantly overestimate the wind erosion during facility operation. However, the conservative (high) estimate of operational emissions results in a minimum estimate of the reduction in windblown dust emissions from the pre-construction baseline scenario to operational activities. In other words, the expected potential reduction in windblown dust by construction of the RSPP, estimated using the WEPS model, is a minimum value and the reduction in emissions from the pre- to post-Project will likely be much larger than presented.

DR-AIR-4

Information Required:

Please provide an analysis of the available onsite surface/near surface soil sieve data that identifies a defensible site specific soil silt content value.

Response:

The silt content used to estimate construction, operation and wind erosion emissions for this Data Response are based on the average silt content that was analyzed for grain size distribution according to method ASTM D422, which uses the 200-mesh sieve. The data were provided in Appendix B of the AFC. The average silt content that is used in the updated emissions calculations is 21 percent.

DR-AIR-5

Information Required:

Please provide an updated fugitive dust emission calculation for both construction and operations using the defensible soil silt content value.

Response:

The construction and operations fugitive dust emissions calculations were updated with a site-specific surface silt content of 21 percent as determined in response to DR-AIR-4. The updated construction emissions are presented in Tables DR-AIR-5-1 and DR-AIR-5-2 and the updated operating emissions are shown in Table DR-AIR-5-3. Detailed emission calculations are provided in the spreadsheet with filename *Ridgecrest DR Operating Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

Table DR-AIR-5-1 Maximum Daily Construction Emissions

Phase of Construction	NOx (lb/day)	VOC (lb/day)	CO (lb/day)	SO_2 (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Power Plant (on site)	788.50	86.90	427.09	1.73	904.14	209.64
Roadway (off site)	270.55	29.91	140.51	0.57	169.31	58.29
Transmission and Communication Line (offsite)	12.63	1.61	16.55	0.03	18.79	6.21

Notes: lb/day = pounds per day
NOx = Nitrogen oxide
VOC = volatile organic compounds
CO = Carbon Monoxide
SO_2 = Sulfur Dioxide
PM2.5 = Particulate Matter of 2.5 microns or less

Table DR-AIR-5-2 Maximum Annual Construction Emissions

Phase of Construction	NOx (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM10 (tpy)	PM2.5 (tpy)
Power Plant (on site)	90.72	10.15	48.53	0.20	106.03	24.99

Table DR-AIR-5-3 Summary of Project Criteria Pollutant Emissions

Emissions	NOx	VOC	CO	SO_2	PM10	PM2.5
Hourly Emissions (lb/hr)	32.83	2.97	21.59	0.83	44.92	9.22
Daily Emissions (lb/day)	38.42	10.37	40.45	6.27	553.00	111.16
Annual Emissions (tpy)	1.25	1.18	1.89	0.42	19.78	2.64

Operating emissions were updated (compared to the emissions presented in the AFC) to address four issues:
1) Silt content of soils (impacts PM10 and PM2.5 emissions only) (per DR-AIR-4),
2) revisions to maintenance vehicle mileage (per DR-AIR-14, -15, -16, and -17).
3) Model year 2013 vehicle emission standards (all pollutants) (per DR-AIR-18), and
4) a larger diesel-fired emergency generator (all pollutants) (per DR-AIR-23).

The emissions shown in this table reflect the changes to emission from all four issues.
lb/hr = pounds per hour

DR-AIR-6

Information Required:

Please provide a revised PM10 and PM2.5 modeling analysis using the updated fugitive dust emission values.

Response:

The particulate modeling analyses based on the revised construction and operation emissions are provided in Attachment DR-AIR-6, Revised Air Quality Impacts Assessment.

DR-AIR-7

Information Required:

Please provide the spreadsheet version of the Appendix E-2 Construction Emission Worksheets with the embedded calculations intact.

Response:

Updated construction emission calculations are provided in the spreadsheet with filename *Ridgecrest DR Construction Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

DR-AIR-8

Information Required:

Please identify whether all of the off-road equipment emission factors are based on Tier 3 engines, or if Tier 3 engines are only assumed for the engines listed with Tier 3 in the equipment name column.

Response:

All of the off-road equipment emission factors are based on engines that meet Tier 3 emission standards. Please see the response to DR-AIR-9 for a description of how the emission factors were derived.

Tier 3 engines were selected for predicting emissions because they have lower emissions than the other available options. A worst-case modeling scenario was selected which assumed the heavy earthwork equipment is operated in close proximity to the Project boundary, and based on AECOM's experience with modeling construction emissions for other solar energy projects, NOx emissions need to be as low as possible to ensure that the Project does not cause exceedances of the Nitrogen Dioxide (NO_2) 1-hour ambient air quality standard at the fence line. This potential impact is due to the low release height (stack height) of the construction equipment and the high concentration of equipment near the fence line assumed for the worst-case scenario used for modeling. Note that the worst-case scenario used for modeling purposes would be an infrequent occurrence given the extremely conservative assumptions used to develop the scenario. This situation is also not unique to RSPP; any construction project that would operate large numbers of heavy equipment near a fence line would have the potential for similar short-term high impacts.

DR-AIR-9

Information Required:

Please provide the input assumptions to obtain the OFF ROAD Model raw engine emission factors, the assumptions used to derive the equipment specific emission factors, and please provide the spreadsheets used to create the emission factors shown in Appendix E-1.

Response:

The OFFROAD2007 Model was run with the input options shown in Table DR-AIR-9-1.

Table DR-AIR-9-1 OFFROAD Model Options

Variable	Selected Option
Episode Period	Calendar Year: 2010 Averaging Days: Monday - Sunday Month or Season: Annual
Report Options	HC Emissions as Reactive Organic Gases (ROG) Report by Model Year: Exhaust, Evaporative and Toxics
Filter Options: Area	State
Filter Options: Equipment Categories	All
Filter Options: Fuel and Horsepower	Fuel: Diesel Horsepower Class: All horsepowers

The model produced a tab-delimited text file that contained annual average daily diesel equipment exhaust emissions, in tons per day, and average daily operating time, in hours per day, for calendar year 2010 by equipment type (e.g., rubber-tired loaders, cranes, etc.), horsepower range (e.g., 0 to 25 horsepower, 26 to 50 horsepower, etc.) for each equipment type, and model year for each equipment type and horsepower range. This information was listed for every combination of county, air district and air basin within the State. For example, one line of output listed average annual daily operating hours and daily exhaust emissions of ROG, CO, NOx, Carbon Dioxide (CO_2), SO_2, PM, Nitrous Oxide (N_2O) and Methane (CH_4) from model year 2008 air compressors with horsepower ratings from 26 to 50 horsepower in the portion of Kern County located within the Mojave Desert Air Basin that is in the Kern County Air Pollution Control District's (KCAPCD's) jurisdiction. The model output file was imported into a Microsoft Access database, and a query was used to calculate total emissions and operating hours by equipment type, horsepower range and model year. The equipment is not weighted in the OFFROAD model; the model calculates emission factors for each type of equipment and horsepower range individually.

Emission factors, in pounds per operating hour, were calculated by dividing the annual average daily emissions, converted from tons per day to pounds per day, by the annual average daily operating hours. These emission factors were calculated for each combination of equipment type, horsepower range and model year. The emission factors used to calculate exhaust emissions presented in the AFC were based on the model outputs for the portion of Kern County located within the Mojave Desert Air Basin that is in the KCAPCD's jurisdiction. However, in preparing the response to this Data Request, it was concluded that it is more appropriate to use statewide average emission factors because of the relatively small equipment populations within the local geographic area. Therefore, the emission factors and construction emission calculations have been revised.

The emission factors for the specific equipment shown in Appendix E.2, Table E.2-1 (of the AFC), are the emission factors calculated from the OFFROAD2007 Model output for the corresponding OFFROAD2007 Model equipment category, horsepower range that encompasses the specific equipment, and the model year that is the earliest model year required to comply with Tier 3 emission standards, which depends on engine horsepower.

The emission factors used for estimating construction emissions submitted with the Data Responses differ from the emission factors used for the construction emissions that were submitted with AFC the in the range of approximately five percent higher to five percent lower depending on the specific equipment and pollutant. The change varies according to equipment type and horsepower range. The percentage change in emission factors used for the AFC compared to the emission factors used for this data response is shown in Table DR-AIR-9-2.

The tab-delimited output file from the OFFROAD2007 Model and revised construction emission calculation spreadsheets, including tabs with the emission factor calculations, are provided in the spreadsheet with filename *Ridgecrest DR Construction Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations). Revised maximum daily and annual construction emissions are provided in Data Response DR-AIR-5.

Table DR-AIR-9-2 OFFROAD Emission Factors: Difference between KCAPCD and CA Statewide Runs

Equipment Type	Fuel	Horsepower	Model Year	Air Resources Board Off-Road Model Category	CO (lb/hr)[a]	ROG (lb/hr)[a]	NOx (lb/hr)[a]	SOx (lb/hr)[a]	PM10 (lb/hr)[a]	PM2.5 (lb/hr)[b]
375 cfm Compressor	Diesel	20	2008	Air Compressors	-2%	-2%	-2%	-2%	-2%	-2%
Air Compressor Ingersol Rand, P65WK	Diesel	23.5	2008	Air Compressors	-2%	-2%	-2%	-2%	-2%	-2%
Backhoe, 450E	Diesel	124	2007	Tractors/Loaders/ Backhoes	0%	0%	0%	0%	0%	0%
Concrete Pump Rig, B50	Diesel	130	2007	Other Construction Equipment	-2%	-2%	-2%	-2%	-2%	-2%
Crane 20 Ton Grove, YB7722	Diesel	130	2007	Cranes	0%	0%	0%	0%	0%	0%
Dozer,Cat, D10T	Diesel	580	2006	Crawler Tractors	0%	0%	0%	0%	0%	0%
Excavator, 365C	Diesel	404	2006	Excavators	0%	0%	0%	0%	0%	0%
Folklift, DP45K	Diesel	124	2007	Forklifts	1%	1%	1%	1%	1%	1%
Generator, XQ400	Diesel	328	2006	Generator Sets	-1%	-1%	-1%	-1%	-1%	-1%
Grade-All, TL1055	Diesel	125	2007	Rough Terrain Forklifts	-1%	-1%	-1%	-1%	-1%	-1%
Loader, 972H	Diesel	287	2006	Rubber Tired Loaders	0%	0%	0%	0%	0%	0%
Motor Grader, 160M	Diesel	213	2006	Graders	0%	0%	0%	0%	0%	0%
Paving Machine, AP1055D	Diesel	224	2006	Pavers	5%	5%	5%	5%	5%	5%
Roller, CB-534D	Diesel	130	2007	Rollers	0%	0%	0%	0%	0%	0%
Scraper Cat, 657G	Diesel	564	2006	Scrapers	0%	0%	0%	0%	0%	0%
Scraper Cat, 657G, Blade Engine	Diesel	410	2006	Other Construction Equipment	1%	1%	1%	1%	1%	1%
Sheepsfoot, 825G	Diesel	315	2006	Rollers	0%	0%	0%	0%	0%	0%

Table DR-AIR-9-2 OFFROAD Emission Factors: Difference between KCAPCD and CA Statewide Runs

Equipment Type	Fuel	Horsepower	Model Year	Air Resources Board Off-Road Model Category	CO (lb/hr)[a]	ROG (lb/hr)[a]	NOx (lb/hr)[a]	SOx (lb/hr)[a]	PM10 (lb/hr)[a]	PM2.5 (lb/hr)[b]
Vibratory Roller, 825H	Diesel	354	2006	Rollers	0%	0%	0%	0%	0%	0%
Scraper Cat 623	Diesel	330	2006	Scrapers	0%	0%	0%	0%	0%	0%
Asphalt Paver, Cat AP1055B	Diesel	174	2007	Pavers	-1%	-1%	-1%	-1%	-1%	-1%
Backhoe, Cat, 430E	Diesel	97	2008	Tractors/Loaders/ Backhoes	0%	0%	0%	0%	0%	0%
175-250 kW Gen Set	Diesel	400	2006	Generator Sets	-1%	-1%	-1%	-1%	-1%	-1%
Light Tower 5 KW	Diesel	8	2008	Generator Sets	0%	0%	0%	0%	0%	0%
600 A Temp Power	Diesel	400	2006	Generator Sets	-1%	-1%	-1%	-1%	-1%	-1%
200 A Temp Power	Diesel	135	2007	Generator Sets	0%	0%	0%	0%	0%	0%
Compactor, Cat 826H	Diesel	410	2006	Rollers	0%	0%	0%	0%	0%	0%
185 cfm Compressor	Diesel	20	2008	Air Compressors	-2%	-2%	-2%	-2%	-2%	-2%
999 Manitiwoc	Diesel	390	2006	Cranes	0%	0%	0%	0%	0%	0%
2250 Manitiwoc 300 Ton-Upper engine	Diesel	450	2006	Cranes	0%	0%	0%	0%	0%	0%
2250 Manitiwoc 300 Ton - carrier engine	Diesel	460	2006	Cranes	0%	0%	0%	0%	0%	0%
Crane, 40-Ton, Grove, RT600	Diesel	173	2007	Cranes	0%	0%	0%	0%	0%	0%
Dozer, Cat D-9	Diesel	410	2006	Crawler Tractors	0%	0%	0%	0%	0%	0%
Dozer, Cat D-6	Diesel	150	2007	Crawler Tractors	0%	0%	0%	0%	0%	0%
Dozer, Cat 824	Diesel	354	2006	Rubber Tired Dozers	0%	0%	0%	0%	0%	0%

Table DR-AIR-9-2 OFFROAD Emission Factors: Difference between KCAPCD and CA Statewide Runs

Equipment Type	Fuel	Horsepower	Model Year	Air Resources Board Off-Road Model Category	CO (lb/hr)[a]	ROG (lb/hr)[a]	NOx (lb/hr)[a]	SOx (lb/hr)[a]	PM10 (lb/hr)[a]	PM2.5 (lb/hr)[b]
Loader, Cat, 972G	Diesel	275	2006	Rubber Tired Loaders	0%	0%	0%	0%	0%	0%
Motor Grader, Cat 140H	Diesel	150	2007	Graders	0%	0%	0%	0%	0%	0%
Diesel Welder 400 Amp	Diesel	31	2008	Welders	0%	0%	0%	0%	0%	0%
Hydro Crane 70-75 Ton RT	Diesel	275	2006	Cranes	0%	0%	0%	0%	0%	0%
Hydro Crane 30-35 Ton RT	Diesel	155	2007	Cranes	0%	0%	0%	0%	0%	0%
Tower Crane (Lieberr 630)	Diesel	275	2006	Cranes	0%	0%	0%	0%	0%	0%
Forklift 10000# RT	Diesel	100	2007	Forklifts	0%	0%	0%	0%	0%	0%
Forklift 30000#	Diesel	130	2007	Forklifts	1%	1%	1%	1%	1%	1%
CAT IT 28 Utility Loader	Diesel	50	2008	Rubber Tired Loaders	1%	1%	1%	1%	1%	1%
Truck Crane	Diesel	130	2007	Cranes	0%	0%	0%	0%	0%	0%
40'- 60' Manlift	Diesel	50	2008	Aerial Lifts	-4%	-4%	-4%	-4%	-4%	-4%
90' Manlift	Diesel	70	2008	Aerial Lifts	-5%	-5%	-5%	-5%	-5%	-5%
Scissor Lift	Diesel	50	2008	Aerial Lifts	-4%	-4%	-4%	-4%	-4%	-4%

Computation for percent change: (KCAPCD EF - CA EF)/(CA EF)*100

a. From Table 1.1 for diesel and Table 1.2 for gasoline.

b. Diesel PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Diesel Engine Exhaust = 0.920 and PM2.5 Fraction of PM10 in Gasoline Engine Exhaust =0.756 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds per day] = Emission factor [pounds per hour] x Number pieces of equipment x Operating time for each piece [hours per day]

DR-AIR-10

Information Required:

Please provide a defensible rationale as to why the locations for the area source emission inputs did not change from short-term to annual modeling, or please provide annual construction modeling that matches the extent of annual construction activities.

Response:

The choices of source location were intended to demonstrate the worst-case scenario for construction-phase modeling. Keeping the construction emission sources in the worst-case location for the entire year for the annual period model runs is a more conservative (worst-case) approach than to keep the sources in the worst-case location for a shorter period of time. By increasing the size of the area sources to cover the entire area to be worked over the course of a year and thus distributing the annual construction emissions over a much wider area, the modeled impacts would decrease substantially.

In response to this and other Data Requests, the annual construction-phase modeling was redone to be more realistic (less conservative). Although the annual impacts did decrease related to this factor, short-term impacts are greater due to the increased silt content (see DR-AIR-4), relocation of the power blocks and solar field, and other changes to the emissions. As noted above, the revised modeling results are provided in Attachment DR-AIR-6.

DR-AIR-11

Information Required:

Please provide a revised construction emissions NO2 modeling analysis that uses the NOx_OLM option with an OLM source group, and if necessary or desired, that uses actual hourly background NO2 data.

Response:

The air quality-impact analyses were revised to incorporate the updated emissions and more realistic modeling approaches as described in the Data Requests and responses above. The revised modeling results are provided in Attachment DR-AIR-6.

DR-AIR-12

Information Required:

Please provide a GHG emissions estimate for the project construction in CO2-equivalent tons for the entire construction period.

Response:

Greenhouse gas (GHG) emissions for the construction period are summarized in Table DR-AIR-12. A detailed explanation of the GHG emissions calculation procedure is provided as Attachment DR-AIR-12, Construction Greenhouse Gas Emission Calculations.

Table DR-AIR-12 Construction GHG Emissions

Aspect of Construction	Project Total (metric tons CO_2 equivalent)
Construction Equipment Total	27,558
Onsite Motor Vehicle Total	591
Offsite Motor Vehicle Total	15,108
Project Total	**43,257**
Annualized over Project Life (30 years)	**1,442**

DR-AIR-13

Information Required:

Please clarify the estimations and assumptions used in determining the number of mirror washing events per year.

Response:

The mirrors will be washed on an as-needed basis. For the purpose of estimating the wash truck vehicle mileage and wash water consumption, the Applicant assumes that the mirrors will be washed once monthly in the six months surrounding winter (assumed to be October through March) and twice monthly from mid-spring through mid-fall (assumed to be April through September). This schedule assumes 18 mirror washing events per year. The basis for this assumed mirror wash schedule is information provided to AECOM by the operations staff of the Kramer Junction Solar Energy Generating Station (SEGS) facility, a solar thermal facility in the Mojave Desert that uses a similar mirror technology. Each wash event is predicted to take 10 days to complete. However, as noted, the mirrors would be washed as-needed to maintain optimum performance.

DR-AIR-14

Information Required:

Please provide a clear and defensible explanation of why the amount of parabolic trough pipe length is equivalent to the mirror washing vehicle mileage for each washing cycle event, or revise this estimate as necessary to obtain a more reasonable total vehicle mileage estimate for mirror washing.

Response:

The vehicle travel distance has been revised to account for the additional distances required for refilling the water tank, refilling the soil stabilizer tank, refueling, and activity-specific considerations. The assumptions used to develop the revised travel distance for each of the required maintenance activities is explained briefly below and summarized in Table DR-AIR-14-1. Detailed step-by-step calculations are provided in Table E.2-20 in the spreadsheet with filename *Ridgecrest DR Operating Emissions.xlsx* on the CD-ROM in Attachment DR-AIR-3, Emission Calculations.

Mirror Wash Vehicle Travel

The total number of individual rows of mirrors is multiplied by the length of an individual row; added to this figure is the perpendicular length through the solar field to account for travel from row to row. This sum is the minimum travel distance in the solar field for a single pass. As the washing process is currently proposed, only one-half of each of the mirrors is washed per day. The mirror is stowed in the vertical upright position facing east and the bottom half of the mirror is washed on the first day. The following day, the mirror is stowed facing west and the other half is washed. Thus, the minimum travel distance is doubled to account for the actual physical washing process.

The mirror wash truck is assumed to have a capacity of 5,000 gallons of water, and the washing activity itself requires about 0.7 gallons per linear foot of mirror. Based on these values, the water truck can wash five full rows of mirrors before a truck refill is required. The average travel distance to refill the truck was calculated from the solar field back to the power block where the water storage tank is located. Each refill trip would require travel from the solar field to the power block and back to the solar field, thus for every refill trip, the average distance is doubled.

The travel distance through the solar field for washing is added to the travel distance for the refill trips to determine the total travel distance required for the mirror washing activity with water refill. It is assumed that the water wash truck would be refueled at the power block by a mobile fueling truck during a water refill stop, thus additional travel for fueling is not required. It was assumed that more than one water truck will be needed on site and that one mirror washing event can be completed in 10 days.

Weed Abatement Application

Weed abatement is performed on average four times per year. Similar to the travel for mirror washing, the total number of individual rows of mirrors is multiplied by the length of an individual row; added to this figure is the perpendicular length through the solar field to account for travel from row to row. Additional travel is assumed along the ends of the mirror rows. It is assumed that the weed abatement truck will not require refilling, as the herbicide would be applied to living plants only, and based on observations of the Kramer Junction SEGS facility, vegetation growth is minimal. Refueling is assumed to occur off site by the contractor prior to arrival at the site; thus no additional mileage for refueling is included in the distance estimate. It was assumed that one weed abatement application for the entire facility will take 10 days to complete.

Soil Stabilizer Application

Soil stabilizers are applied four times per year to the normal travel paths used by maintenance vehicles. Similar to the travel for mirror washing, the total number of individual rows of mirrors is multiplied by the length of an individual row; added to this figure is the perpendicular length through the field to account for travel from row to row. In addition to the travel in a single pass, it was also assumed that the perpendicular lengths would be stabilized a second time for stabilization of the path of travel required for header inspections.

The soil stabilizer truck is assumed to hold 5,000 gallons of solution, and the stabilizing activity itself requires about 0.8 gallons per linear foot of roadway. Based on these figures, the soil stabilizer truck can treat the roadway between four full rows of mirrors before a refill is required. The average distance of travel was calculated from the solar field back to the power block where the stabilizer supply is located.

Each refill trip would require travel from the solar field to the power block and back to the solar field, thus for every refill trip, the average distance is doubled.

The travel distance through the solar field for soil stabilizer application is added to the travel distance for the refill trips to determine the total travel distance required for the soil stabilizer application activity plus refill. It is assumed that the soil stabilizer truck will be refueled at the power block by a mobile fueling truck during a refill stop, thus additional travel for fueling is not required. It was assumed that one soil stabilizer application for the entire facility will take 10 days to complete.

Water Truck

Water truck travel distance is calculated based on the volume of reverse osmosis (RO) reject water generated per day that would be applied for dust suppression, and an application rate of three gallons per linear foot. RO reject water would be generated and applied to the solar field up to 365 days per year.

Maintenance Truck Travel

The piping headers will be physically inspected once per operating day, assumed to be 365 days per year; the distance traveled is equal to the piping length of the header itself, with some additional distance included to account for backtracking, as the heat transfer fluid (HTF) header is not a simple loop. In addition, the mirrors would have to be physically inspected following every high wind event. For the purpose of this estimate, 18 high wind events are assumed to occur per year, and the travel distance is equal to the minimum travel distance calculated for the solar field, as explained in the mirror wash description above. Maintenance vehicles are assumed to have the spare parts and supplies necessary to effect repairs without additional travel to the maintenance stores area at the power block. Refueling is assumed to occur off site; mileage is calculated based on the refueling frequency and the distance to the nearest off-site refueling facility. Similar to the weed abatement and soil stabilizer application, it was assumed that more than one maintenance vehicle will be required for the facility, and a full field inspection will require 10 days to complete.

Table DR-AIR-14 Maintenance Vehicle Travel Distance

Vehicle Use	Vehicle Type	Distance		
		Miles/task	Miles/day	Miles/year
Mirror Wash Truck	Water Trucks, Freightliner 5000 gallon	810	81	14,578
Weed Abatement	Water Trucks, Freightliner 5000 gallon	158	16	631
Soil Stabilizer Application	Water Trucks, Freightliner 5000 gallon	529	53	2,117
Water Trucks	Water Trucks, Freightliner 5000 gallon	1.5	1.5	536
Maintenance Vehicles	Onsite Pick Up Truck 1/2 Ton	---	171[1]	6,089

1. Daily mileage is based on the distance required for inspection of the entire solar field.

DR-AIR-15

Information Required:

Please provide the entire calculation to show how an annual mileage value of 438 miles was determined for the mirror washing vehicles.

Response:

As explained in the response to DR-AIR-14, the vehicle travel distance has been revised to account for the additional distances required for refilling the water tank, refueling, and activity-specific considerations. The assumptions used to develop the revised travel distance for each of the required maintenance activities is explained in the response to DR-AIR-14 and summarized in Table DR-AIR-14-1. Detailed calculations are provided in Table E.2-20 in the spreadsheet with filename *Ridgecrest DR Operating Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

DR-AIR-16

Information Required:

Please explain how the annual mileage values were determined for the Soil Stabilizer Application and Weed Abatement trucks.

Response:

As explained in the response to DR-AIR-14, the vehicle travel distance has been revised to account for the additional distances required for refilling the tank trucks, refueling, and activity-specific considerations. The assumptions used to develop the revised travel distance for each of the required maintenance activities is explained in the response to DR-AIR-14 and summarized in Table DR-AIR-14. Detailed calculations are provided in Table E.2-20 in the spreadsheet with filename *Ridgecrest DR Operating Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

DR-AIR-17

Information Required:

Please review the maintenance vehicle annual mileage estimates and revise the emission estimates and air dispersion modeling as necessary if corrections are found that increase the emission estimates.

Response:

As explained in the response to DR-AIR-14, the vehicle travel distance has been revised to account for the additional distances required for refilling the tank trucks, refueling, and activity-specific considerations. Daily mileage is based on the distance required for inspection of the entire solar field. The assumptions used to develop the revised travel distance for each of the required maintenance activities is explained in the response to DR-AIR-14 and summarized in Table DR-AIR-14. Detailed calculations are provided in Table E.2-20 in the spreadsheet with filename *Ridgecrest DR Operating Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

DR-AIR-18

Information Required:

Please revise the emissions calculations for the onsite dedicated vehicle exhaust emissions assuming only new model year vehicles are used.

Response:

Exhaust emissions for gasoline powered maintenance trucks have been revised using model year 2013 emission factors, which will be the new model year as of start of operations. The specific emission factors used are shown in Table DR-AIR-18-1 and the corresponding emissions are shown in Table DR-AIR-18-2. The emission factors and emissions also appear in Tables E-3.7a and E-3.7c in the spreadsheet with filename *Ridgecrest DR Operating Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

Table DR-AIR-18-1 Gasoline and Diesel Powered Maintenance Vehicle Emission Factors

Vehicle Type	NOx (lb/mi)	VOC (lb/mi)	CO (lb/mi)	SOx (lb/mi)	Exh. PM10 (lb/mi)	Tire + Brake PM10 (lb/mi)	Exh. PM2.5 (lb/mi)	Tire + Brake PM2.5 (lb/mi)
Gasoline	9.18E-05	4.16E-05	1.20E-03	1.07E-05	1.07E-05	4.59E-05	9.90E-06	1.64E-05
Diesel	4.16E-03	4.24E-04	2.12E-03	4.14E-05	1.19E-04	1.40E-04	1.09E-04	4.60E-05

Table DR-AIR-18-2 Maintenance Vehicle Emissions

Period	NOx	VOC	CO	SOx	PM10[1]	PM2.5[1]
Maximum Hourly Emissions (lb/hr)	0.049	0.005	0.037	0.001	0.001	0.001
Maximum Daily Emissions (lb/day)	0.359	0.042	0.381	0.005	0.0012	0.0011
Annual Emissions (tpy)	0.037	0.004	0.023	0.000	0.001	0.001

1. Emissions presented in this table do not include fugitive PM10 or fugitive PM2.5 emissions, as the model year emission factors do not impact the entrained dust or associated emissions.

DR-AIR-19

Information Required:

Please identify if the applicant would be willing to stipulate to a condition of certification that would require a review of available alternative low-emission vehicle technologies, including electric and hydrogen fueled vehicles, and use of those technologies to replace the proposed diesel and gasoline fueled vehicles used for operations maintenance if lower emission alternative technology vehicles are both available and not cost prohibitive.

Response:

The RSPP is not currently exploring using alternative-fuel vehicle technologies such as electric or hydrogen fueled vehicles. As shown in Table DR-AIR-18-2 above, vehicle (tailpipe) emissions during facility operations are estimated to be well below 0.01 ton per year of all criteria pollutants. While entrained road dust fugitive emissions are expected to exceed one ton per year, the use of alternative fueled vehicles would not reduce the fugitive dust emissions. As concluded in the AFC, the RSPP has not identified any direct or indirect significant adverse air quality impacts from the use of on-site vehicles and, therefore, mitigation as suggested in this data request is not warranted. As an alternative, the Applicant would be willing to accept a condition similar to that recommended by Staff for the Beacon Solar Energy Project, as follows:

The Project owner shall use 2013 model year or newer vehicles, meeting California model year on-road vehicle emission standards, for onsite parabolic mirror washing activities and all other facility maintenance activities. Other vehicle/fuel types may be allowed assuming that the emission profile for those vehicles, including fugitive dust generation emissions, is comparable to the vehicles types identified above.

DR-AIR-20

Information Required:

Please provide quarterly wind rose data for the Mojave, Ridgecrest, and Trona monitoring sites.

Response:

The quarterly wind rose data are provided at the end of this section as Attachment DR-AIR-20, Quarterly Wind Roses.

DR-AIR-21

Information Required:

Please provide the coordinates of the Mojave, Ridgecrest, and Trona monitoring sites in Latitude and Longitude or Universal Transverse Mercator (UTM) coordinates.

Response:

The Latitude and Longitude coordinates for the three sites are as follows:

Mojave:	Latitude: 35.051	Longitude: -118.146
Trona:	Latitude: 35.764	Longitude: -117.396
Ridgecrest (China Lake):	Latitude: 35.688	Longitude: -117.693

DR-AIR-22

Information Required:

Please provide a data completeness comparison for the Mojave, Ridgecrest, and Trona monitoring sites for meteorological data from 2000 to 2008.

Response:

The Mojave measurement site, operated by the California Air Resources Board (ARB) was chosen as the surface station for the RSPP mainly due to data capture statistics at the upper air station (Mercury-Desert Rock, Nevada) and alternate surface stations recommended by Glen Stephens at KCAPCD, specifically China Lake Naval Air Facility in Ridgecrest and the Trona measurement site. In an email dated July 14, 2009, Mr. Stephens indicated that if the data capture at Trona and China Lake were not sufficient for use in dispersion modeling, the use of the data from the Mojave site would be acceptable. The text of the email is included at the end of this response.

The data capture statistics for the upper air soundings from Mercury-Desert Rock, presented in Table DR-AIR-22-1, show that the upper air data after 2004 do not meet the 90 percent (minimum) completeness criteria recommended by EPA ambient air quality monitoring and modeling guidelines. Therefore, no meteorological data after 2004 were considered for the analysis.

Table DR-AIR-22-1 Upper Air Data Capture Statistics for Mercury-Desert Rock, NV

Year	Missing Soundings	% Complete
2000	1	99.7%
2001	2	99.5%
2002	4	98.9%
2003	2	99.5%
2004	0	100.0%
2005	54	85.2%
2006	52	85.8%
2007	107	70.7%
2008	101	72.4%

According to the National Climatic Data Center - Integrated Surface Hourly meteorological data, the data capture statistics for 2000 through 2004 at China Lake Naval Air Facility, shown in Table DR-AIR-22-2 are well below the 90 percent data capture threshold for wind speed, wind direction and ambient temperature. Therefore, China Lake Naval Air Facility was not chosen as the surface station for the dispersion modeling analysis.

Table DR-AIR-22-2 Data Capture Statistics at China Lake Naval Air Facility

Year	% Complete		
	Wind Direction	Wind Speed	Temperature
2000	36.6%	45.2%	47.9%
2001	32.3%	44.4%	46.4%
2002	32.9%	48.0%	47.8%
2003	34.5%	48.9%	48.7%
2004	34.7%	47.9%	47.7%

Surface data for the Trona air monitoring station obtained from Mojave Desert Air Quality Management District (MDAQMD) were analyzed for data capture statistics for 2000 through 2004. The data capture at Trona also is incomplete (i.e., less than 90 percent) for wind speed in 2003 and for wind direction in 2001 (see Table DR-AIR-22-3). Therefore, the Trona Air Monitoring station was not chosen as the surface station for the dispersion modeling analysis.

Table DR-AIR-22-3 Data Capture Statistics at Trona Air Monitoring Station

Year	% Complete		
	Wind Direction	Wind Speed	Temperature
2000	96.1%	99.7%	99.7%
2001	79.6%	96.8%	96.8%
2002	95.3%	99.3%	99.3%
2003	91.4%	88.1%	91.7%
2004	99.8%	95.0%	98.9%

Surface data from the Mojave air monitoring site for 2002 through 2004, chosen to coincide with the three most recent years in which the upper air data from Mercury-Desert Rock has a data capture greater than 90 percent, were analyzed to assess the completeness of the data. As shown in Table DR-AIR-22-4, the data capture for wind direction, wind speed and temperature meet the 90 percent data capture completeness criteria. Therefore, based on data capture statistics, the Mojave air monitoring station was chosen as the surface station for the dispersion modeling analysis.

Table DR-AIR-22-4 Data Capture Statistics at Mojave ARB Air Monitoring Station

Year	% Complete		
	Wind Direction	Wind Speed	Temperature
2002	99.7%	99.7%	99.7%
2003	99.9%	99.9%	99.9%
2004	93.6%	93.5%	93.6%

Email from Glen Stephens of Kern Country APCD to Matthew Stresing of AECOM, 7/17/09:

From: Glen Stephens [mailto:GlenS@co.kern.ca.us]
Sent: Tuesday, July 14, 2009 10:25 AM
To: Stresing, Matthew
Subject: Re: MET Data Selection for Ridgecrest Solar Power Project

Matthew, Please proceed.

-Glen

Glen Stephens, P.E.
Kern County Air Pollution Control District
Phone: (661) 862-8687
FAX: (661) 862-5251

>>> "Stresing, Matthew" <Matthew.Stresing@aecom.com> 07/14/2009 6:51 AM >>>

Glen,

Per our phone conversation regarding MET data selection to be used in dispersion modeling for the proposed solar power project near Ridgecrest, I investigated surface data for China Lake Naval Air Facility and at the Trona air monitoring site.

According to the NCDC ISH Data Inventory, the data capture at China Lake (shown in table below) is only >90% for two years (2007-2008) with years before 2007 being well below 90%. Therefore, China Lake cannot be used.

Monthly Data Capture at China Lake Naval Air Facility														
USAF	WBAN	YEAR	Observations per Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
746120	93104	2002	334	325	368	385	370	358	341	375	336	387	334	323
746120	93104	2003	341	338	367	404	361	373	388	363	390	382	318	319
746120	93104	2004	312	346	399	392	356	365	350	387	358	350	338	300
746120	93104	2005	313	345	388	370	366	373	336	379	392	343	313	315
746120	93104	2006	354	321	385	337	334	350	346	401	353	334	355	304
746120	93104	2007	296	885	1162	924	902	736	750	748	825	879	704	749
746120	93104	2008	658	658	732	403	617	732	742	745	713	747	791	635

I requested and received surface data for the Trona air monitoring station from MDAQMD and analyzed the data capture for 2002-2004. 2002-2004 was chosen to coincide with upper air data at Mercury Desert Rock, NV that meets 90% data capture. Unfortunately the data capture at Trona also has a data capture issues where the wind speed in 2003 is <90% (see the table below). Therefore I propose using meteorological data previously process for the Beacon Solar Power Project using Mojave ARB surface data (2002-2004) with concurrent upper air data from Mercury Desert Rock, NV.

2002 Data Capture Statistics for Trona Air Monitoring Site		
Parameter	**# of Hours Missing**	**% Complete**
Pressure	59	99.3%
Temperature	64	99.3%
Wind Speed	65	99.3%

2003 Data Capture Statistics for Trona Air Monitoring Site		
Parameter	**# of Hours Missing**	**% Complete**
Pressure	631	92.8%
Temperature	725	91.7%
Wind Speed	1042	88.1%

2004 Data Capture Statistics for Trona Air Monitoring Site		
Parameter	**# of Hours Missing**	**% Complete**
Pressure	8	99.9%
Temperature	97	98.9%
Wind Speed	437	95.0%

Please feel free to call me with any questions or comments.

Matt

DR-AIR-23

Information Required:

Please confirm the emergency generator engines size and describe what facilities the emergency generator will support in an emergency.

Response:

The emergency generator will be a 2-megwatt (output) diesel-fired unit. The engine driving the generator is 2,922 horsepower. The Applicant will purchase and install an engine meeting the applicable emissions standards for this engine as of the date of manufacture, as defined by the applicable regulation.

At this time, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 horsepower is the Tier 2 standard. The Applicant proposed a Tier 2 engine for the emergency generator based on the emission standards identified in 40 Code of Federal Regulations (CFR), Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Pursuant to Section 60.4202(a)(2) of that subpart, engines with a maximum rating of more than 50 horsepower must meet the emission standards listed in 40 CFR 89.112 for all pollutants beginning in 2007. The emission standards

listed in 40 CFR 89.112 for engines with rated power greater than 560 kilowatt (kW) (750 Hp) are Tier 2 standards which are: 6.4 grams per kilowatt hour (g/kWh) for NOx and non-methane hydrocarbons (NMHC) combined, 3.5 g/kWh for CO and 0.20 g/kWh for PM.

If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. According to the ATCM, new stationary emergency engines must meet the standards for off-road engines of the same model year and maximum rated power as specified in the Off-Road Compression Ignition Engines Standards (Title 13, California Code of Regulations (CCR), Section 2423). Title 13 CCR Section 2423 sets emission standards for the generator engine with model years 2011 and later. The Interim Tier 4 standard applies to the Project generator engine as the engine would be larger than 900 kW (750 horsepower) and would be manufactured between 2011 and 2014. The standards are 0.67 g/kWh for NOx, 0.40 g/kWh for NMHC, 3.5 g/kWh for CO and 0.10 g/kWh for PM.

Tier 2 emissions were used in the emission calculations, ambient air quality impacts analysis (i.e., modeling) and health risk assessment. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standard and NOx, NMHC and PM10 emissions would be lower than the emissions from the Tier 2 engine. In that case, the air quality impacts would be lower than the impacts predicted for the Tier 2 engine. Thus, use of the Tier 2 emissions yields the worst-case predicted impacts for modeling, for predicting emission offset requirements, and for predicting health risk impacts.

The emergency generator is required to provide motive power to three principle areas of the facility: 1) Freeze Protection Pump, 2) Balance of Plant (BOP) Motor Control Center (MCC), and 3) HTF MCC. The specific loads for the BOP MCC and HTF MCC are shown in Table DR-AIR-23-1, and there may be other small loads connected to the power supply to allow the facility to shut down safely.

Table DR-AIR-23-1 Emergency Loads

BOP MCC	HTF MCCs	
Heat Trace XFMR	Power supply cabinet channel A - H	Anticondensation heater LV-motors
Main Fire Alarm Panel	Nitrogen system Heater switchboard	HTF control valve behind reheater 1 to 4
CEMS HVAC	Nitrogen system Junction Box-Power	Centralization box signals
480V Power Panel	PLC Main nitrogen supply	Anticondensation heater LV-motor
STG Turning Gear	Field Supervisory Control 1 and 2	Fire alarm control panel supply 1 and 2
ST Turbine Lube Oil Pump	Fiber optic termination cabinet	Centralization box signals
Fire Water Jockey Pump	HTF control system supply 1 and 2	Distribution box heaters
Battery Charger A	Nitrogen control valves in front of expansion vessels	Filler valve of HTF system
UPS Bypass	Tracing of main service water pipe	Tracing of overflow vessel 1 to 8
CEMS Skid	Control valve in ullage pipe	Control valve in ullage pipe
Gen Breaker	Transformer temperature monitoring cabinet	Anticondensation heater LV-motors
GSU Fans Feeder	Shutoff devices	Overflow return pumps
	Control valve in front of reclamation flash vessel	HTF drain pumps

DR-AIR-24

Information Required:

Please confirm that 500 hours/year of heater operation is sufficient for HTF freeze protection.

Response:

Based on the system performance modeling and historical ambient temperature data, 500 hours of operation for the HTF heater is expected to be sufficient for HTF freeze protection.

DR-AIR-25

Information Required:

Please confirm that the sole purpose of the auxiliary heater is for HTF freeze protection and that it will not be used directly for power generation or for rapid start support.

Response:

The sole purpose of the HTF heater is to ensure the HTF fluid temperature is maintained at a minimum of 54 degrees Fahrenheit for HTF freeze protection. This unit will not be used for direct power generation or for rapid start support.

DR-AIR-26

Information Required:

Please confirm that the use of the auxiliary boiler is strictly for rapid start support through overnight low load (25 percent) operation and early morning full load operation and that it will not be used directly for power generation or for HTF freeze protection.

Response:

The auxiliary boiler will be used to support rapid startup each morning, specifically to establish the steam seals in the steam turbine and maintain the air-cooled condenser (ACC) in an evacuated condition so that the facility can generate power as soon as the solar-generated steam is sufficient to drive the steam turbine. The auxiliary boiler will not be used directly for power generation or for HTF freeze protection. The maximum daily operation of the boiler is expected to be 15 hours per day at 25 percent load and two hours per day at full load.

DR-AIR-27

Information Required:

Please identify the equivalent MWh generated or enabled by the rapid start support use of this boiler.

Response:

The equivalent megawatt per hour (MWh) generated or enabled by the rapid start support use of these boilers is determined by estimating the time required to evacuate the ACC if the seal steam was lost, as steam is required to establish the seal. According to the ACC equipment manufacturer, approximately one hour is required to evacuate the ACC. Based on this duration, use of the auxiliary boiler enables an additional net output at 27 gigawatt hours per year for the Project.

Note that the auxiliary boiler capacity does not directly influence the MWh enabled by the use of the boiler. The boiler is used to maintain the steam seal on the steam turbine and ACC and maintain the ACC in an evacuated condition (under vacuum) during non-generating periods (i.e., at night). The size of the boiler is dictated by the steam requirements for those two functions only. The MWh "saved" is estimated by predicting the time required to generate enough steam to establish the steam seal on the turbine and ACC and then evacuate the ACC using only solar heat (i.e., assuming that the gas-fired boiler did not exist). According to engineering estimates, the time required to generate sufficient steam to establish the steam seal on the turbine and ACC and then evacuate the ACC is approximately one hour following sunrise. One hour represents approximately six percent of the daily availability for power production during the summer (16 hours per day of sunlight) and approximately 10 percent of the availability during the winter (10 hours per day of sunlight). The actual calculation to determine MWh enabled was performed with a thermodynamic model of the solar plant operation, and is not a simple calculation.

In addition, use of the auxiliary boiler reduces the wear and tear on the steam turbine by avoiding the heat-up and cool-down cycle that would occur without the boiler. This provides the direct benefit of longer service intervals and less downtime.

DR-AIR-28

Information Required:

> Please provide an estimate of the SF6 onsite inventory and leakage emissions both in operation and construction phases to complete the GHG emission estimates.

Response:

Sulfur hexafluoride (SF_6) will not be used during the construction period. The on-site inventory of SF_6 during operations is found in the circuit breakers and will be not more than 100 pounds for the Project. The SF_6 leakage rate from operating equipment is guaranteed at 0.5 percent per year and can be less than 0.2 percent per year with current best technology. At the maximum guaranteed leak rate of 0.5 percent, this corresponds to 0.5 pounds per year of SF_6 emissions, or 5.98 metric tons per year of CO_2 equivalent (CO_2e) for the Project. The more probable, technically feasible leak rate is 0.2 percent, which corresponds to approximately 71.7 metric tons CO_2e emissions over the 30-year plant lifetime.

DR-AIR-29

Information Required:

Please confirm that there will be no gasoline or diesel vehicle refueling storage at the site and that either fuel/lube trucks will be used for onsite refueling or the onsite dedicated vehicles will have to drive to the nearest gasoline station, which is approximately a ten mile round trip from the site, to refuel. If gasoline or diesel storage is used at the site, provide information for any proposed onsite gasoline or diesel storage and refueling facilities including throughput information and permitting requirements.

Response:

The diesel-fueled equipment (i.e., mirror wash trucks, soil stabilizer application trucks, and emergency fire water pump and generator engines) will be refueled by a mobile fuel truck that will travel to the Project site. The gasoline powered maintenance trucks will be refueled at the nearest retail gasoline station. There are no fuel storage facilities planned for the Project.

DR-AIR-30

Information Required:

Please indicate if the additional vehicle mileage required for offsite refueling of the dedicated onsite vehicles or fuel/lube truck mileage is considered in the total vehicle miles estimates and emissions estimates, or please correct the estimates accordingly.

Response:

As noted above, the diesel-fueled equipment will be refueled by a mobile fuel truck that will travel to the Project site. The gasoline powered maintenance trucks will be refueled at the nearest retail gasoline station. The vehicle miles traveled for fueling operations are summarized in Table DR-AIR-30-1.

Emission estimates have been revised to include emissions from periodic delivery of diesel fuel to the Project site via a mobile refueling truck. The mobile refueler is assumed to travel from Lancaster, a round trip travel distance of 161 miles. The mobile refueler is assumed to make 12 fuel deliveries per year.

Maintenance vehicle emission estimates have been revised to reflect periodic refueling at a local service station, assumed to be located in Ridgecrest, a roundtrip travel distance of approximately 25 miles. Refueling is assumed to occur a total of 26 times per year and a maximum of twice per day. Detailed calculations of the refueling mileage are also provided in Table E.3-8a in the spreadsheet with filename *Ridgecrest DR Operating Emissions* on the CD-ROM (Attachment DR-AIR-3, Air Emission Calculations).

Emissions associated with this off-site vehicle travel are summarized in Table DR-AIR-30-2, and detailed calculations are provided in Table E.2-7 on the CD-ROM.

Table DR-AIR-30-1 Vehicle Refueling Mileage Estimate

Fuel Type		Diesel	Gasoline
Vehicle Use		Miscellaneous Solar Vehicle Refueling	Maintenance Truck Refueling
Vehicle Type		Water Trucks, Freightliner 5,000 gallon	Pickup Truck
Fuel Type		Diesel	Gasoline
Number of Trips	Trips per Day	1	2
	Trips per Year	12.0	26.0
Destination	---	Lancaster	Ridgecrest
Round Trip Distance	Miles per Trip	161	25
Miles Traveled	Miles per Day	161	50
	Miles per Year	1,932	650

Table DR-AIR-30-2 Off-site Vehicle Criteria Pollutant Emission for the Project

Trip Type	**NOx**	**VOC**	**CO**	**SOx**	**PM10**	**PM2.5**
	Monthly Emissions (lb/month)					
Propane Delivery	5.7E+00	4.2E-01	1.6E+00	6.3E-03	4.2E-01	3.0E-01
Miscellaneous Delivery	1.1E+01	8.4E-01	3.2E+00	1.3E-02	8.4E-01	6.0E-01
Diesel Truck Refueling	5.6E+00	4.2E-01	1.6E+00	6.3E-03	4.2E-01	3.0E-01
Maintenance Vehicles	4.6E-03	2.1E-03	6.0E-02	5.3E-04	5.0E-02	2.3E-02
Total	**22.621**	**1.672**	**6.389**	**0.026**	**1.723**	**1.226**
	Annual Emissions (tpy)					
Propane Delivery	2.9E-01	2.1E-02	8.0E-02	3.2E-04	2.1E-02	1.5E-02
Miscellaneous Delivery	1.7E-01	1.3E-02	4.8E-02	1.9E-04	1.3E-02	9.0E-03
Diesel Truck Refueling	3.4E-02	2.5E-03	9.4E-03	3.8E-05	2.5E-03	1.8E-03
Maintenance Vehicles	3.0E-05	1.4E-05	3.9E-04	3.5E-06	3.2E-04	1.5E-04
Total	**0.491**	**0.036**	**0.138**	**0.001**	**0.037**	**0.026**

DR-AIR-31

Information Required:

Please provide a list from the KCAPCD of large stationary source projects with permitted emissions, for projects with greater than 5 tons of permitted emissions of any single criteria pollutant, located within six miles of the project site that have been recently permitted, but did not start operation prior to 2009, or are in the process of being permitted.

Response:

Please refer to the response to DR-AIR-32 below.

DR-AIR-32

Information Required:

Please provide a cumulative impacts modeling analysis in consultation with Energy Commission staff, if necessary, based on the project list provided by KCAPCD.

Response:

In an email to Richard Hamel of AECOM dated August 26, 2009, Glen Stephens of the KCAPCD indicated that no applicable Kern County permitted sources existed within 6 miles of the RSPP site and that the addition of ambient background concentrations would be sufficient for the cumulative modeling analysis. As a result, no non-Project sources were included in the RSPP modeling analysis. The text of that email is included below:

Richard, you are correct in your assessment.

-Glen

Glen Stephens, P.E.
Kern County Air Pollution Control District
Phone: (661) 862-8687
FAX: (661) 862-5251

>>> "Hamel, Richard" <richard.hamel@aecom.com> 08/26/2009 2:26 PM >>>
Glen,

Thank you for your assistance earlier today regarding the Ridgecrest Solar Power Project.

This email is a follow up to confirm that I requested information about any other emissions sources in the area that would need to be included in a cumulative modeling analysis, if one is required, for PM10. You indicated that no other KCAPCD permitted emissions sources are located in the RSPP area and hence adding the appropriate ambient background for PM10 would be sufficient to demonstrate compliance with the NAAQS. If I misunderstood anything, please let me know.

Thanks again,
Richard Hamel

DR-AIR-33

Information Required:

Please provide copies of any official submittals and correspondence to or from KCAPCD within 5 days of their submittal to or their receipt from the District.

Response:

The correspondence with the KCAPCD regarding this Project since the submittal of the AFC in September 2009 is limited to the submittal of the air permit application; a copy of which have been provided to CEC. As requested, future correspondence will be provided in a timely manner.

Attachment DR-AIR-3

Air Emission Calculations

(On CD-ROM)

Attachment DR-AIR-6

Revised Air Quality Impacts Assessment

AECOM
Environment

Attachment DR-AIR-6

Revised Air Quality Impact Assessment for Ridgecrest Solar Power Project

09-AFC-9

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1.0 Introduction

This document outlines the supplemental modeling performed in response to RIDGECREST SOLAR POWER PLANT (09-AFC-9), DATA REQUESTS SET 1 issued by the California Energy Commission (CEC) on December 22, 2009. This attachment provides the results of revised air dispersion modeling performed in response to the following CEC Air Quality data requests:

- DR-AIR-6: Please update the construction and operations particulate modeling analysis, as necessary, based on the revised fugitive dust emission calculations.
- DR-AIR-10: Please provide a defensible rationale as to why the locations for the area source emission inputs did not change from short-term to annual modeling, or please provide annual construction modeling that matches the extent of annual construction activities.
- DR-AIR-11: Please provide a revised construction emissions NO_2 modeling analysis that uses the NOx_OLM option with an OLM source group, and if necessary or desired, that uses actual hourly background NO_2 data.
- DR-AIR-17: Please review the maintenance vehicle annual mileage estimates and revise the emission estimates and air dispersion modeling as necessary if corrections are found that increase the emission estimates.

Additionally, as outlined in the Alternatives section there are concerns about the orientation of the site as proposed in the AFC in regard to the passage of the El Paso Wash through the Project area. A revised site layout has therefore been prepared. Because of the reconfiguration of the site and in response to the four data requests listed above, the newest version of the AERMOD model (version 09292) was applied with a three-year sequential hourly meteorological data set, which is more than the one year of meteorological data required by Appendix B of the CEC's Guidelines (Rules of Practice and Procedure, Power Plant Site Certification, 2008) for both the operations and the construction modeling.

The meteorological data and ambient background concentrations used remain the same as in the original application and are fully documented in Section 5.2 of the Application for Certification (AFC) and not repeated here. Questions concerning the selection of the meteorological data are addressed in the responses to DR-AIR-20, -21, and -22. The configuration of the model sources and the receptor grids have been updated for the reconfigured site and are documented in the sections below.

The Air Dispersion Modeling Archive is included electronically on a CD at the end of this attachment.

2.0 Summary of Modeling Revisions

2.1 Criteria Pollutant Emissions Changes

For both operations and construction, a number of changes were made to the sources and their emissions used in the modeling analysis. These changes include:

- Due to siting considerations, the planned configuration of the facility has changed, resulting in the relocation of the power block. As a result, the locations of the ancillary equipment sources have changed and are updated in the revised modeling.
- Particulate matter less than 10 microns (PM10) and particulate matter less than 2.5 microns (PM2.5) emissions were updated to reflect the adjusted silt content for the particulate modeling (per DR-AIR-4).
- Emissions for all criteria pollutant emissions during operations were revised based on updated operations-related vehicular travel estimates (per DR-AIR-14, -15, -16, and -17).
- Emissions for all criteria pollutant emissions during operations were revised based on model year 2013 emission factors (per DR-AIR-18)
- The emergency diesel generator located at the power block has been resized since the original AFC submittal. As a result, the source parameters and criteria pollutant emissions have been updated for the operations modeling (per DR-AIR-23).

The revised detailed emission calculations for construction and operations were provided in spreadsheets provided in Attachment DR-AIR-3 of this submittal.

2.2 Modifications to the Annual Construction Sources

Per request DR-AIR-10, the annual construction modeling was modified by adjusting the area sources to cover construction across the entire Project site. As was discussed in the response to DR-AIR-10, keeping the construction emission sources in the worst-case location for the entire year for the annual period model runs is a very conservative (worst-case) approach compared to distributing the annual emissions over the entire site. To respond to the CEC data request, the revised source locations and layout used in the revised modeling are given in Figure DR-AIR-6-1.

As described in the AFC, the solar field construction activities were divided into three phases: 1) surveying, brush removal and site preparation; 2) scraping and grading; and 3) solar panel installation. In addition to the three area sources representing those phases, additional area sources were defined for modeling purposes which included power block construction and a vehicle corridor from the laydown area to the construction zone.

In the prior modeling, each construction activity was allocated to an individual area source. In the revised annual modeling, the surveying, brush removal, site preparation, scraping and grading, and solar panel installation emission sources were combined into eighteen large solar array construction sources which covered all of the solar fields at the facility. Emissions from each construction activity were equally allocated to each of the eighteen new construction area sources, which combined had a total area of 4,479,185 square meters (m^2). In addition, the power block construction area source was represented by a polygon area source with an area of 113,515 m^2. The revised sources used in the annual construction modeling are shown in Figure DR-AIR-6-1.

Vehicular travel to and from the lay down area was represented by a polygon area source with a total area of 592,420 m^2. This source represents emissions from haul trucks and construction equipment with vertical exhaust pipes travelling from the laydown/manufacturing area at the southern end of Solar Field 2 to the various power block and solar array construction areas. The base elevation chosen for this source was the elevation at the centroid of the source (819.9 meters [m]).

For fugitive particulate emissions, all of the construction emission sources had a second overlaid area source representing paved and unpaved roadway travel and other construction activities that produce fugitive emissions (e.g. scraping, grading and vehicular travel in unpaved areas).

2.3 Modifications to the Short Term (24-hours and less) Construction Sources

Because of the reconfiguration of the site layout, new short term construction sources were chosen to represent worst case construction impacts. These revised construction sources are shown in Figure DR-AIR-6-2 and represent the following:

- Power block construction;
- Surveying and grubbing activities (i.e., brush removal and coarse grading);
- Scraping, grading, and foundation emplacement;
- Solar panel installation; and
- Travel to and from the laydown area to the various construction sites.

Because of the “just in time” construction approach, only a limited area of the Project site would be undergoing construction activities on a given day. A worst-case modeling scenario was developed involving construction in Solar Field 2 and the power block, as shown in Figure DR-AIR-6-2. The modeling scenario selected is conservative for several reasons:

1. The grubbing, scraping and grading, and mirror installation modeling sources are aligned west to east along the eastern property fence line downwind of and parallel to the prevailing wind direction. These sources are also located close to the power block construction source providing the maximum overlap of impacts between the construction sources.
2. The compactness of the modeling sources will maximize the local emission flux from the individual sources.
3. The maximum construction emissions associated with the power block are assumed to occur concurrently with the construction of the solar array field in the area most likely to cause the worst case impacts.

The power block construction emission source was represented by a polygon area source area of 113,515 m^2. This area source represents the entire power block area. The construction emission flux for this source was calculated based on the equipment and operations on a typical day during the month with peak construction emissions. The area source represents emissions from construction equipment with vertical exhaust pipes. For fugitive dust emissions, the power block emission source had a second overlaid area source representing low-level emissions from paved and unpaved roadway travel and other construction activities that produces fugitive emissions (e.g., scraping, grading and vehicular travel in unpaved areas).

The grubbing, scraping and grading, and solar panel installation emission sources were each represented by adjoining square area sources 200 m by 200 m (40,000 m^2). The three area sources represent the typical area that would be under construction during any given 24-hour period. The construction emission flux was calculated based on the equipment and operations in an area of this size on a typical day during

the month with peak construction emissions. As with the power block construction source, each area source represents emissions from construction equipment with vertical exhaust pipes. For fugitive dust sources, each area source had a second overlaid area source representing fugitive dust generated from vehicle travel on the paved and unpaved roads and other construction activities that would produce fugitive dust emissions (e.g. scraping, grading and wind-blown fugitives from storage piles). As shown in Figure DR-AIR-6-2, the three area sources representing the solar field construction were placed in an east-west orientation along the eastern fence line downwind of and parallel to the predominant wind direction, which maximizes the cumulative impacts of the three sources.

Vehicular travel to and from the laydown area was represented by a polygon area source with a total area of approximately 224,455 m^2. This area source represents emissions from haul trucks and construction equipment with vertical exhaust pipes travelling to and from the laydown/manufacturing area at the southern end of Solar Field 2 to and from the various construction areas. For fugitive emissions, the roadways emission source had a second overlaid area source representing fugitive dust generated from vehicle travel on the paved and unpaved roadways. The base elevation chosen for this source was the elevation at the mid-point of the entire source (829.0 m).

Buoyancy and mechanical turbulence from the hot exhaust and mobility of the construction equipment and haul trucks was simulated by use of a constant initial vertical dimension in the area source algorithm. Fugitive dust emissions from onsite motor vehicles were modeled as low-level area sources since these emissions would almost all occur near ground level.

The large construction equipment was assumed to have a release height of 3.7 m. The initial vertical depth of the diesel exhaust plume for construction activities was estimated as being four times the release (exhaust) height. This height (14.8 m) takes into account the plume rise of the hot diesel exhaust, mechanical mixing on the site introduced by the movement of heavy equipment, and structure wake turbulence introduced by buildings and structures on the Project site. The initial area source vertical standard deviation for the construction equipment is calculated by taking this vertical depth and dividing by 2.15 for an initial sigma-z of 6.88 m, consistent with EPA modeling guidance for AERMOD.

A release height of 2.0 m was assumed for the fugitive emissions from onsite vehicle sources, with an initial plume height of 15 feet (4.57 m). Following EPA AERMOD guidance, the initial area source vertical standard deviation for construction combustion emissions is estimated as the plume depth divided by 2.15, or 2.13 m.

2.4 Modifications to the Operations Modeling Sources

As was described in Section 2.1, the planned configuration of the facility has changed significantly due to siting concerns. As a result, the power block is now located on the southwest side of Solar Field 2 in the new configuration, and thus the ancillary equipment has also moved. Additionally, the characteristics of the emergency generator to be installed at the power block has been updated since the AFC submittal based on additional information becoming available. The revised source characteristics and locations for the ancillary equipment are given in Table DR-AIR-6-1.

Table DR-AIR-6-1 Stack Parameters for RSPP Ancillary Equipment

Parameter	Auxiliary Boiler	Emergency Generator	Fire-Water Pump	HTF Heater	Cooling Tower [2]
Stack Coordinates (m)[1]	432,325; 3,935,541	432,290; 3,935,480	432,222; 3,935,477	432,332; 3,935,486	432,241; 3,935,554
Stack Base Elevation (ft)	2,685	2,685	2,685	2,685	2,685
Stack Height (ft)	50	23	10	80	22.4
Stack Diameter (ft)	3	0.75	0.5	3	12
Exit Temperature (^{o}F)	300	770	770	300	90.4
Exit Velocity (ft/sec)	23.6	465	107	23.6	27.0

1. Coordinates for UTM Zone 11 referenced to Datum NAD83.
2. The auxiliary cooling tower has two cells and each was modeled as a single stack. Coordinate provided is the westernmost of the two cells.

Because of the change in location and orientation of the ancillary equipment, a revised Good Engineering Practice (GEP) stack height analysis was conducted to evaluate the potential for building downwash from the power block sources. Point sources with heights below GEP are considered to be subject to building downwash and require building dimensions to be input to AERMOD. The GEP stack height analysis was conducted using the EPA Building Profile Input Program (BPIP) (version 04274) that performs the GEP calculation for a multi-building complex on a stack-by-stack basis. The revised stack locations and buildings included in the GEP analysis for the power block are shown in Figure DR-AIR-6-3. A summary of the GEP analysis is provided in Table DR-AIR-6-2. The stack heights of the Project ancillary equipment will be less than their respective GEP formula heights and thus subject to building downwash. Therefore, building dimensions developed by BPIP for all stacks were input to the dispersion model. The BPIP input and output files are provided on the modeling archive CD.

In addition to the emission sources associated with the power block, the Project will require periodic vehicle travel over the unpaved portions of the solar field to perform routine maintenance including mirror washing, maintenance inspections and repairs of the piping network, herbicide application, soil stabilizer application and water application for dust suppression. Criteria pollutant emissions from the combustion of fuels in the vehicles and fugitive PM10 and PM2.5 emissions are expected from vehicle travel in the solar field. The emissions are included in the modeling in the form of ten area sources laid over the solar arrays, one for each of the six rectangular tiers of solar panels in the northern solar array (Solar Field 2), and one for each of the four rectangular tiers in the southern array (Solar Field 1). One area source was placed over each of these ten large array areas for the purpose of modeling vehicular emissions within the arrays. The total area of the ten area sources was approximately 4,739,500 m^2. The emissions for maintenance vehicle travel were distributed evenly over the entire solar array area.

Table DR-AIR-6-2 Summary of GEP Analysis

Emission Source	Model Source Name	Stack Height (m)	Controlling Buildings or Structures	Building Height (m)	Projected Width (m)	GEP Formula Height (m)
Auxiliary Boiler	AUXBOIL_1	15.24	Air Cooled Condenser	36.6	146.0	91.4
Emergency Generator	EMERGEN_1	7.01	Air Cooled Condenser	36.6	146.0	91.4
Fire-Water Pump	FIRPUMP_1	3.05	Air Cooled Condenser	36.6	153.0	91.4
HTF Heater	HTFHEAT_1	24.38	Air Cooled Condenser	36.6	146.0	91.4
Cooling Tower	COOL1_1-COOL2_1	6.84	Air Cooled Condenser	36.6	146.0	91.4

2.5 NO_2 Modeling with the Ozone Limiting Method

Per request DR-AIR-11, the ozone limiting method (OLM) modeling for Nitrogen Dioxide (NO_2) for both construction and operations was updated to include an OLMGROUP source group to which all modeled sources were added. For the Air Quality Impacts Analysis (AQIA), OLM was applied as implemented in AERMOD with the use of hourly ozone concentrations from the most representative monitor. In using the OLM in AERMOD, conversion of nitrogen oxide emissions to NO_2 concentrations are limited based on the availability of ozone as determined by the ambient background levels. The updated NO_2 modeling for construction and operations for both the 1-hour and annual periods used this updated OLMGROUP configuration.

Monitoring data for ozone were available at the Mojave monitoring station. All missing hourly ozone data were filled using the average hourly concentration over the three years of data.

2.6 2.6 Revised Receptor Grid

Because of the reconfiguration of the site and resulting changes in the location of fence line, a revised comprehensive Cartesian receptor grid extending to approximately 10 kilometers (km) from the center of the Project site was used in the AERMOD modeling to assess maximum ground-level pollutant concentrations. Based on preliminary modeling, the 10-km receptor grid was found to be sufficient to resolve the maximum impacts and any significant impact area(s).

The Cartesian receptor grid consisted of the following receptor spacing from the Project fence line:

- 100 to 3,000 m at 100-m increments;
- Beyond 3,000 m to 5,000 m at 200-m increments; and
- Beyond 5 km to 10 km at 500-m increments.

Discrete receptors were placed approximately every 50 m along the facility fence line for increased resolution of impacts along this boundary. Note that this fence line is within the BLM Right of Way (ROW).

The AERMAP receptor locations (operation emissions) and the AERMAP domain are shown in Figure DR-AIR-6-4 (near-field portion of the receptor grid) and Figure DR-AIR-6-5 (far-field receptors). Terrain elevations from the National Elevation Dataset (NED) acquired from the United States Geological Service (USGS) National Map Seamless Server were processed with AERMAP to develop the receptor terrain elevations and corresponding hill height scale required by AERMOD. The NED file used was from Universal Transverse Mercator (UTM) Zone 11 and referenced to North American Datum (NAD) 83. All receptors were also referenced to NAD83. The NED file, along with the AERMAP input and output files, are included on the modeling archive CD.

3.0 Revised Air Quality Impact Assessment

3.1 Impacts from RSPP Construction

The results of the construction modeling are provided in Table DR-AIR-6-3. Note that these results are based on modeling which uses the site-wide area sources for annual modeling as requested by the CEC (see DR-AIR-10). As shown in the table, all impacts, when added to the appropriate ambient backgrounds, are below their respective National Ambient Air Quality Standards (NAAQS)/ California Ambient Air Quality Standard (CAAQS) with the exception of 24-hour PM10 (CAAQS), annual PM10 (CAAQS), and 24-hour PM2.5 (NAAQS). In the case of annual PM10 and 24-hour PM2.5, Project impacts alone are below their respective CAAQS with maximum concentrations of 5.6 micrograms per cubic meter ($\mu g/m^3$) for annual PM10, and 17.4 $\mu g/m^3$ for 24-hour PM2.5.

For annual PM10, the Project impacts by themselves represent only 28 percent of the CAAQS for annual PM10 and only 19 percent of the total impact to the annual PM10 concentrations when the worst-case background is considered. For 24-hour PM2.5, Project impacts represent 50 percent of the CAAQS and 40 percent of the total impacts when background is considered.

In the case of 24-hour PM10 impacts, the maximum modeled 24-hour impact for PM10 of 61.2 $\mu g/m^3$ exceeds the CAAQS. Exceedances were limited to six winter days over the three years modeled. One day produced seven of the modeled receptor-exceedances, one day produced two receptor-exceedances, and the remaining four days produced a single receptor-exceedance. The primary source contributing to the modeled exceedances was vehicle travel within the laydown area and from the laydown area through the solar field to the power block. The location and timing of travel on a given construction day within the laydown area and through the solar field is highly speculative and subject to many alternative configurations. The modeling scenario chosen was selected as a worst-case scenario to maximize the potential offsite impacts to ensure a conservative analysis. However, the modeling scenario used for this analysis is only one of many possible configurations of source location and vehicle/equipment emission rates on a worst-case day during construction. As all the modeled receptor-exceedances occur at the property line or within 30 m of the property line, the worst-case placement of emission sources adjacent to the property line contributes to the conservativeness of the modeling analysis. However, in actual operation, it is unlikely that individual vehicles will operate directly on the property line but rather would be constrained to travel lanes somewhat interior to the property line.

Figure DR-AIR-6-6 presents the modeled sources, the property line, the receptors with modeled exceedances, and the 3-year wind rose for Mojave. This figure demonstrates the worst-case nature of the modeling scenario assumed for construction and the adjacency of sources at the property boundary that produce the modeled exceedances.

All of the exceedances occur on winter days characterized by early morning periods of low wind speed and low mechanical turbulence (i.e., formerly called stable dispersion conditions) that occur in winter near sunrise and contribute significantly to the modeled exceedances. Construction activities will be limited during the wintertime early morning hours to minimize emissions during poor dispersion conditions. However, it is difficult in AERMOD to prepare a modeling scenario in which operations occur only during daylight hours. Therefore, because the modeling scenarios occur wintertime days in which there are emissions during hours prior to sunrise, it is likely that the modeled impacts are conservatively higher than would be experienced during actual construction.

Table DR-AIR-6-3 NAAQS/CAAQS Modeling Results for RSPP Construction

Pollutant	Averaging Period	Concentrations ($\mu g/m^3$)				
		AERMOD Result[2]	Ambient Background[3]	Total [4,5,6]	CAAQS	NAAQS
NO_2 [1]	1-hr	193.8	103.5	297	339	--
	Annual	6.3	9.4	16	57	100
CO	1-hr	738.0	3,680	4,420	23,000	40,000
	8-hr	152.5	1,840	1,990	10,000	10,000
PM10	24-hr	61.2	72.0	133	50	150
	Annual	5.6	23.0	29	20	--
PM2.5	24-hr	17.4	26.1	44	--	35
	Annual	0.7	7.0	8	12	15
SO_2	1-hr	2.9	86.5	89	665	--
	3-hr	1.0	44.5	46	--	1,300
	24-hr	0.2	13.1	13	105	365
	Annual	0.01	2.6	3	--	80

1. Modeled NO_2 concentrations as determined with the OLM.
2. Annual concentrations are highest annual mean. Short term impacts are high 1st-high except PM2.5 24-hour which is high-2nd-high.
3. From Table 5.2-32 of the RSPP AFC. These values correspond to the highest monitored values from 2005 – 2007, except for PM2.5, which is the 98th percentile value over three years for the Indio, California monitoring site.
4. Modeled concentration plus ambient background.
5. Result reflects 10-hour days from March through September and 8-hour days from October through February.
6. Totals are rounded to three or fewer significant figures.

Overall, the construction modeling is very conservative and significantly overestimates the expected impacts over the duration of the construction period. Only a single, worst-case source location was modeled for the entire construction period. The source locations were chosen on the basis of two worst-case assumptions: 1) worst-case alignment of the prevailing wind, the construction sources, and the vehicle corridor from the laydown area to the power block; and 2) placement of the construction sources along the downwind property boundary (see Figure DR-AIR-6-6). The assumed area sources for the construction activities most likely would not be reflective of actual site activity for more than one month out of the entire construction period as the construction locations will continually move across the entire project site.

The emissions estimates used in the modeling are also highly conservative. For each month of construction, the daily peak emission rates from vehicle and equipment activity were estimated. The daily emission rate for the month with the peak total daily emissions was then converted to an hourly rate and was assumed to reflect the emission rate for every hour of every day during the entire construction period. Such an assumption will significantly overestimate the total mass of emissions that will occur during the construction of the facility, and the temporal release profile of those emissions during the day. For example, the peak emission rate modeled may reasonably reflect peak hourly emissions on a given peak day but is unlikely to represent accurately the emission profile first thing in the morning when construction activities commence. However, it is these first hour in the morning periods in which the model predicts occurrence of the modeled PM10 exceedances.

In summary, the construction modeling analysis incorporates a number of worst-case assumptions that result in an extremely conservative modeling analysis that is likely to overestimate peak PM10 impacts during construction. These assumptions include use of a modeling analysis that includes the simulation of emissions during hours prior to sunrise in the winter and the highly improbable coincidence of the following factors:

1. The alignment of emission sources with the worst-case prevailing wind direction,
2. The placement of the sources in the worst-case position adjoining the property boundary, and
3. The use of construction period peak worst-case emissions for every hour modeled.

3.2 Impacts from RSPP Operations

The worst-case operations emissions of the Project stationary sources were modeled along with vehicular emissions from the solar field maintenance vehicles. The maximum modeled concentrations for all Project emissions are summed with ambient background concentrations for comparison to the CAAQS/NAAQS in Table DR-AIR-6-4.

As shown in Table DR-AIR-6-4, the total concentrations comprised of maximum modeled concentration plus maximum ambient background are below the NAAQS/CAAQS for all pollutants with the exception of the 24-hour PM10 CAAQS, annual PM10 CAAQS, and 1-hour NO_2 CAAQS.

In the case of PM10, the ambient background utilized already exceeds the standards, and RSPP contributions by themselves are below the standards (78 percent and 15 percent of the 24-hour and annual PM10 CAAQS, respectively).

In the case of 1-hour NO_2, periods during each year showed modeled impacts which, when added to the maximum ambient background, exceeded the 1-hour NO_2 CAAQS of 339 µg/m^3. To refine the modeling analysis, AERMOD was rerun using the “Maxifile” option to determine how many hours produced impacts of at least 235 µg/m^3, which, when added to the maximum ambient background concentration of 104 µg/m^3, would exceed the CAAQS. The results showed that only nine hours out of the three years modeled (i.e., an average of only three hours per year) had the potential to exceed the 1-hour NO_2 CAAQS.

As a further refinement, hourly NO_2 background data for the Mojave, California monitoring site were acquired from the U.S. Environmental Protection Agency AIRS database data repository (http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqsdata.htm). The actual ambient background NO_2 concentration for each hour was then added to the modeled concentration and compared to the CAAQS. The results are shown in Table DR-AIR-6-5. As seen in the table, when added to the time-matched ambient background NO_2 concentration, all nine hours with the potential to exceed the CAAQS fall below the standard of 339 µg/m^3. Thus compliance is demonstrated and no additional analysis is required.

Table DR-AIR-6-4 NAAQS/CAAQS Modeling Results for RSPP Operations

Pollutant	Averaging Period	Concentrations ($\mu g/m^3$)			
		AERMOD Result[2]	Ambient Background[3]	Total [4,5]	CAAQS / NAAQS [6]
NO_2 [1]	1-hr	302.0	103.5	406	339
	Annual	0.1	9.4	9.5	57
CO	1-hr	1,604.6	3,680	5,290	23,000
	8-hr	359.1	1,840	2,200	10,000
PM10	24-hr	39.2	72.0	111	50
	Annual	3.0	23.0	26.0	20
PM2.5	24-hr	4.9	26.1	31.0	35
	Annual	0.3	7.0	7.3	12
SO_2	1-hr	11.3	86.5	97.8	655
	3-hr	7.8	44.5	52.3	1,300
	24-hr	0.6	13.1	13.7	105
	Annual	0.04	2.6	2.7	80

1. Modeled NO_2 concentrations as determined with the OLM.
2. Annual concentrations are high annual mean. Short term impacts are high 1st-high except PM2.5 24-hour which is high-2nd-high.
3. Highest value from Table 5.2-32 of RSPP AFC.
4. Modeled concentration plus ambient background.
5. Totals are rounded to three or fewer significant figures.
6. The most restrictive of the CAAQS or NAAQS is presented.

Table DR-AIR-6-5 Time matched NO_2 impacts for Hours with Potential CAAQS Exceedance

Hour	Modeled Impact ($\mu g/m^3$)	Ambient Background (ppb)	Ambient Background ($\mu g/m^3$)	Total Concentration[1] ($\mu g/m^3$)	Fraction of CAAQS (%)
5/24/02 Hour 14	279.27	5	9.41	289	85.2%
8/10/02 Hour 11	244.10	5	9.41	254	74.8%
8/17/02 Hour 10	269.60	7	13.17	283	83.4%
9/02/02 Hour 09	236.41	6	11.29	248	73.1%
5/21/03 Hour 11	271.45	10	18.81	290	85.6%
6/01/03 Hour 14	301.95	6	11.29	313	92.4%
6/04/03 Hour 08	235.97	11	20.69	257	75.7%
7/27/03 Hour 14	267.18	3	5.643	273	80.5%
6/29/04 Hour 09	237.90	13	24.45	262	77.4%

1. Totals are rounded to three significant figures.
ppb = parts per billion
$\mu g/m^3$ = micrograms per cubic meter

3.3 Cumulative Impacts from RSPP Operations

As discussed in the response to DR-AIR-31, no other existing or permitted-but-not-yet-operating sources were identified through contact with the Kern County Air Pollution Control District or through scans of aerial photographs. Therefore, because there are no nearby non-Project sources that will contribute to a cumulative impact, a cumulative modeling analysis is not necessary and was not performed.

Figure DR-AIR-6-1 Revised Area Sources Used in Annual Construction Modeling

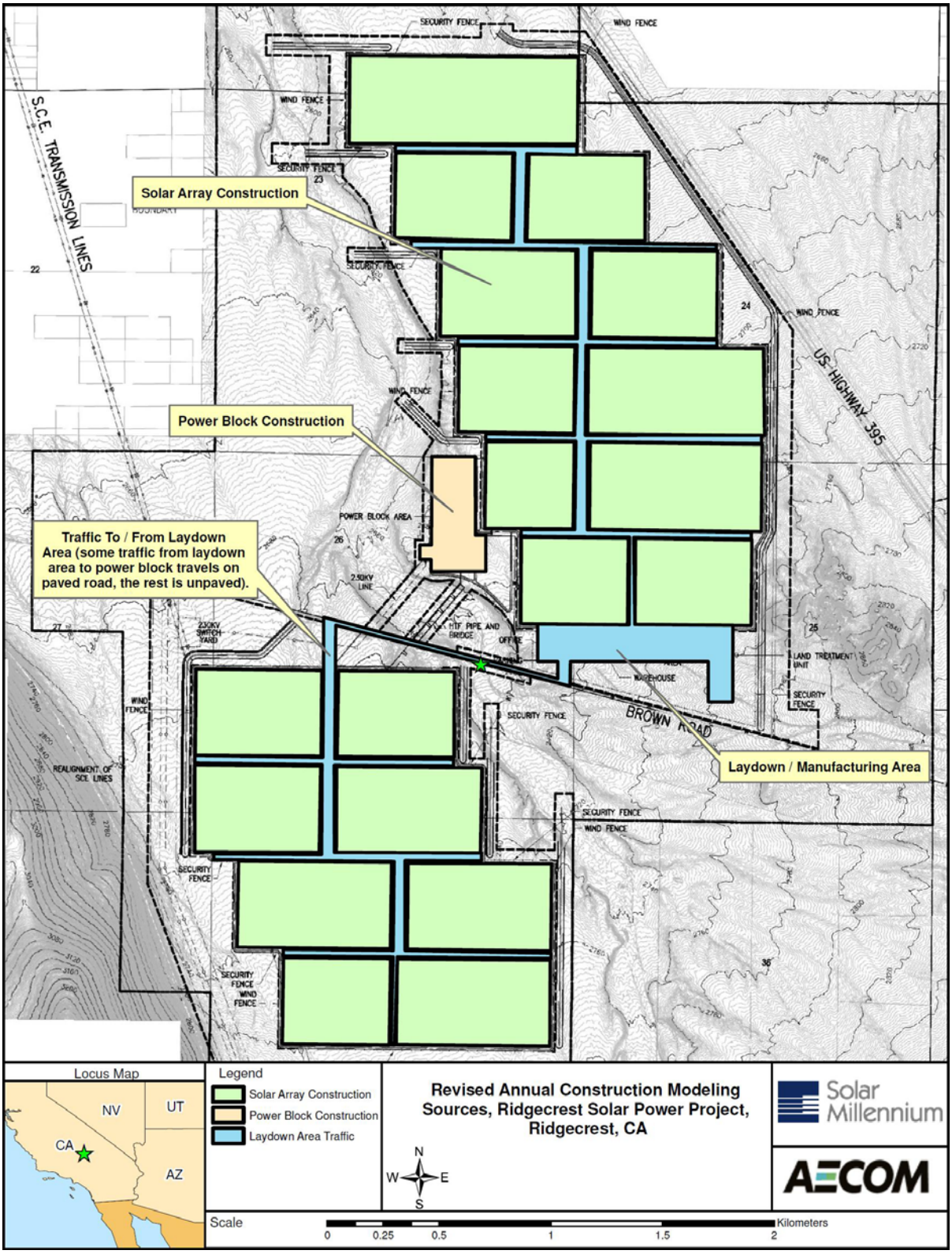


Figure DR-AIR-6-2 Revised Area Sources Used in Short Term Construction Modeling

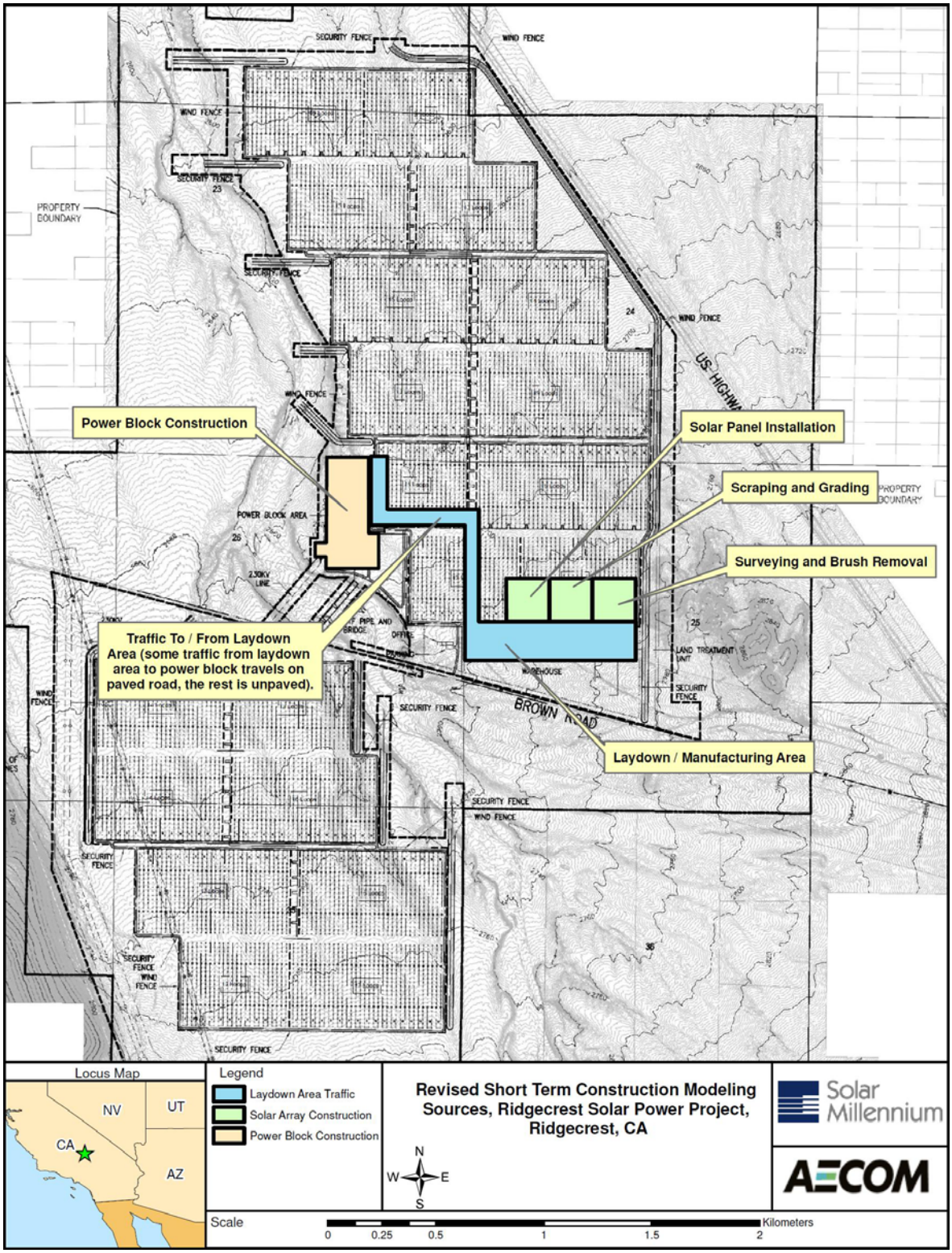
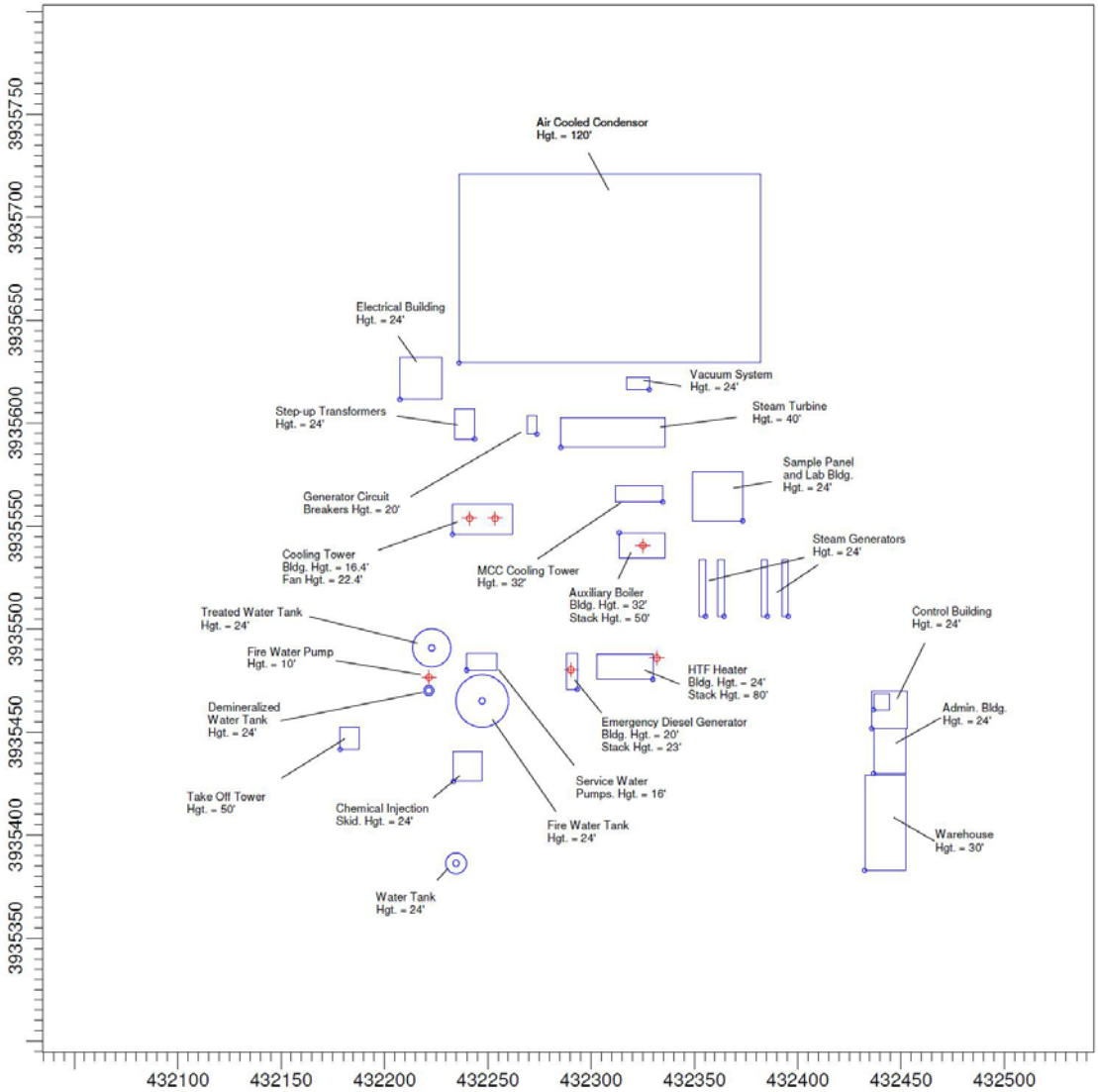


Figure DR-AIR-6-3 Revised Buildings Structures Included in GEP Analysis

PROJECT TITLE:

Structures Evaluated in GEP Analysis
Ridgecrest Solar Power Project



COMMENTS:	SOURCES: 16	COMPANY NAME:	
	RECEPTORS: 6382	MODELER:	
		SCALE: 1:3,104 (0 – 0.1 km)	
		DATE: 1/19/2010	PROJECT NO.:

AERMOD View - Lakes Environmental Software

J:\AQES\Projects\Solar Millennium\Ridgecrest\Response to comments\Lakes\New_Ops.isc

Figure DR-AIR-6-4 Revised Near Field Receptors used in RSPP Modeling Analysis

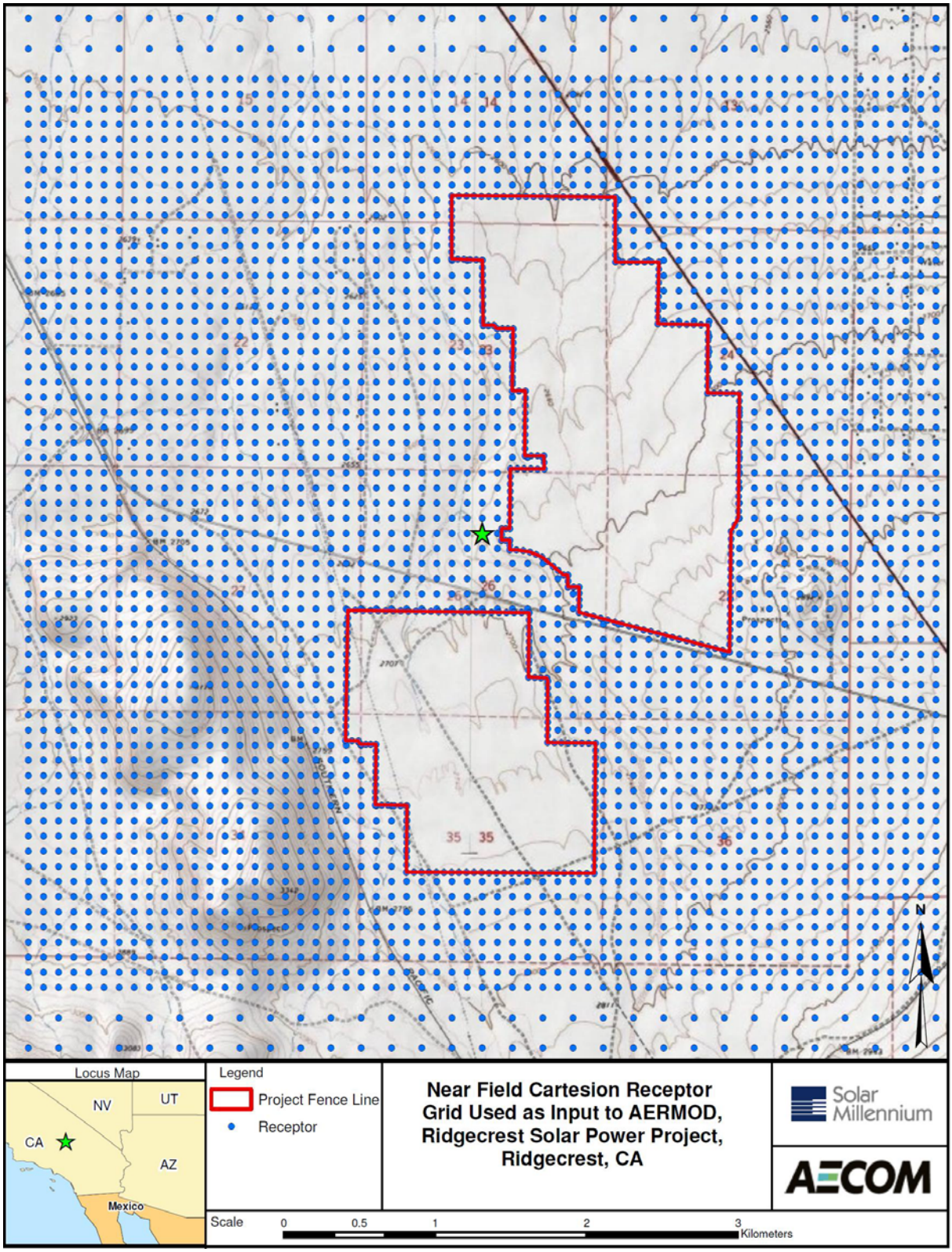


Figure DR-AIR-6-5 Revised Far Field Receptors used in RSPP Modeling Analysis

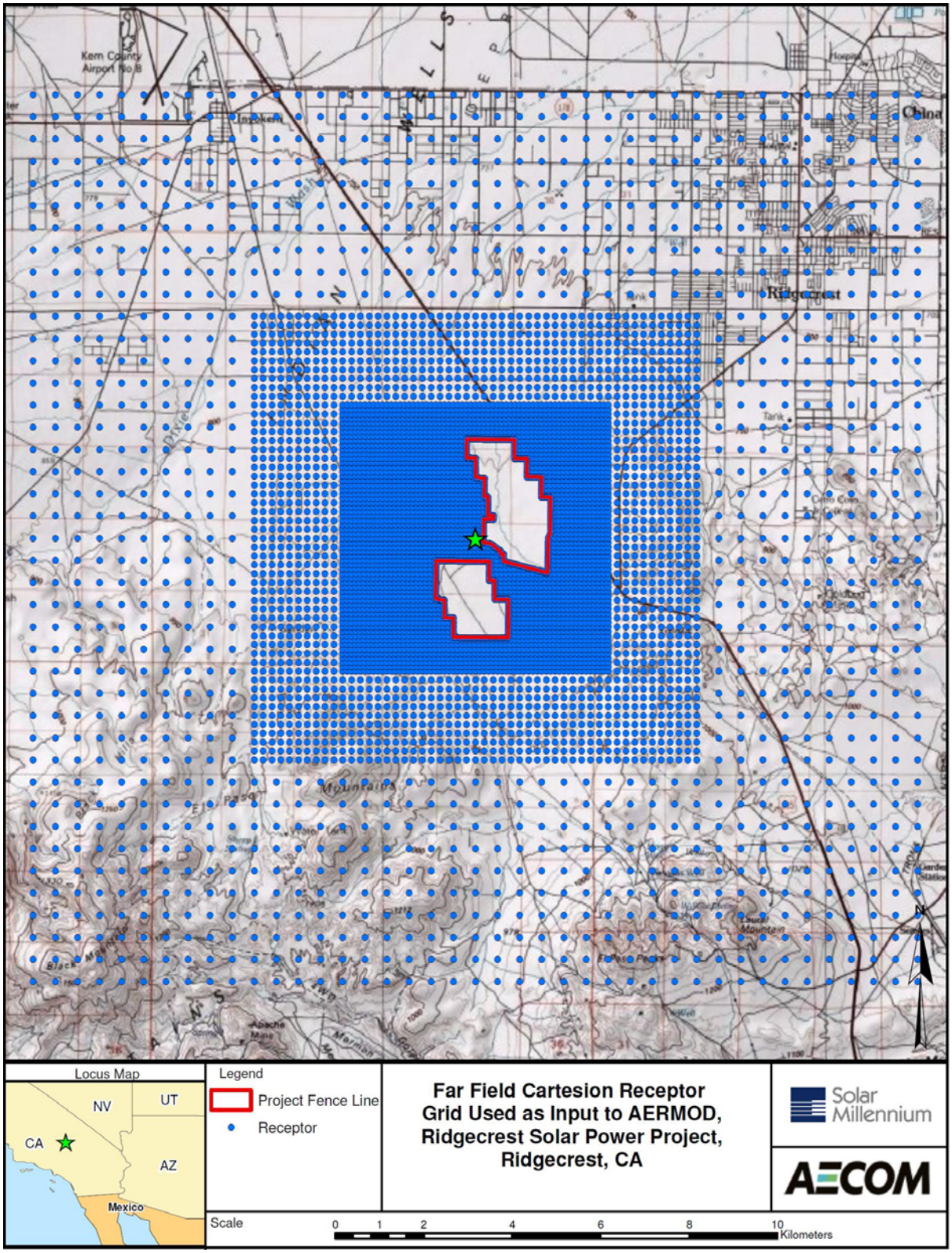
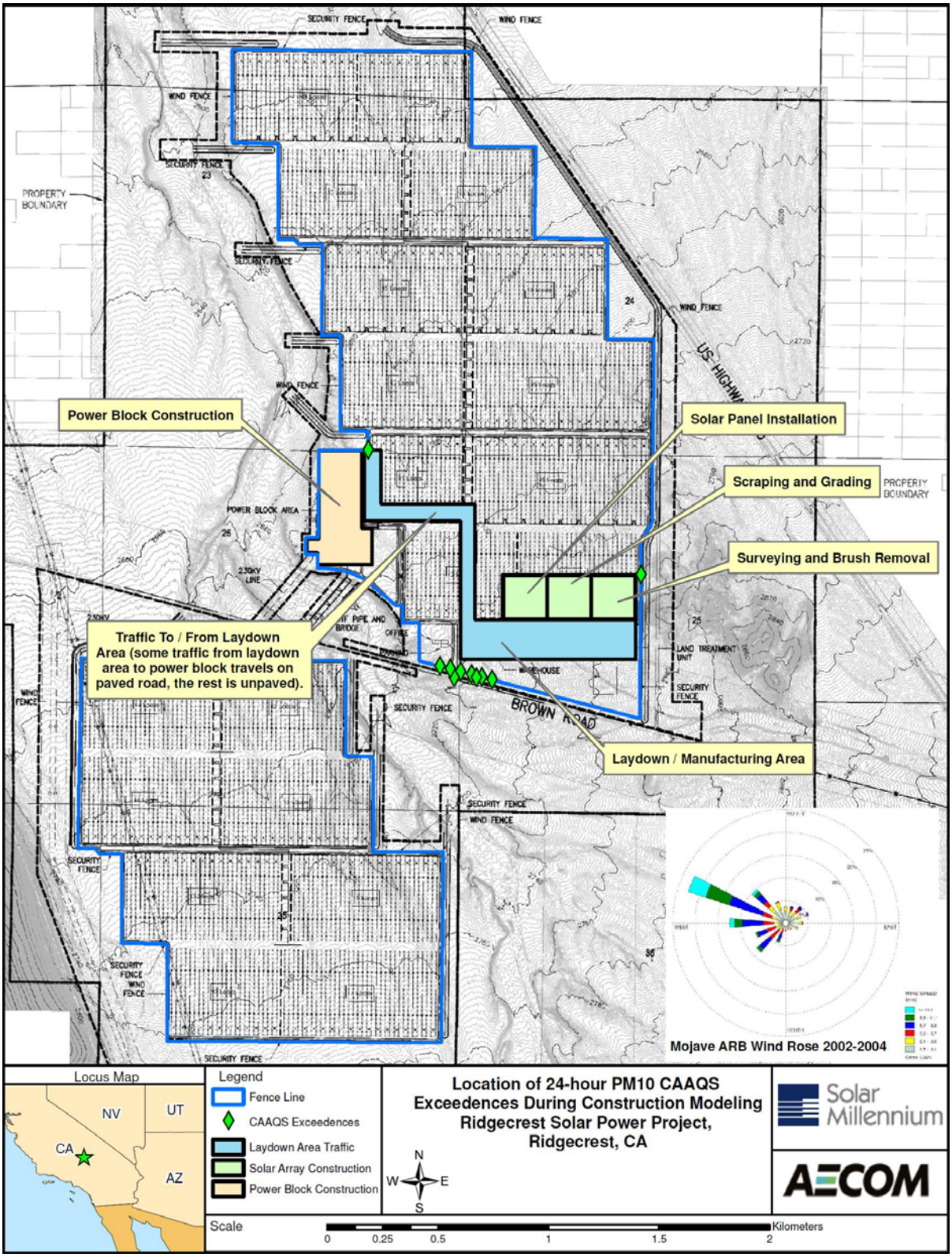


Figure DR-AIR-6-6 Location of Construction Modeling PM10 24-Hour CAAQS Exceedences



Air Dispersion Modeling CD Archive (On CD-ROM)

Attachment DR-AIR-12

Construction Greenhouse Gas Emission Calculations

Prepared for:
Solar Millennium
Ridgecrest Solar Power Project

Attachment DR-AIR-12 Construction Greenhouse Gas Emissions Calculations

AECOM, Inc.
December 2009
Document No.: DR-AIR-12

Prepared for:
Solar Millennium
Ridgecrest Solar Power Project

Attachment DR-Air-12 Construction Greenhouse Gas Emissions Calculations

Prepared By Howard Balentine

Reviewed By Russ Kingsley

AECOM, Inc.
December 2009
Document No.: DR-AIR-12

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1.0 Introduction

This document contains a description of greenhouse gas (GHG) emissions calculated for construction of the Ridgecrest Solar Power Project (RSPP, or Project). Section 2 describes the methodology used to calculate emissions, results are presented in Section 3, and references are provided in Section 4. Table 1 at the end of this document provides the computed GHG emissions factors for construction equipment obtained from the OFFROAD2007 model output. Table 2 provides of the RSPP follow in tables at the end of the computed GHG emission factors for motor vehicles obtained from the EMFAC2007 BURDEN model output.

2.0 Construction Greenhouse Gas Emissions

GHG emissions will arise from the operation of construction equipment and motor vehicles. This report describes the calculation methodology for the GHG emissions associated with Project construction. GHG emissions during each month of construction were calculated separately and the monthly emissions were summed over the construction duration for each Project component to calculate total GHG emissions.

2.1 Overview of Calculation Methodology

Emissions were computed for three GHGs: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). When the respective emissions for a given GHG is multiplied by the corresponding global warming potential (GWP), the emissions of each gas is expressed as its equivalent amount of CO_2 emissions, assuming a 100-year quantification period. The sum of the individual CO_2 equivalent (CO_2e) emissions for each of the three gases results in the project total CO_2 equivalent emissions.

There are multiple emission factors available in the literature and published protocols for computation of GHG emissions from fuel combustion. These factors tend to differ by the units of the emission factors and the assumptions of a given heat (or carbon) content of the fuel. However, almost all of these emission factors are ultimately based on a standard set of emission factors published by the Intergovernmental Panel on Climate Change (IPCC, 2006). For example, the Air Resources Board (ARB) reporting guidance for mandatory GHG reporting (ARB, 2008) references the ARB AB-32 Mandatory Reporting Guidance document (ARB, 2008) which, in turn, references an EPA GHG inventory guidance document (EPA, 2003), which, in turn, states that EPA GHG calculation methodology for mobile sources is consistent with IPCC 2006 guidance.

The GHG emissions for construction are based on output from the OFFROAD2007 (ARB, 2007a) and EMFAC2007 (ARB, 2007b) BURDEN models. These models were used to compute the criteria pollutant emissions during construction and quantified in the Application for Certification (AFC) for the RSPP. The same model runs are used as a basis for estimating GHG emissions during construction because both models produce estimates of CO_2 emissions. In addition, the OFFROAD2007 model directly provides estimates of N_2O and CH_4 emissions from diesel equipment[1].

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1. While OFFROAD2007 output provides N_2O emissions as an output, the N_2O values output by OFFROAD2007 for all equipment sizes and equipment types are zero. However, N_2O emissions are a small fraction of CO_2e emissions from equipment during construction activities, even when the much larger GWP of N_2O compared to CO_2 is taken into account. Therefore, the zero values for N_2O emissions are used without modification or adjustment. The assumption of zero for N_2O emissions from construction equipment is well within the very large uncertainty associated with the quantification process for estimating construction emissions and has an insignificant impact on the overall GHG emission estimates during construction over the lifetime of the facility.

For past projects, the CEC has requested that the GHG emission computations for mobile sources follow the methodology contained in the ARB mandatory reporting guidance document. These emission factors are in terms of kilograms of CO_2 per gallon for motor fuels and gram per mile for N_2O and CH_4. For the RSPP, the GHG emission estimates from construction activities are based on the ARB OFFROAD2007 and EMFAC2007 BURDEN models, which as discussed above, are ultimately based on IPCC 2006 emission factors.

The composite GHG emission factors used for a given run of OFFROAD2007 and EMFAC2007 are not explicitly listed in the model output but can be readily computed from model output. The emission factors can be computed on either 1) an hours of operation (or mileage) basis or 2) a fuel consumption basis, because total GHG emissions by GHG are listed, along with hours of operation or mileage accumulation for a given equipment/vehicle type, and the fuel consumption. Both sets of emission factors are ultimately the same with only unit conversions applied, along with assumptions of energy content per unit volume and fuel consumption/fuel economy assumptions. In other words, the OFFROAD2007 and EMFAC2007 output data can be used to compute GHG emission factors on different bases, depending on the intended use. As needed, the emission factors can be readily converted from one basis to the other using output data from the model. For example, if the on-road emission factors are computed on a per-volume of fuel used basis, they are easily converted to a mileage basis by dividing by the fuel economies used by EMFAC2007. Likewise, if the emission factors are on a per-hour-of-operation basis, they can readily be converted to units of emissions per volume of fuel consumed by dividing by the default specific fuel consumption provided in the OFFROAD2007 output.

The activity data developed to estimate emissions from equipment and vehicles for the RSPP are naturally compiled in terms of hours of operation (equipment) and miles traveled (vehicles). Therefore, the most direct method for using OFFROAD2007 and EMFAC2007 output to compute GHG emissions is to use the model output to compute composite GHG emission factors that are on a per-hour-of-operation basis for equipment and on a per-mile basis for vehicles.

Therefore, for this analysis, the construction equipment GHG emission factors are derived from OFFROAD2007 output by dividing the total emissions for each GHG and equipment class by the hours of operation for that GHG and equipment class. Likewise, GHG emission factors for motor vehicles are derived from EMFAC2007 output by dividing the total emissions for each vehicle type by the output activity (miles) for that vehicle type. Once computed, unit conversions are applied to adjust the emission factors to the desired metric units (kg/mile). This straight forward approach avoids the necessity of assuming a specific fuel consumption or fuel economy that may differ from that used in OFFROAD2007 or EMFAC2007, thereby potentially biasing the estimate of the total GHG emissions.

EMFAC2007 only provides estimates of CO_2 emissions. To estimate N_2O and CH_4 emissions, the mobile source emission factors in the California Climate Action Registry (CCAR) General Reporting Protocol Version 3.1 (CCAR, 2009) was used. These emission factors are on a gram-per-mile basis, are ultimately based on the IPCC 2006 emission factors, and are identical to those contained in the ARB mandatory reporting regulation.

2.2 Construction Equipment Exhaust GHG Emissions

The combustion of fuel to provide power for the operation of various construction activities and equipment results in the generation of GHG, including CO_2, CH_4, and N_2O. The following predictive emission equation was used to calculate exhaust emissions from construction equipment:

$$\text{Exhaust Emissions}_{ij}\,(\text{MT}) = EF_{ij} \times T_j / 1000 \qquad \text{(Eq. 2-1)}$$

Where:

$EF_{,i,j}$ = Emission factor for specific GHG *i* from construction equipment type *j* (kg/hour)

T_j = Operating time for equipment of type *j* (hr)

1000 = kilograms per metric tonne (kg/MT)

The exhaust emission factor E_{ij} is computed from the OFFROAD2007 output by dividing the total emissions for a given GHG *i* and equipment type *j* by the operating hours of that equipment type in the OFFROAD2007 run. The OFFROAD2007 model calculates total daily emissions of CO_2, N_2O, and CH_4 by equipment category (crane, dozer, grader, etc.) and type of fuel (diesel, gasoline, etc.) within engine horsepower ranges in a geographic area, such as statewide or within a given jurisdiction (e.g., Kern County Air Pollution Control District). The model also calculates total daily operating hours within the geographic area by equipment category, fuel and horsepower range. For the RSPP, OFFROAD2007 was run to generate statewide average emissions and activity data for 2010 for equipment with engines meeting Tier 3 emission standards, consistent with the revised construction criteria pollutant analysis for the RSPP prepared in Data Response DR-AIR-8 and -9 as part of responding to CEC data requests.

The total GHG emissions are the summation over all of the operating equipment with application of the appropriate GWP for each GHG. The GWP used for this analysis are those required by the ARB mandatory reporting rule and are equal to 1 for CO_2, 21 for CH_4, and 310 for N_2O.

The OFFROAD2007 GHG emission estimates, the hours of operation, the computed emission factors, and the projected hours of operation for the diesel off-road equipment anticipated to be used during construction of the RSPP are provided in Table 1 at the end of this document.

2.3 Motor Vehicle Exhaust Emissions

The combustion of fuel in motor vehicle engines results in the generation of GHGs, including CO_2, CH_4 and N_2O. The following predictive equation was used to calculate exhaust emissions from motor vehicles:

$$\text{Exhaust Emissions}_{ij}\,(\text{MT}) = EF_{ij} \times VMT_j \times CF_i / 1000 \qquad \text{(Eq. 2-1)}$$

Where:

$EF_{i,j}$ = Emission factor for specific GHG *i* from motor vehicles type *j* (kg/mile or g/mile)

VMT_j = Mileage for vehicle type *j* (miles)

CF_i = EF units conversion factor (1.0 for CO2, 0.001 for CH4 and N2O to convert from g/mi to kg/mi)

1000 = kilograms per metric tonne (kg/MT)

The exhaust emission factor E_{ij} for CO_2 is computed from the EMFAC2007 BURDEN output by dividing the total emissions for a given GHG *i* and vehicle type *j* by the mileage accumulation for that vehicle type in the EMFAC2007 run. For the RSPP, EMFAC2007 was run to generate statewide emissions and activity data for 2010. The EMFAC2007 Model calculates total daily emissions of CO_2, N_2O, and CH_4 by vehicle type (light-duty truck, heavy-heavy duty diesel vehicle, etc.) and type of fuel (diesel, gasoline, etc.) in a geographic area, such as the Kern County Air Pollution Control District jurisdiction. For N_2O and CH_4, the exhaust emission factors come from the CCAR General Reporting Protocol Table C.6 (CCAR, 2009). As stated above, these N_2O and CH_4 emission factors are identical to those required by ARB under the AB-32 mandatory GHG reporting.

The total GHG emissions are the summation over all of the operating vehicle types with application of the appropriate GWP for each GHG. The GWP used for this analysis are those required by the ARB mandatory reporting rule and are equal to 1 for CO_2, 21 for CH_4, and 310 for N_2O.

The 2009 OFFROAD2007 BURDEN GHG emission estimates, accumulated mileage, the computed emission factors, and the projected operating miles for vehicles anticipated to be used during construction of the RSPP are in Table 2 at the end of this document.

Emissions were calculated from estimates of 1) the types, number, horsepower rating and daily operating hours for construction equipment; and 2) the types, number and daily miles traveled by onsite and offsite motor vehicles. These estimates were made by construction month for construction of the solar facility. The monthly emissions are based on 22 working days per month, consistent with the emission calculations for the criteria pollutants emitted during construction activities. The monthly emissions for equipment and vehicles for each GHG were summed to produce monthly and project total CO_2e emissions estimates.

Detailed GHG construction emission calculations are provided in the spreadsheet with filename Air Attachment Emission Calculations on the CD-ROM.

3.0 GHG Emission Calculation Results and Context

Global warming is a global issue, not a local issue, and there is no significance criterion yet established by the CEC for CO_2e emissions. Lacking a significance criterion for construction emissions, a more robust evaluation of the potential impact of construction CO_2e emissions for a solar power plant is to compute the emissions for construction and operation over the lifetime of the facility and compare those total emissions to the emissions that would be emitted from an alternative source of electrical power generation. An appropriate alternative to consider for comparison would be a modern combustion turbine combined cycle (CTCC) natural gas fired power plant.

To this end, the emissions from construction and operation of a CTCC facility based on a 30-year lifetime were estimated from information provided in the Application for Certification (AFC) for a current CTCC power plant seeking licensing approval before the CEC. The facility chosen is the Oakley Generating Station (Docket 09-AFC-04, previously named the Contra Costa Generating Station) (CEC, 2009), a nominal 624 MW greenfield facility. For this 2x1 facility (two combustion turbines with one steam turbine), the reported CO_2e emissions from the 33 month construction period is 10,524 metric tons (MT).

The appropriate operational CO_2 emissions factor to apply to a modern CTCC facility is the California Public Utility Commission limit on new power plant, i.e., CO_2 emissions of 1,100 pounds-per-megawatt-hour of electrical generation. The AFC for the Oakley Generating Station provides an equivalent availability factor for the facility of 92 percent to 98 percent, with an average of 95 percent. The equivalent availability factor takes into account both the hours of operation and the operating load for the facility.

Table 3 presents the estimated the GHG emissions (CO_2e) for construction and operation over a 30-year lifetime for the RSPP and an equivalent CTCC plant providing the same nominal generating capacity (250 MW). From Table 3, the construction emissions for the RSPP are 67,700 MT, compared to the construction emissions for the Oakley Generating Station of 10,500 MT. Both quantities are rounded to the nearest 100 MT. Please note that no adjustment was made to the construction emission estimate for Oakley to adjust for the size of the facility compared to that for the RSPP. There are larger GHG emissions associated with the solar plant construction due to a much larger area requiring scraping and grading, cut and fill, and assembly and installation, etc., during construction of the solar arrays. However, the operational GHG emissions from a CTCC plant dwarf the operational GHG emissions from a solar plant. Overall, the lifetime emission burden for the solar facility is 0.7 percent of the lifetime emission burden of the equivalent CTCC power plant.

4.0 References

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CCAR, 2009. California Climate Action Registry General Reporting Protocol, Version 3.1, January, Available online at: http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html as of 12/15/2009.

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IPCC, 2006. 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006), Volume 2 (Energy) , Available online at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html as of 12/15/2009.

EPA, 2003 Introduction to Estimating Greenhouse Gas Emissions. June 2003, and subsequent updates.

TABLES
(Tables 1 and 2 Provided on CD Rom)

Table 3. RSPP and Equivalent CTCC Power Plant Construction and Operation GHG Emissions Over a Projected 30-Year Operational Lifetime

Project	Nominal Size (MW)	Construction Period (months)	Construction GHG Emissions (MT CO2e)	Annual Operational GHG Emissions (MT CO2e/year)	30-Year Facility Lifetime GHG Emission Burden (MT CO2e)	*RSPP* Emissions as Percent of CTCC Plant (%)
RSPP	*250*	*28*	*67,700*	*4,800*	*211,700*	0.*7%*
Generic CTCC	*250*	33	10,500	*1,038,100*	*31,153*,500	

All GHG emissions rounded to the nearest 100 MT. Generic CTCC operational emissions based on CPUC limit of 1,100 lbs CO_2/MWh, yearly operation of 8760 hours, and an equivalent availability factor of 95%. The construction emission estimates are representative of those for the Oakley Generating Station (09-AFC-04), a nominal 624 MW CTCC facility. The Generic CTCC facility emission estimate is underestimated because it does not include CH_4 or N_2O emissions from facility operation.

Attachment DR-AIR-20

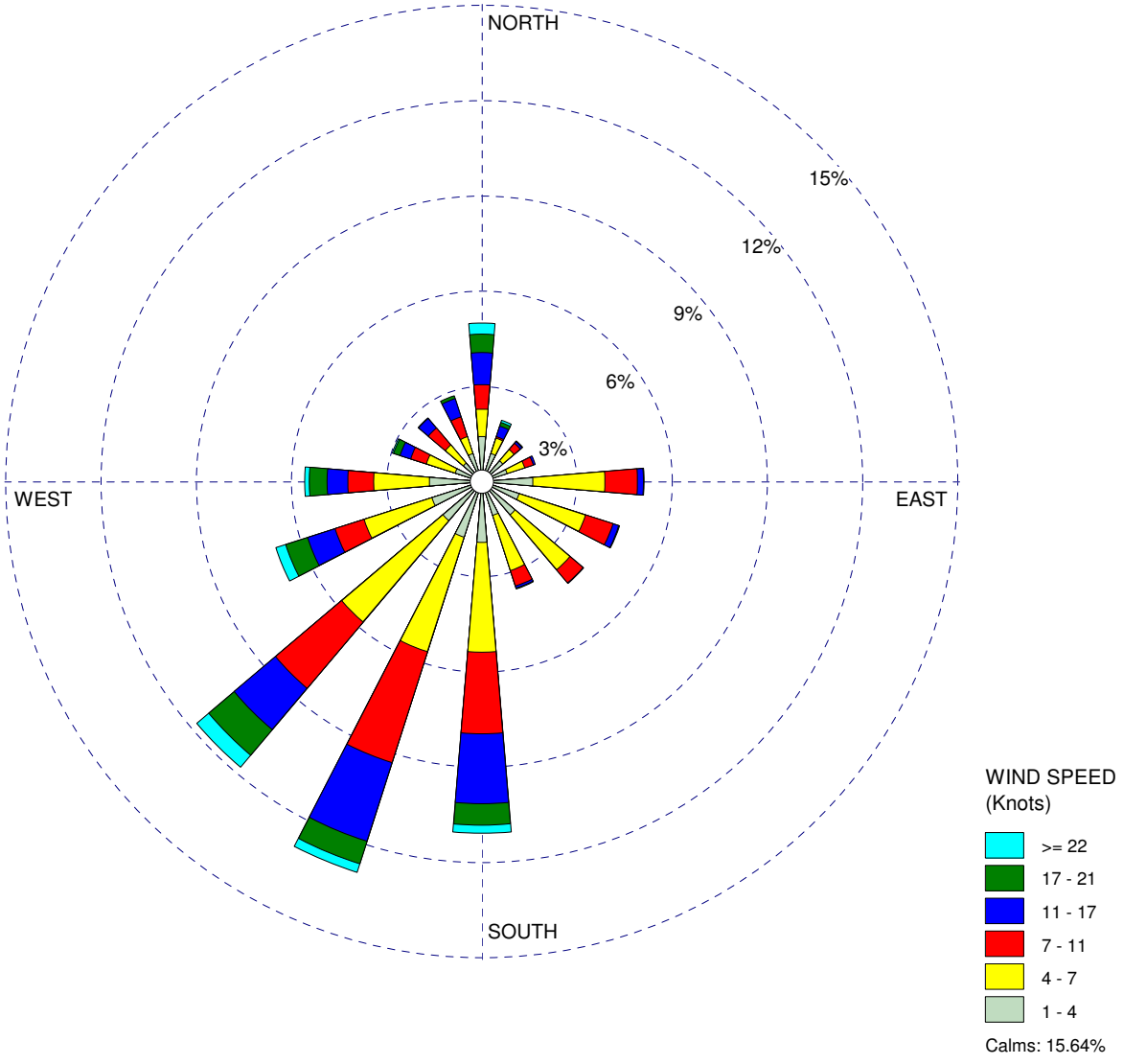
Quarterly Wind Roses

WIND ROSE PLOT:

China Lake NAF, Kern County, CA
Wind Rose for 2000-2004 - 1st Quarter (Jan. 1- Mar. 31)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2002 2003 2004 2000 2001 **Jan 1 - Mar 31** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **15.64%**	TOTAL COUNT: **4290 hrs.**	
	AVG. WIND SPEED: **6.97 Knots**	DATE: **12/4/2009**	PROJECT NO.: **60139696**

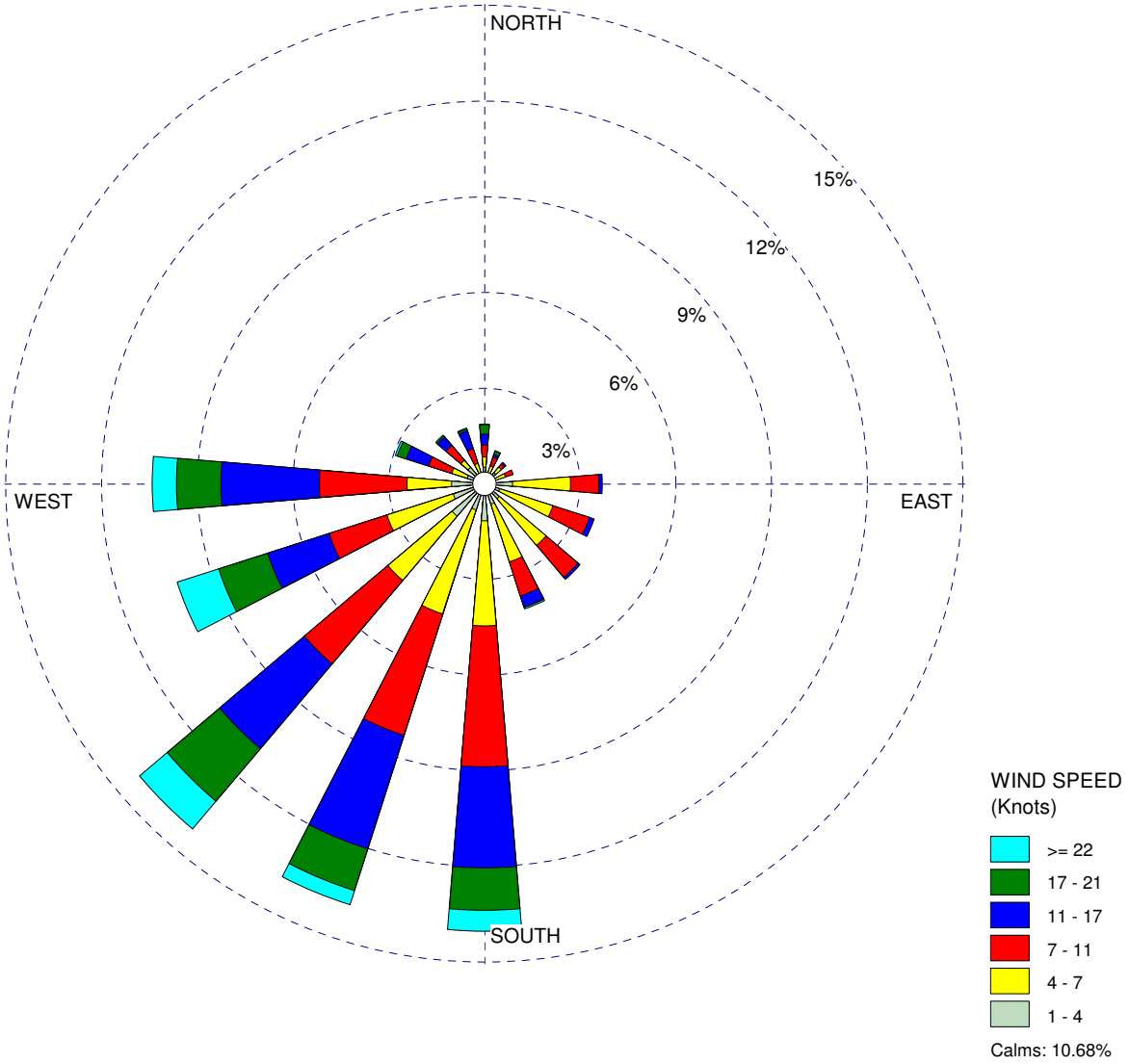
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

China Lake NAF, Kern County, CA
Wind Rose for 2000-2004 - 2nd Quarter (Apr. 1- Jun. 30)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2002 2003 2004 2000 2001 **Apr 1 - Jun 30** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **10.68%**	TOTAL COUNT: **4746 hrs.**	
	AVG. WIND SPEED: **9.33 Knots**	DATE: **12/4/2009**	PROJECT NO.: **60139696**

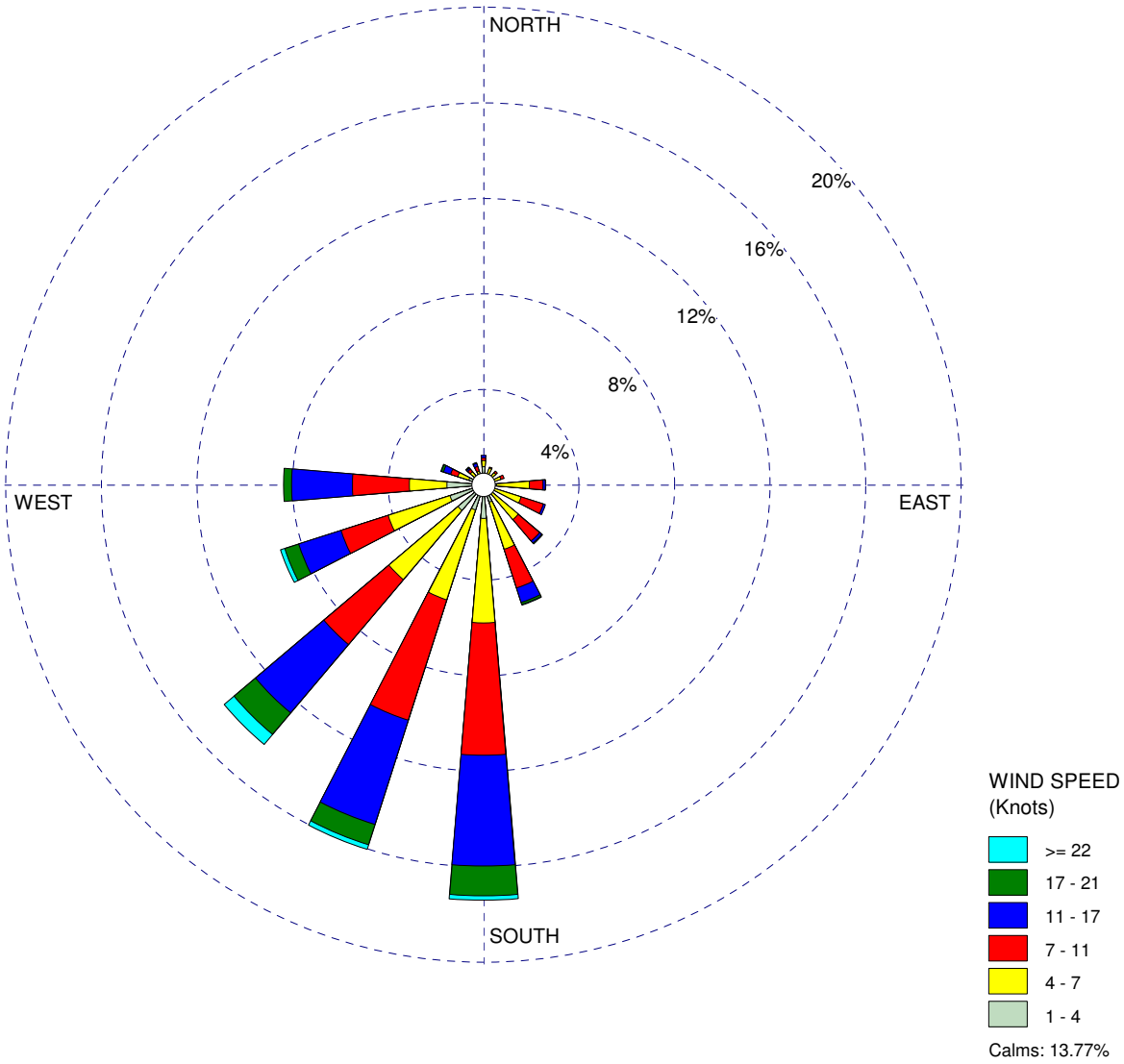
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

China Lake NAF, Kern County, CA
Wind Rose for 2000-2004 - 3rd Quarter (Jul. 1- Sep. 30)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2002 2003 2004 2000 2001 **Jul 1 - Sep 30** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **13.77%**	TOTAL COUNT: **4414 hrs.**	
	AVG. WIND SPEED: **8.00 Knots**	DATE: **12/4/2009**	PROJECT NO.: **60139696**

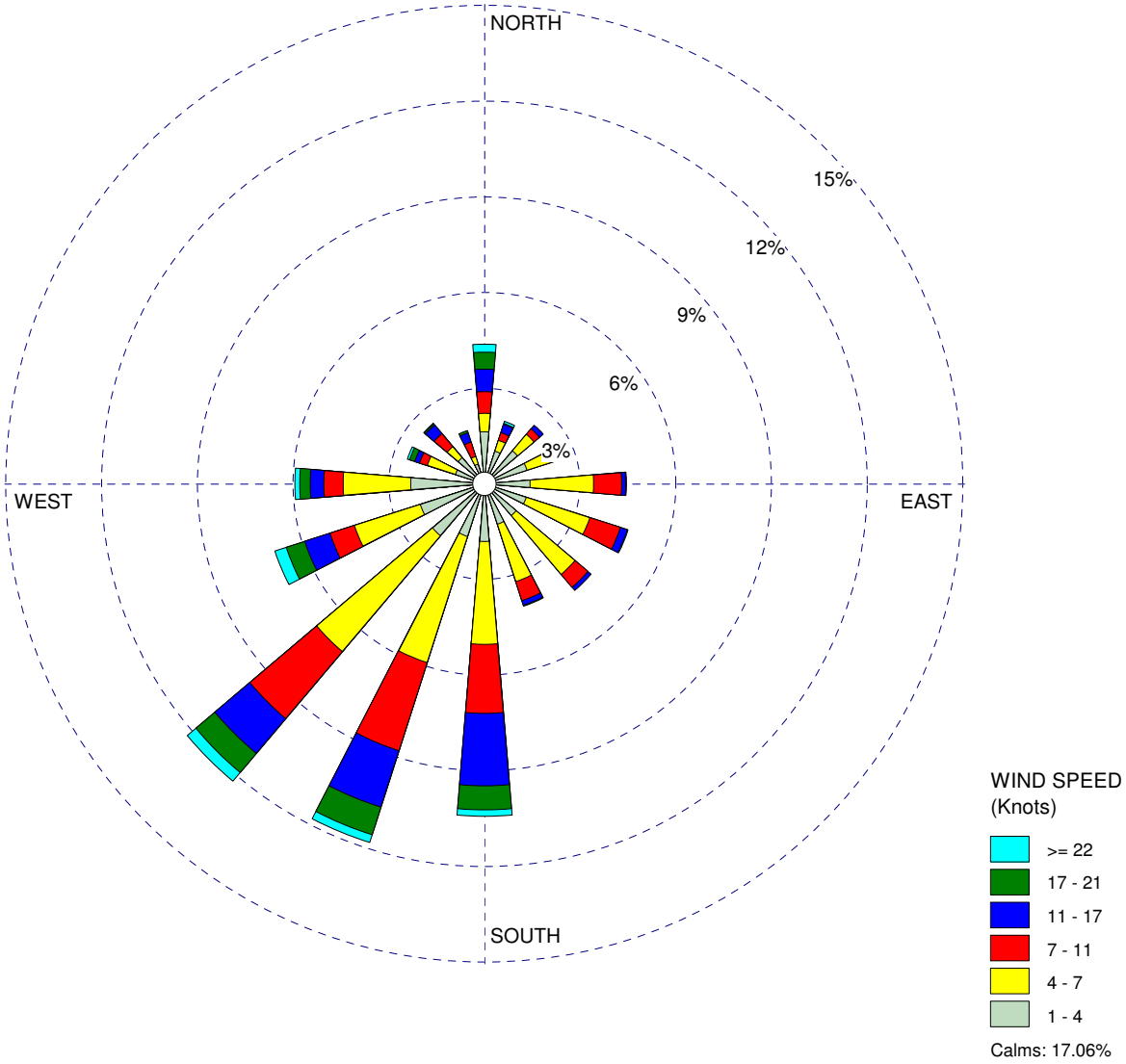
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

China Lake NAF, Kern County, CA
Wind Rose for 2000-2004 - 4th Quarter (Oct. 1- Dec. 31)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2002 2003 2004 2000 2001 **Oct 1 - Dec 31** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **17.06%**	TOTAL COUNT: **3981 hrs.**	
	AVG. WIND SPEED: **6.46 Knots**	DATE: **12/4/2009**	PROJECT NO.: **60139696**

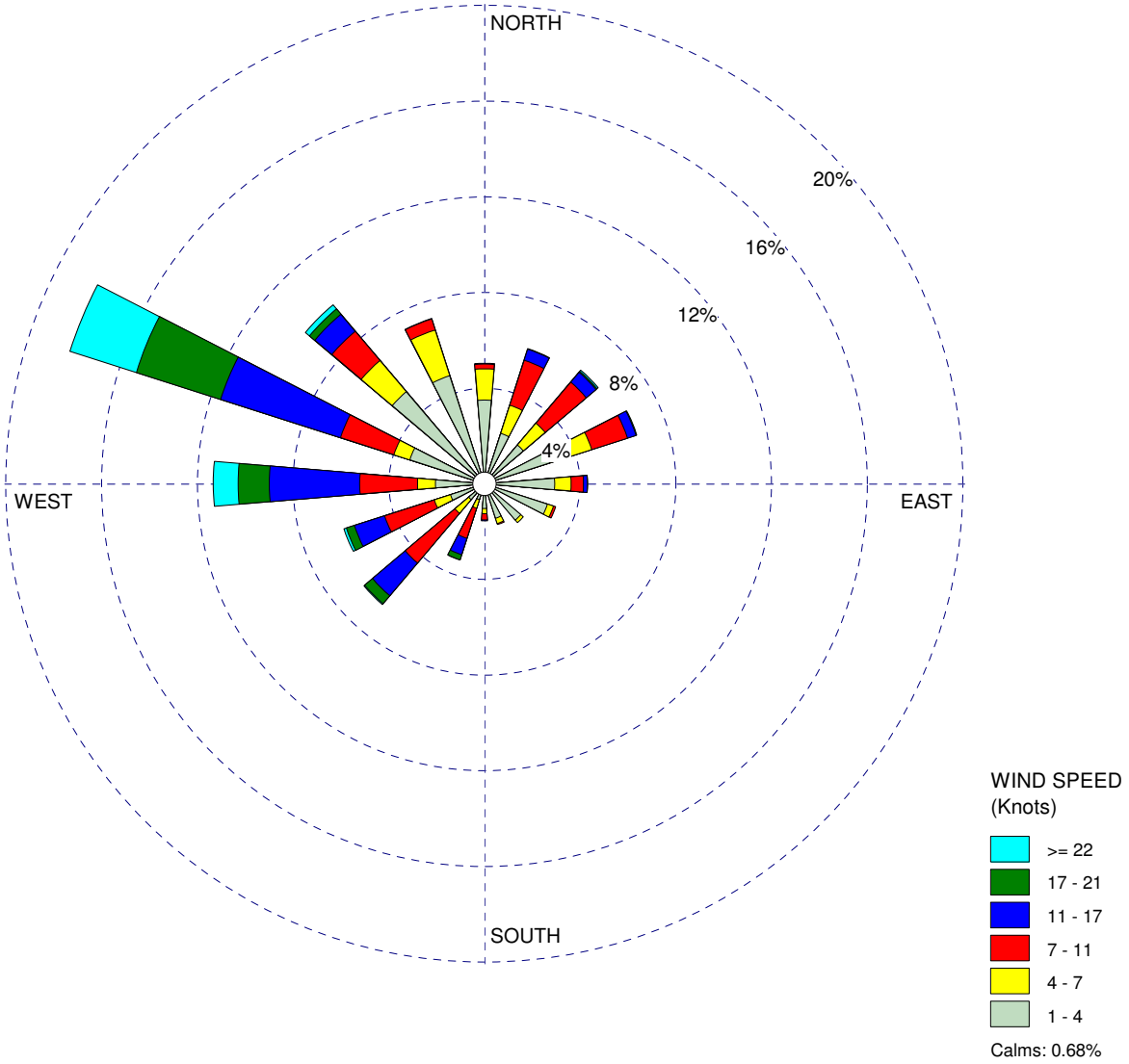
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mojave ARB Measurement Site
Wind Rose for 2000-2004 - 1st Quarter (Jan. 1- Mar. 31)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Jan 1 - Mar 31** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **0.68%**	TOTAL COUNT: **8642 hrs.**	
	AVG. WIND SPEED: **8.17 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

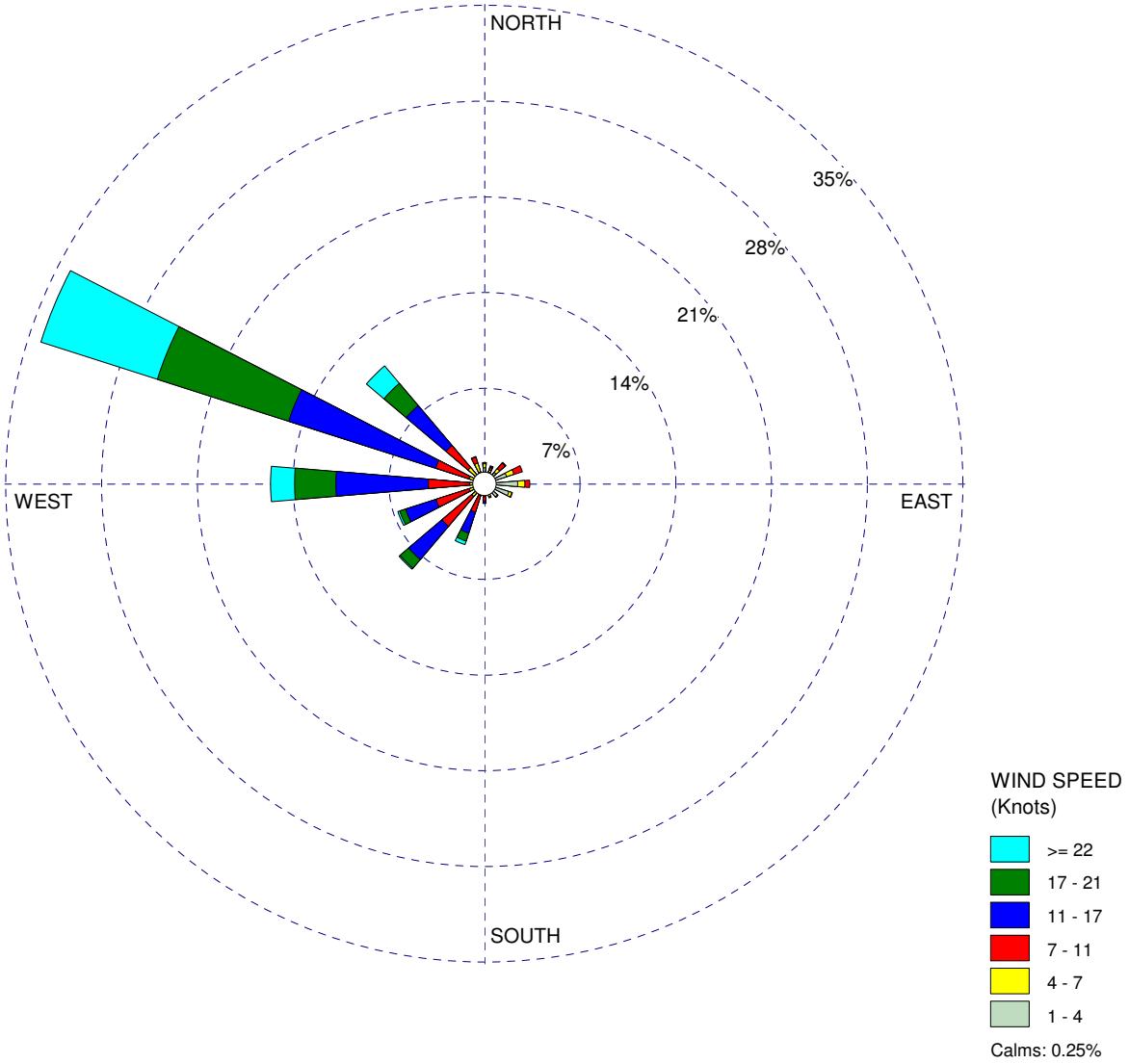
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mojave ARB Measurement Site
Wind Rose for 2000-2004 - 2nd Quarter (Apr. 1- Jun. 30)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Apr 1 - Jun 30** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **0.25%**	TOTAL COUNT: **8385 hrs.**	
	AVG. WIND SPEED: **13.26 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

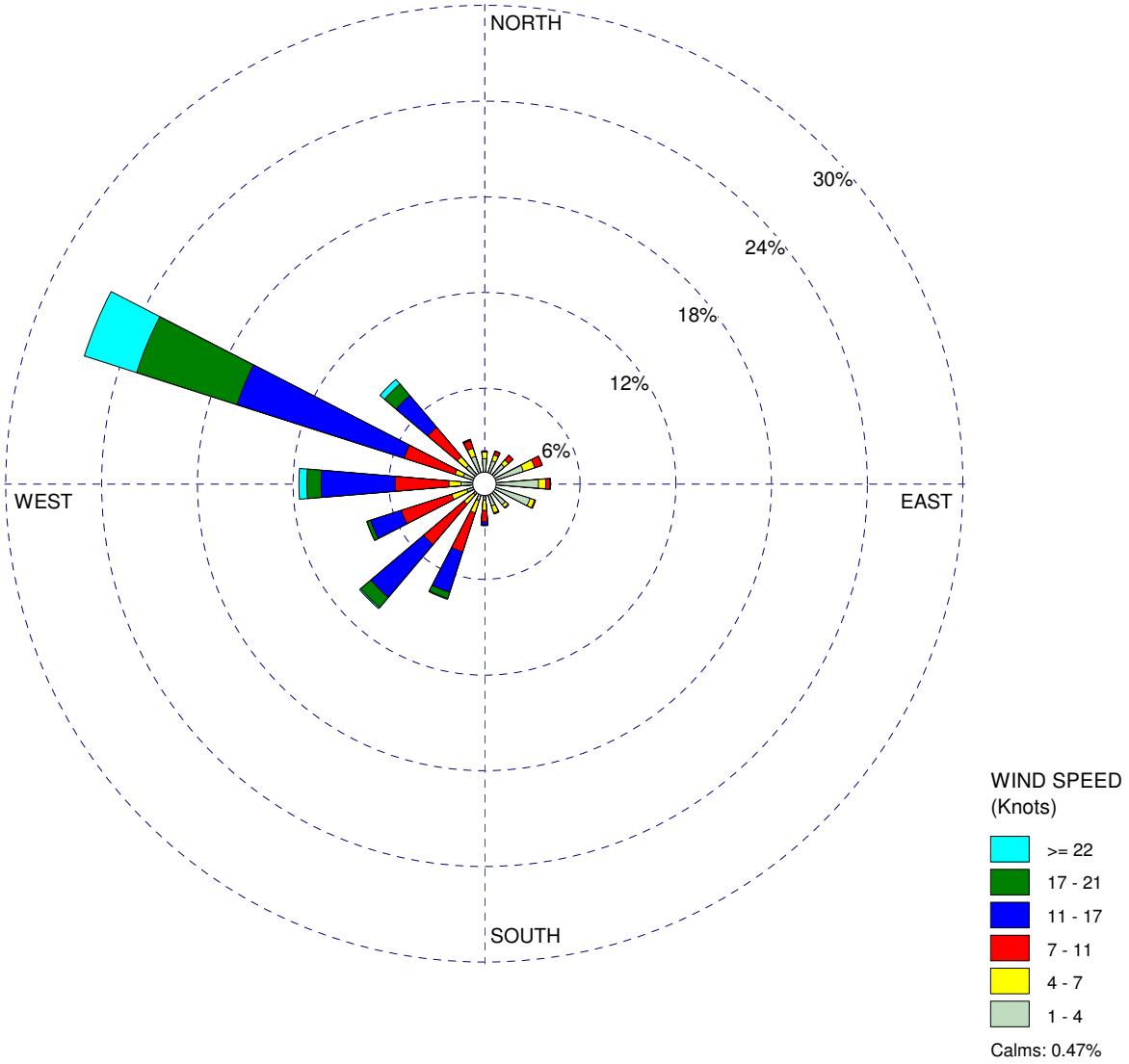
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mojave ARB Measurement Site
Wind Rose for 2000-2004 - 3rd Quarter (Jul. 1- Sep. 30)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Jul 1 - Sep 30** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **0.47%**	TOTAL COUNT: **8275 hrs.**	
	AVG. WIND SPEED: **10.10 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

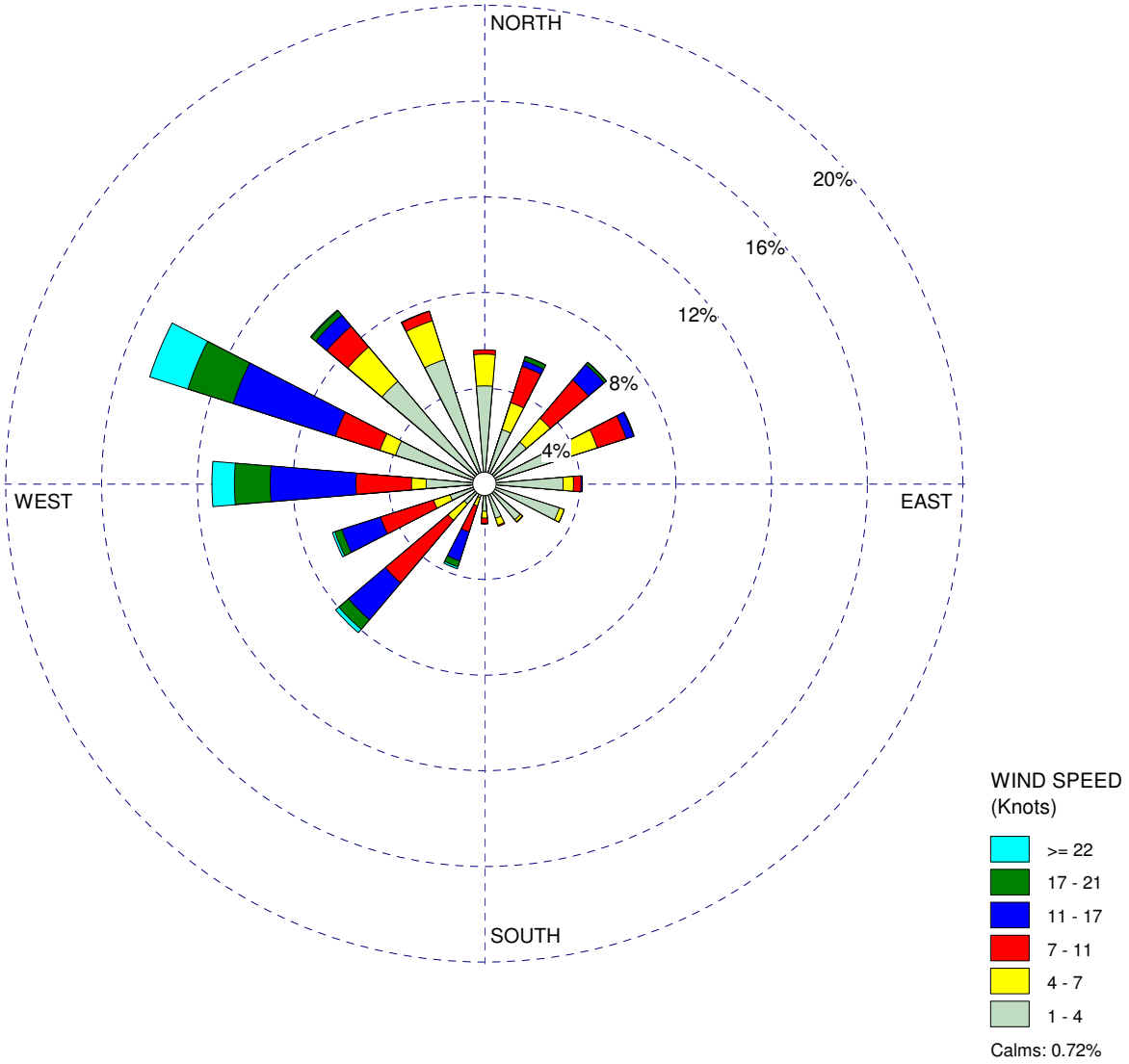
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mojave ARB Measurement Site
Wind Rose for 2000-2004 - 4th Quarter (Oct. 1- Dec. 31)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Oct 1 - Dec 31** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **0.72%**	TOTAL COUNT: **9556 hrs.**	
	AVG. WIND SPEED: **7.46 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

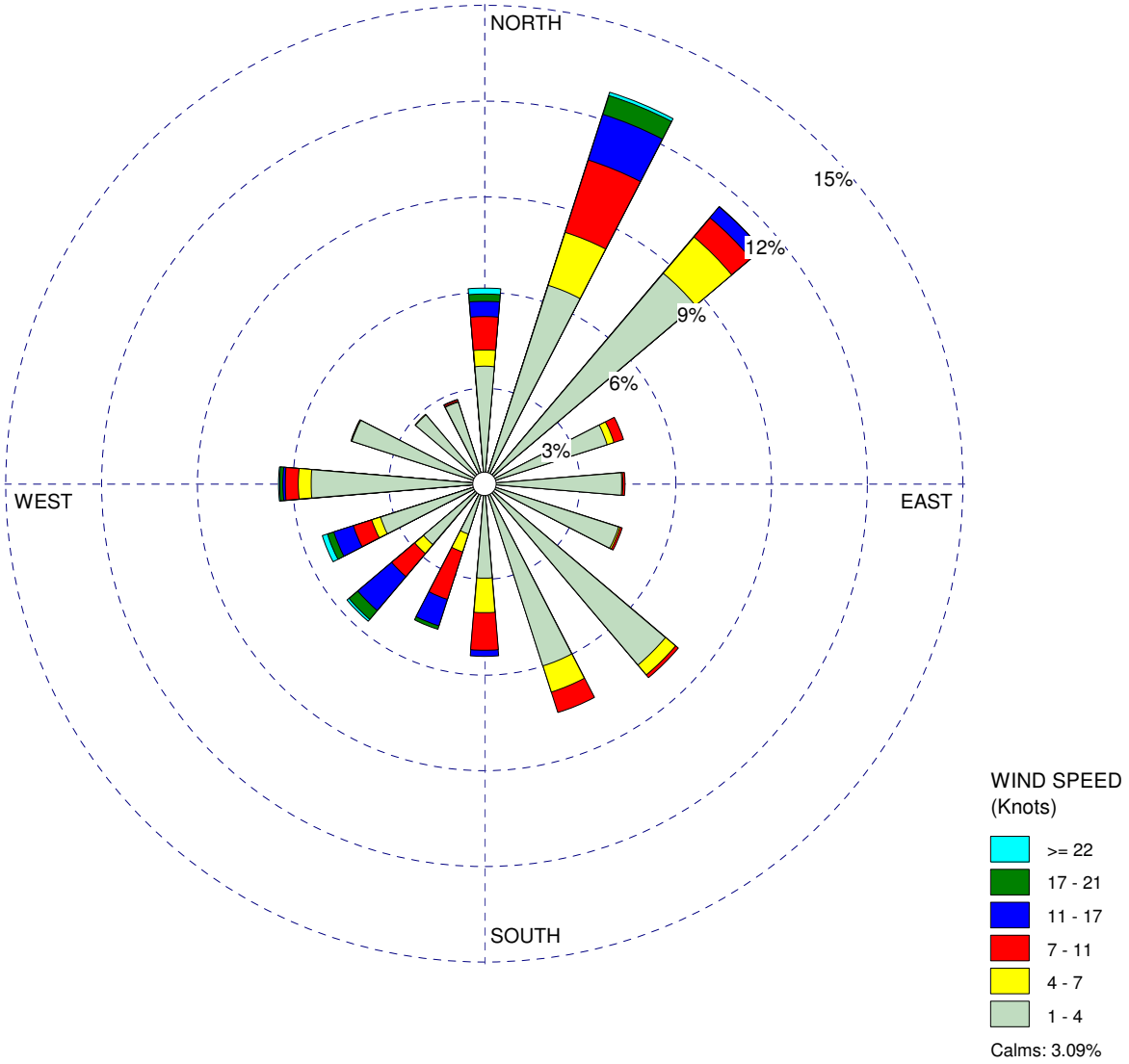
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Trona Measurement Site
Wind Rose for 2000-2004 - 1st Quarter (Jan. 1- Mar. 31)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Jan 1 - Mar 31** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **3.09%**	TOTAL COUNT: **9072 hrs.**	
	AVG. WIND SPEED: **4.23 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

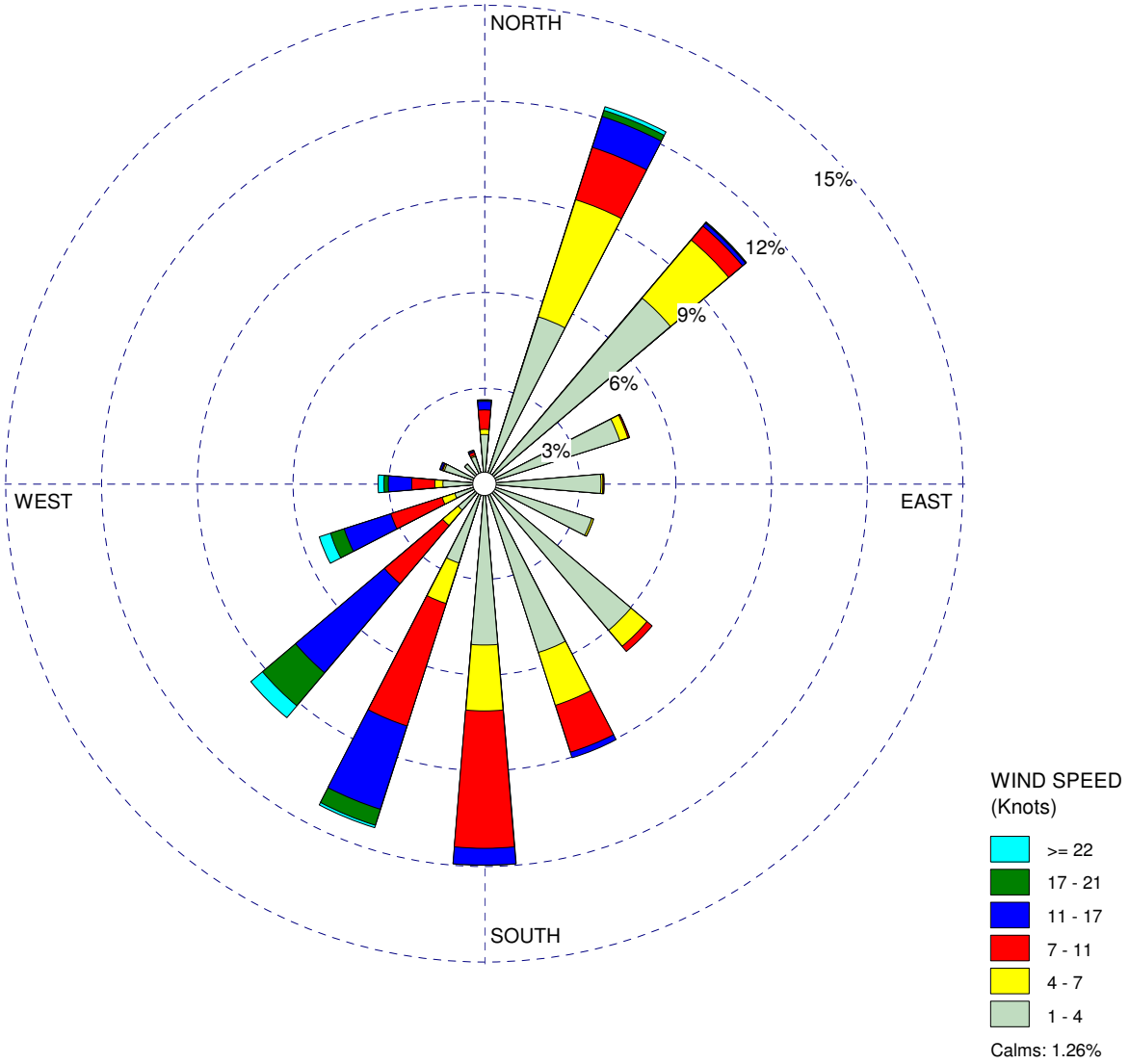
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Trona Measurement Site
Wind Rose for 2000-2004 - 2nd Quarter (Apr. 1- Jun. 30)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Apr 1 - Jun 30** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **1.26%**	TOTAL COUNT: **9905 hrs.**	
	AVG. WIND SPEED: **6.20 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

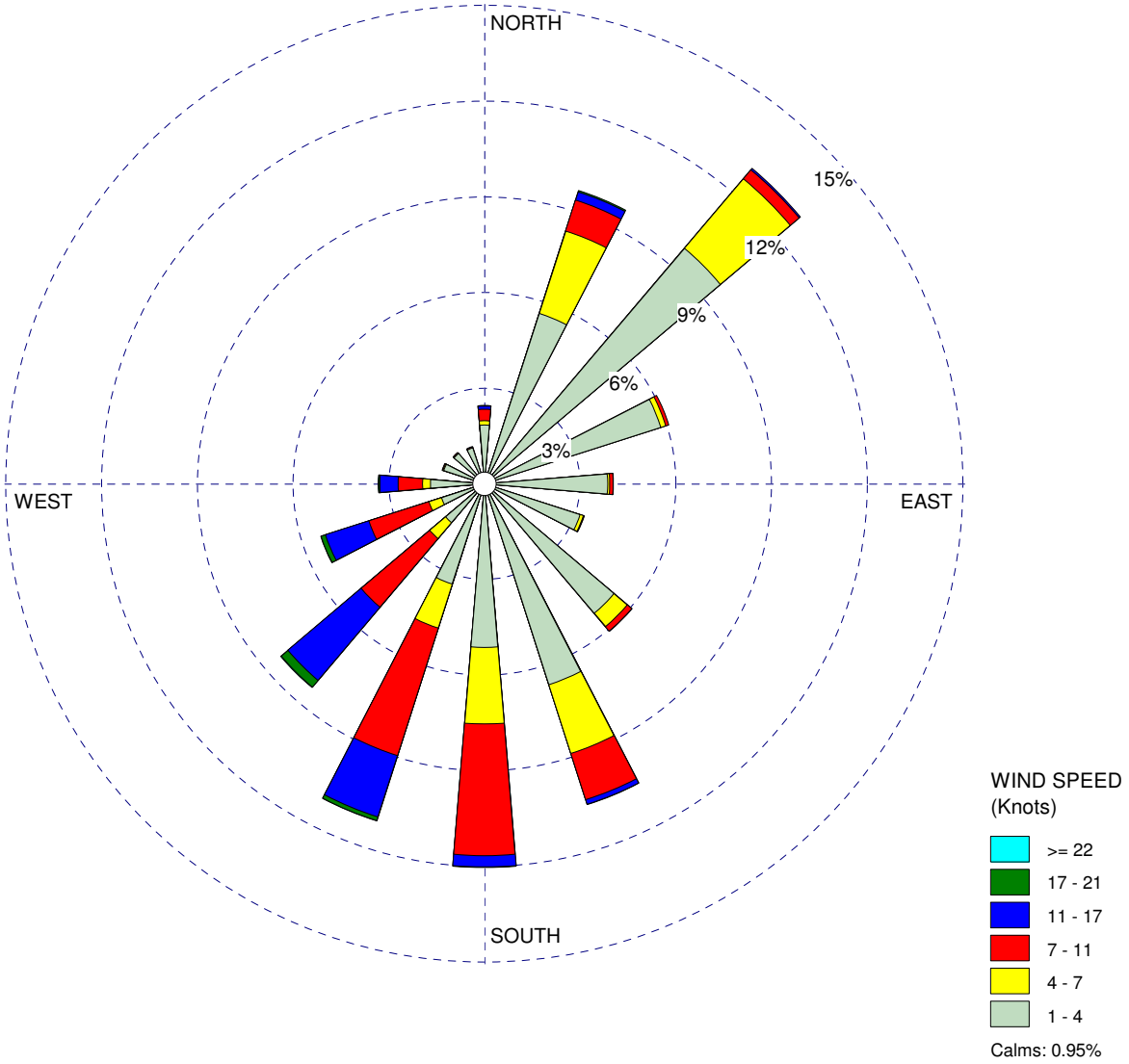
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Trona Measurement Site
Wind Rose for 2000-2004 - 3rd Quarter (Jul. 1- Sep. 30)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Jul 1 - Sep 30** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **0.95%**	TOTAL COUNT: **11029 hrs.**	
	AVG. WIND SPEED: **5.17 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

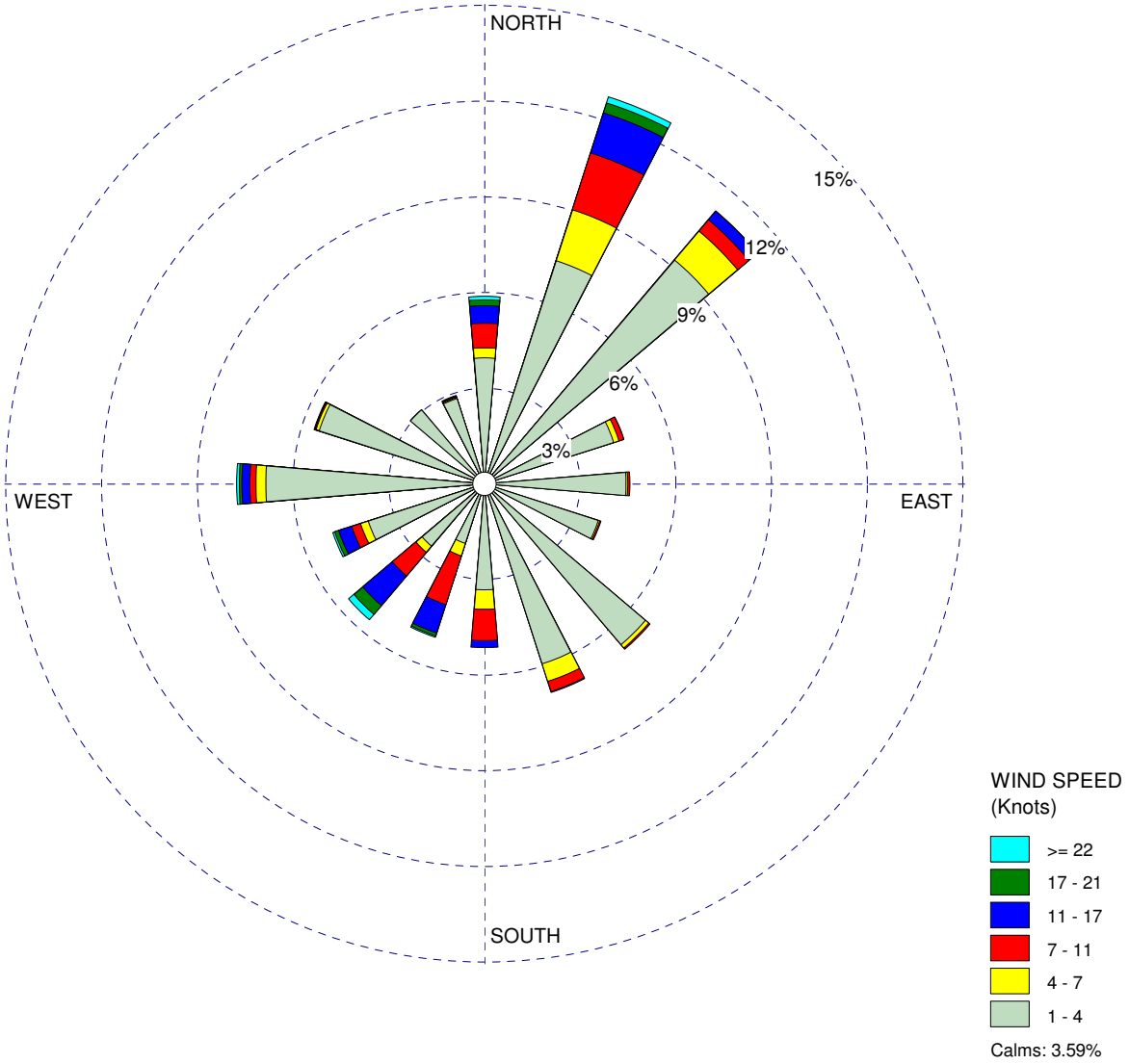
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Trona Measurement Site
Wind Rose for 2000-2004 - 4th Quarter (Oct. 1- Dec. 31)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2000-2004 **Oct 1 - Dec 31** **00:00 - 23:00**	**AECOM**	
		MODELER: **M. Stresing**	AECOM
	CALM WINDS: **3.59%**	TOTAL COUNT: **9795 hrs.**	
	AVG. WIND SPEED: **3.84 Knots**	DATE: **12/15/2009**	PROJECT NO.: **60139696**

WRPLOT View - Lakes Environmental Software

DR-ALT-34

Information Required:

In order to facilitate preparation of the PSA/DEIS document and allow further analysis of the project site with alternative sites, please provide the exact locations of the three alternative sites (Township/Range/Section and/or parcel numbers).

Response:

The alternative sites are located in the following sections. Township and range are abbreviated as T and R respectively. North, South, East and West are abbreviated N, S, E and W respectively. The California City and Boron alternative site descriptions are relative to the San Bernardino Baseline and Meridian. The Alabama Hills alternative site description is relative to the Mt. Diablo Baseline and Meridian.

California City:	T 11 N, R 9 W, Sections 29, 30
Alabama Hills:	T 16 S, R 36 E, Sections 20, 21, 28, 29
Boron:	T 1 N, R 9 W, Sections 13, 24 T 1 N, R 8 W, Section 19

DR-ALT-35

Information Required:

Please identify the size (total acreage) and dimensions of each alternative site.

Response:

All three of the alternative sites are irregularly shaped. Approximate total acreages of the sites (rounded to the nearest hundred acres) are as follows:

- Alabama Hills 2,600 acres
- Boron 1,900 acres
- South of California City 1,300 acres

These sites were determined to not provide sufficient acreage for economically viable development for a 250MW site.

DR-ALT-36

Information Required:

For the Bureau of Land Management (BLM) land alternative (Alabama Hills), please indicate if the BLM has received a right-of-way application from a developer for any portion of the alternative site.

Response:

According to the BLM, they have not received a ROW application for any portion of the Alabama Hills site.

DR-ALT-37

Information Required:

For the private land alternatives (Boron, South of California City), please indicate the number of individual landowners comprising ownership of the alternative site, and the acreage of each separate parcel and landowner.

Response:

The California City alternative site is situated on three separate parcels owned by three landowners. The following table (Table DR-ALT-37-1) identifies the assessor's parcel number, acreage, and landowner name and address of each separate parcel, as provided by the Kern County Assessor.

Table DR-ALT-37-1 Parcel Information California City Alternative Site

APN	Acres	Landowner Name	Landowner Address
233340017	315.25	Noble I Edwards LLC	230 South Temple, Salt Lake City UT 84111
233340025	311.5	Archer Georgine J TR	509 Andover Dr, Burbank CA 91504
233340033	634.5	US Borax Inc	4700 Daybreak Parkway South Jordan UT 84095-5120

The Boron alternative site is situated on eight separate parcels owned by three landowners. The following table (Table DR-ALT-37-2) identifies the assessor's parcel number, acreage, and landowner name and address of each separate parcel, as provided by the Kern County Assessor.

Table DR-ALT-37-2 Parcel Information Boron Alternative Site

APN	Acres	Landowner Name	Landowner Address
232051284	629.8	US Borax Inc	4700 Daybreak Parkway South Jordan UT 84095-5120
233101013	280	US Borax Inc	4700 Daybreak Parkway South Jordan UT 84095-5120
233101039	280	US Borax Inc	4700 Daybreak Parkway South Jordan UT 84095-5120
233101054	40	Lau Trust	2170 St Francis Dr, Palo Alto CA 94303
233101062	10	Palomares Sophia C TR	21810 Strathern St, Canoga Park CA 91304
233101070	151	US Borax Inc	4700 Daybreak Parkway South Jordan UT 84095-5120
233101096	160	US Borax Inc	4700 Daybreak Parkway South Jordan UT 84095-5120
233101138	320	US Borax Inc	4700 Daybreak Parkway South Jordan UT 84095-5120

The Alabama Hills alternative site is entirely on public lands administered by the BLM.

DR-ALT-38

Information Required:

For each alternative site, please provide an aerial or topographic map identifying the site boundary, township ranges, property parcels, roads, transmission line to which the site could interconnect, and any other pertinent features.

Response:

Aerial maps of the alternative sites are provided as Figures DR-ALT-38-1 (Alabama Hills), DR-ALT-38-2 (Boron), and DR-ALT-38-3 (California City).

DR-ALT-39

Information Required:

Please fill in Table 1 on the last page of this Data Request, using available data, to compare the alternative sites with the proposed project using the criteria developed by the environmental community.

Response:

Table DR-ALT-39-1 provides the requested comparison of alternative sites.

Table DR-ALT-39-1

Environmental Criteria	Proposed Project Site	Alabama Hills	Boron	South of California City
Is site mechanically disturbed?	A paved road (Brown Road) runs through the site and several unpaved roads traverse the site. Overhead transmission lines are located on the western portion of the site. Site is commonly used by Off Highway Vehicles (OHVs).	Unpaved roadways. Stream traverses the southwest corner of the site.	Paved roads, unpaved roads. Borax Mine. Mojave Cogeneration Co. listed as electric services/steam and air-conditioning supply. US Borax Inc listed on environmental databases including Corrective Action Site) and listed as pesticide producer. Formerly Used Military Sites - Pac Coast Borax Plant and Landing Field Boron.	Unpaved roads. Disturbed area in northwest corner of the site.
Is site located adjacent to degraded and impacted private lands?	Disturbed areas are shown adjacent to the northwestern portion of the site	None found.	Residences are located to the south of the site.	Residences are located to the east of the southeast quadrant of the site.
Is site a Brownfield?	No	No	No	No
Is site located adjacent to urbanized areas (indicate distance)?	~ 4 miles southwest of center of Ridgecrest, ~3.5 miles south of China Lake Acres, and ~ 5 miles southeast of center of Inyokern	~ 5 miles south of Lone Pine	~ 1 mile north of Boron; ~ 0.5 miles east of North Edwards	Adjacent to unincorporated North Edwards; ~8.5 miles southeast of center of California City; and ~10 miles west of Boron.
Does site require the building of new roads (indicate length)?	No. Three Flags Highway (State Highway 395) and Brown Road traverse the site.	Yes. Highway 395 is ~0.7 miles east of site and Horseshoe Meadows Road is ~0.4 miles west of site.	No. Highway 58 runs through site.	Yes. Site is surrounded by unpaved roads. Highway 58 is located ~0.25 miles south of site.
Could site be served by existing substations (indicate name and distance)?	Yes. The SCE Inyokern Substation is situated ~5 miles to the north of the site. However, the Applicant proposes to construct a new substation/switchyard onsite, interconnecting through an existing SCE 115kv/230kV transmission line (Inyokern/Kramer Junction) which runs alongside the site to the west.	No. Site would require construction of new transmission line(s) and designation of new transmission corridor(s), as it is ~5 miles from a 230kV transmission line	No. Site would require construction of new transmission line(s) and designation of new transmission corridor(s), as it is and a ~16.2 miles from a SCE 230kV transmission line	No. Site would require construction of new transmission line(s) and designation of new transmission corridor(s), as it is ~ 12.3 miles from a LA DWP 230kV transmission line; ~15.9 miles from a LA DPW 230kV transmission line; and ~20.1 miles from a SCE 230kV transmission line
Is site located proximate to sources of municipal wastewater (indicate name and distance)?	~6 miles west of the Ridgecrest Wastewater Treatment Plant	~ 5 miles south of the Lone Pine treatment ponds	~ 3.2 miles north of the Boron treatment ponds	~ 8 miles west of the Boron treatment ponds

Environmental Criteria	Proposed Project Site	Alabama Hills	Boron	South of California City
Is site located proximate to load centers (indicate name and distance?)	Los Angeles ~100 miles south-southwest of site; Las Vegas ~140 miles west-northwest of site.	Los Angeles ~ 160 miles south of site; Las Vegas ~ 160 miles west-southwest of site.	Los Angeles ~ 70 miles south-southwest of the site; Las Vegas ~ 155 miles northwest of site.	Los Angeles ~ 70 miles south-southwest of the site; Las Vegas ~ 160 miles northwest of site.
Is site located adjacent to federally designated corridors with existing transmission lines?	Yes	Yes	None identified	None identified
Does site support sensitive biological resources, including federally designated and proposed critical habitat; significant populations of federal or state threatened and endangered species, significant populations of sensitive, rare and special status species and rare or unique plant communities?	The southern portion of the site is located in a Mohave ground squirrel conservation area. Desert tortoises have been observed on the site, but the site is not located within designated Desert Tortoise critical habitat.	While there are no records of sensitive species occurring on the site as identified by the CNDDB, several special-status species have been documented within 5 miles of the site.	The site is located within designated Desert Tortoise critical habitat. Mohave ground squirrel and several sensitive plant species have also been identified in the vicinity of the site by CNDDB.	The site is located within designated Desert Tortoise critical habitat. Mohave ground squirrel and several sensitive plant species have also been identified in the vicinity of the site by CNDDB.
Is site within an Area of Critical Environmental Concern, Wildlife Habitat Management Area, proposed HCP and NCCP Conservation Reserves?	None identified	None identified	None identified	None identified
Does site contain land purchased for conservation including those conveyed to BLM?	None identified	None identified	None identified	None identified
Does site contain landscape-level biological linkage areas required for the continued functioning of biological and ecological processes?	Site contains desert washes that facilitate animal movement in the desert. Project has potential to impact such wildlife movement corridors, but these would not be considered by themselves as required for the continued functioning of biological and ecological processes in the immediate area.	Site contains channels descending from foothills of the Eastern Sierras towards Owens Lake. These ephemeral washes may facilitate animal movement in this area, though there is little to no change in vegetation type or density from the surrounding upland areas. Project has potential to impact these washes; however, they would not be considered by themselves as required for the continued functioning of biological and ecological processes in the immediate area.	Site contains desert washes that facilitate animal movement in the desert. Project has potential to impact such wildlife movement corridors, but these would not be considered by themselves as required for the continued functioning of biological and ecological processes in the immediate area.	None identified

Environmental Criteria	Proposed Project Site	Alabama Hills	Boron	South of California City
Is the site within Proposed Wilderness Area, proposed National Monuments, and Citizens' Wilderness Inventory Areas	None identified	None identified	None identified	None identified
Does the site contain wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands?	Site contains no wetlands or riparian areas but ephemeral washes on site likely qualify as jurisdictional waters of the state.	Site contains no wetlands or riparian areas but ephemeral washes on site likely qualify as jurisdictional waters of the state.	Site contains no wetlands or riparian areas but ephemeral washes on site likely qualify as jurisdictional waters of the state.	Site contains no wetlands or riparian areas and few, if any ephemeral desert washes. If present, such washes would likely qualify as jurisdictional waters of the state.
Is the site a National Historic Register eligible site and does it contain other known cultural resources?	Site contains a number of sites requiring evaluation (NHPA Sec 106) for potential eligibility for National Register.	Records search in progress; results will be provided to the CEC by February 12, 2010.	Class I archival survey in progress; results will be available by February 12, 2010.	Records search in progress; results will be provided to the CEC by February 12, 2010.
Is the site located directly adjacent to National or State Park units?	None identified	None identified	None identified	None identified

DR-ALT-40

Information Required:

Please provide the results of a CNDDB search for the Boron Alternative site and the Garlock Road alternative.

Response:

Figure DR-ALT-40-1 shows the results of the CNDDB search for the Boron alternative site. The data provided below are for the site plus a five-mile radius. Special-status species identified include the following:

Species	Status
desert cymopterus	BLM sensitive; CNPS List 1B
recurved larkspur	BLM sensitive; CNPS List 1B
desert tortoise	Fed – Threatened; State – Threatened
Mohave ground squirrel	State – Threatened

Figure DR-ALT-40-2 shows the results of the CNDDB search for the Garlock alternative site. The data provided below are for the site itself plus a five-mile radius. Special-status species identified include the following:

Species	Status
Charlotte's phacelia	BLM sensitive; CNPS List 1B
Red Rock poppy	BLM sensitive; CNPS List 1B
desert tortoise	Fed – Threatened; State – Threatened
Le Conte's thrasher	State – Species of Special Concern; BLM – Sensitive
Mohave ground squirrel	State - Threatened
San Joaquin kit fox	Fed – Endangered; State - Threatened
western burrowing owl	State – Species of Special Concern; BLM - Sensitive
western snowy plover	Fed – Threatened; State – Species of Special Concern

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DR-ALT-41

Information Required:

Please provide an Information Center search (Class I) for recorded sites identified within the Boron Alternative and the Garlock Road alternative.

Response:

An Information Center search (Class I) for recorded sites identified within the Boron and Garlock Road alternative will be provided to the CEC on February 12, 2010.

DR-ALT-42

Information Required:

Please indicate the number of individual landowners comprising ownership of the Garlock Road alternative site, the acreage of each separate parcel and landowner, and a parcel map of the alternative.

Response:

The Garlock Road alternative site is situated on seven separate parcels owned by two landowners. Table DR-ALT-42-1 identifies the assessor's parcel numbers, acreage, and landowner and address of each separate parcel, as provided by the Kern County Assessor's office.

Table DR-ALT-42-1 Garlock Road Alternative Site

APN	Acreage	Landowner	Landowner Address
154131080	480	Arciero Ranches	27231 Burbank, Foothill Rch, CA 92610-2500
154131098	160	Arciero Ranches	27231 Burbank, Foothill Rch, CA 92610-2500
154150064	160	Arciero Ranches	27231 Burbank, Foothill Rch, CA 92610-2500
154150213	143.3	Saltdale Farms Inc	27231 Burbank, Foothill Rch CA 92610-2500
182020057	323	Arciero Ranches	27231 Burbank, Foothill Rch, CA 92610-2500
154131064	160	Arciero Ranches	27231 Burbank, Foothill Rch, CA 92610-2500
154131049	320	Arciero Ranches	27231 Burbank, Foothill Rch, CA 92610-2500

DR-ALT-43

Information Required:

Please identify where a transmission interconnection would occur for the Garlock Road alternative site; note – the Garlock Road alternative is within 10 miles of the transmission line considered for the proposed site. Provide CNDBB data for the potential interconnection route.

Response:

Figure DR-ALT-43 depicts where a transmission interconnection would occur for the Garlock Road alternative site. The transmission interconnection route shown in the figure represents the shortest path from the Garlock Road alternative site to the existing SCE 230-kV transmission line. The depicted route is approximately 6 miles long and occurs entirely within BLM administered land.

Figure DR-ALT-40-2 shows the results of a CNDDB search for the transmission interconnect route for the Garlock alternative site. Special-status species identified in the vicinity of the transmission route include the following:

Species	Status
desert tortoise	Fed – Threatened; State – Threatened
San Joaquin kit fox	Fed – Endangered; State – Threatened

DR-ALT-44

Information Required:

To determine the feasibility of obtaining site control, reference the number of different property owners (per Data Request 4) and, if less than 20 landowners, please indicate why multiple parcels of private land would result in poor probability of obtaining site control, given the Renewable Energy Transmission Initiative (RETI) Phase 2A Report statement that: "At the recommendation of solar generators and other stakeholders, proxy solar projects in areas having more than 20 different owners per two-square mile area were deemed unlikely to be developed."

Response:

The California City alternative site is comprised of 3 separate parcels owned by 3 individual landowners. The Boron alternative site is comprised of 8 separate parcels owned by 3 individual landowners.

As stated in Section 4.2.2, Alternative Site Selection Criteria of the AFC, "site control" is one of the criteria used by the Applicant (Ridgecrest Solar I, LLC) during the site selection process. In the AFC description of the site control criterion, it notes "If private land, the site should not be subdivided between more than **three** landowners to avoid lengthy or unsuccessful negotiations."

Solar thermal projects of the size of the proposed RSPP represent enormous investments, whoever the proponent(s) might be. The ease and certainty of establishing site control is a critical component of determining whether to proceed with a large-scale solar thermal project. Although different applicants may have different views regarding how many landowners is "too many" for site control purposes, the Applicant determined, based on CEC guidance, that the appropriate maximum number of landowners is three.

DR-ALT-45

Information Required:

To determine the significance of the project's use of MGS Conservation Area land, please provide a list of other projects that fall within the MGS Conservation Area.

Response:

Based on preliminary information obtained from the BLM, one project, the California Light-Weight Pumice Mine expansion, encroaches on the MGS Conservation Area. The pumice mine expansion encroaches on 59 acres of the MGS Conservation Area.

The total MGS Conservation Area is 1,726,712 acres, of which 1,280,106 acres are public land administered by the BLM. Under BLM's West Mojave Plan, BLM may authorize the development of up to one percent of the total public land in the Conservation Area, or 12,801 acres. Accounting for the 59 acres taken up by the pumice mine expansion, 12,742 acres are still available before the development limit is reached. The revised Project site layout is expected to disturb 809 acres within the MGS Conservation Area, or approximately 6.03% of the total remaining acreage available for development.

The BLM believes that there may be additional projects that fall within the MGS conservation area and is currently investigating this possibility. BLM is expected to share the results of its investigation with the CEC.

DR-ALT-46

Information Required:

Please provide cultural and biological impacts for the proposed northern portion of the project only. Provide this by giving us both a map illustrating distribution of resources on the land and also a tabular list of resources on the land. Please describe and map any other project changes that would occur with this alternative.

Response:

An alternative that would limit Project development to the northern solar field would have similar biological resource impacts as the proposed Project, at least within the area subject to development (impacts caused by the Project's southern solar field obviously would not occur). Under the northern-only solar field alternative, although no new impacts would occur, the impacts in the developed area would be roughly the same as with the proposed Project (i.e., significant impacts to sensitive vegetation communities [e.g., Mojave Desert wash scrub], jurisdictional waters, desert tortoise, Mohave ground squirrel, and other sensitive biological resources). Impacts to Mohave ground squirrel could be reduced because no impacts would occur to the Mohave ground squirrel conservation area. Figures depicting sensitive biological resources maps for the northern half of the site are included in Attachment DR-ALT-46.

Table DR-ALT-46-1 Vegetative Communities North of Brown Road
(see Attachment DR-ALT-46-1 for corresponding map)

Community Type	Acres
Mojave Creosote Scrub	9506
Disturbed Habitat	11
Developed	150
Mojave Desert Wash Scrub	73
Unvegetated Ephemeral Dry Wash	44

Table DR-ALT-46-2 Western Burrowing Owl Observations North of Brown Road (see Attachment DR-ALT-46-2 for corresponding map)

Western Burrowing Owl	No. of Detections	No. Owls Observed
Active Burrow (Main)	3	6
Active Burrow (Satellite)	2	0
Burrow with Sign	17	0
Burrow with Abundant Sign	9	0

Table DR-ALT-46-3 Desert Tortoise Observations North of Brown Road (see Attachment DR-ALT-46-3 for corresponding map)

Desert Tortoise	No. of Detections
Adult Tortoise	17
Juvenile Tortoise	2
Tortoise (Unknown Age)	3
Tortoise Bone Fragments	6
Tortoise Burrow	82
Tortoise Burrow - Active	19
Tortoise Burrow - Occupied	12
Tortoise Carcass - Juvenile	2
Tortoise Carcass - Adult	1
Tortoise Pallet - Active	4
Tortoise Pallet	11
Tortoise Scat	69
Tortoise Scat - Fresh	12

Table DR-ALT-46-4 Other Special Status Species Observations North of Brown Road (see Attachment DR-ALT-46-4 for corresponding map)

Other SS Species Sign	No. of Signs	No. Observed
Kit Fox Burrow	1	0
Kit Fox Burrow Complex	32	0
Active Kit Fox Burrow Complex	2	3 pups
Loggerhead Shrike	2	2
Le Conte's Thrasher	1	1

Table DR-ALT-46-5 Archaeological Sites North of Brown Road
(see Attachment DR-ALT-46-6 for corresponding map)

Site Number	Age	Type
CA-KER-6837H	Historic	Old Highway 395 alignment and associated historic debris
RC-H-1	Historic	
RC-H-2	Historic	
RS-1	Historic	Tin can scatter
RS-1b	Historic	Tin can scatter
RS-1c	Historic	Tin can scatter
RS-2	Historic	Claim post feature and tin can scatter
RS-3	Historic	Tin can scatter
RS-5A	Historic	Tin can scatter
RS-5B	Historic	Historic debris scatter (cans, car parts, milled wood)
RS-6	Historic	Rock-lined historic roadbed
RS-8	Historic	Claim post and can scatter
RS-10	Historic	Claim post/rock pile feature
RS-11	Historic	Claim post/rock pile feature
RS-12	Historic	Claim post/rock pile feature
RS-13	Historic	Claim post/rock pile feature
RS-15	Historic	Tin can scatter
RS-19c	Prehistoric	Metate milling feature and CCS biface
RS-32	Historic	Tin can scatter
RS-37	Historic	Tin Can and glass scatter
RS-38	Historic	Tin can scatter
RS-39	Historic	Tin can scatter
RS-40	Historic	Tin can scatter
R-S-42	Historic	Tin can scatter
RS-158	Historic	Tin can scatter
RS-781/865	Historic	Tin can scatter
RS-856	Historic	Tin can scatter
RS-866	Historic	Tin can scatter
RS-869	Historic	Historic road alignment

Table DR-ALT-46-6 Isolates North of Brown Road (see Attachment DR-ALT-46-7 for corresponding map)

Isolate Number	Age	Type
I-1	Historic	Upright pocket tobacco tin
I-2	Historic	Unidagnostic tin can
I-3	Historic	Rebar and possible claim post
I-4	Historic	Clear glass bottle fragments
I-5	Historic	2 church-key-opened cans
I-6	Historic	Church-key-opened can
I-7b	Historic	crimped seam can
I-9b	Historic	Cast iron post
I-10b	Historic	Milled wood
I-12	Historic	Hole-in-top can
I-13	Historic	crimped seam can
I-14	Historic	2 undiagnostic tin cans
I-15b	Historic	2 church-key-opened cans
I-26	Historic	Undiagnostic tin can
I-28	Historic	church-key-opened crimped seam can
I-29	Historic	Hole-in-top can
I-30	Historic	Knife cut crimped seam can
I-31	Historic	Knife cut crimped seam can
I-32	Historic	Fallen cast iron post
I-33	Historic	church-key-opened can
I-34	Historic	Hole-in-top can
I-36	Historic	2 church-key-opened cans
I-37	Historic	2 church-key-opened cans
I-38	Historic	2 undiagnostic tin cans
I-39a	Historic	Undiagnostic tin can
I-39b	Historic	Undiagnostic tin can
I-40	Historic	church-key-opened can
I-41	Historic	church-key-opened can
I-43a	Historic	church-key-opened can
I-43b	Historic	Hole-in-cap can, church-key-opened can
I-44	Historic	Undiagnostic tin can

Table DR-ALT-46-6 Isolates North of Brown Road (see Attachment DR-ALT-46-7 for corresponding map)

Isolate Number	Age	Type
I-46	Historic	Cast iron post
I-47b	Historic	2 hole-in-top soldered bottom cans
I-48a	Historic	Coffee can?
I-48b	Historic	2 church-key-opened cans
I-49	Historic	Knife cut food can
I-52	Historic	Historic Post
I-53	Historic	Upright pocket tobacco Tin
I-54	Historic	Stand Pipe
I-55	Historic	undiagnostic food can
I-59	Historic	undiagnostic food can
I-60	Historic	Fence Post
I-61	Historic	church-key-opened food can
I-73	Historic	church-key-opened food can
I-74	Historic	church-key-opened food can
I-75	Historic	church-key-opened food can
I-76	Historic	church-key-opened interlocking seam can
I-77	Historic	church-key-opened interlocking seam can
I-78	Historic	Crimped seam motor oil can, embossedd "SAE 30"
I-79	Historic	Can opener opened tuna can and undiagnostic crushed can
I-80	Historic	church-key-opened food can
I-81	Historic	Upright pocket tobacco tin
I-82	Historic	Stand Pipe
I-84	Historic	Stand Pipe
I-85	Historic	Milk can
I-86	Historic	food can
I-88	Historic	church-key-opened food can
I-90	Historic	church-key-opened food can
I-91	Historic	Downed fence post
I-93	Historic	Soldered bottom can
I-94	Historic	Auto exhaust system parts
I-95	Historic	church-key-opened can

Table DR-ALT-46-6 Isolates North of Brown Road (see Attachment DR-ALT-46-7 for corresponding map)

Isolate Number	Age	Type
I-97	Historic	Milk can
I-98	Historic	Milk can
I-99	Historic	Amethyst glass bottle
I-101	Historic	Large rectangular (fuel?) can
I-104	Historic	1 punch bottom food can, 1 undiagnostic food can
I-105	Historic	Amethyst glass
I-106	Historic	2 church-key-opened cans
I-107	Historic	Box spring
I-108	Historic	Motor oil can, embossed "SAE 20"
I-110	Historic	church-key-opened large rectangular can
I-112	Historic	Motor oil can
I-113	Historic	church-key-opened food can
I-114	Historic	Blasting powder can, embossed "BLASTING"
I-115	Historic	Unidagnostic food can
I-119	Historic	Motor oil can, embossed (unreadable)
I-121	Historic	Undiagnosed food can
I-122	Historic	Rock pile
I-150	Historic	Upright pocket tobacco tin
I-151	Historic	2 interlocking seam church-key-opened cans
I-152	Historic	1 gallon size bayonet cut can
I-153	Historic	Punch-opened can
I-154	Historic	church-key-opened can
I-155	Historic	church-key-opened can
I-157a	Historic	knife cut food can
I-157b	Historic	Blasting powder can, embossed "DUPONT"
I-158	Historic	Punch-opened can
I-159	Historic	church-key-opened can
I-160	Historic	Hole-in-top can
I-161	Historic	church-key-opened can
I-162	Historic	Soldered bottom can
I-163	Historic	church-key-opened can

Table DR-ALT-46-6 Isolates North of Brown Road (see Attachment DR-ALT-46-7 for corresponding map)

Isolate Number	Age	Type
I-164	Historic	church-key-opened can
I-165	Historic	Hole-in-top sanitary can
I-168	Historic	Key wind can
I-169	Historic	Punched can
I-177	Historic	church-key-opened can
I-178	Historic	church-key-opened can
I-304	Historic	Undiagnostic tin can
I-305	Historic	Whiskey bottle with seam
I-306	Historic	church-key-opened can
I-307	Historic	church-key-opened can
I-308	Historic	Crimped, church-key-opened Motor oil can
I-309	Historic	Solder top crimped seam can
I-311	Historic	Knife cut oil can
I-312	Historic	Undiagnostic tin can
I-679	Historic	church-key-opened crimped seam can
I-778	Historic	Star cut crimped seam can
I-779	Historic	Crimped seam church-key-opened can
I-780	Historic	10" square crimped seam can with circular opening, fuel?
I-782	Historic	church-key-opened can
I-854	Historic	Crimped seam can
I-861b	Historic	church-key-opened can
I-862	Historic	Hole-in-cap gallon can
I-863	Historic	2 church-key-opened cans
I-867	Historic	church-key-opened can and large square can
I-868	Historic	church-key-opened opened motor oil can
I-7a	Prehistoric	CCS flake
I-9a	Prehistoric	CCS flake and core
I-10a	Prehistoric	Patinated obsidian flake
I-11	Prehistoric	Patinated obsidian flake
I-27	Prehistoric	flaked cobble/tested core
I-35	Prehistoric	Possibly worked black aphanitic

Table DR-ALT-46-6 Isolates North of Brown Road (see Attachment DR-ALT-46-7 for corresponding map)

Isolate Number	Age	Type
I-42	Prehistoric	Chert side scraper
I-45	Prehistoric	Chert flake
I-51	Prehistoric	CCS flake
I-56	Prehistoric	Obsidian flake
I-57	Prehistoric	CCS Core
I-58	Prehistoric	Metavolcanic flake
I-102	Prehistoric	Basalt metate
I-103	Prehistoric	CCS flake
I-109	Prehistoric	CCS Core
I-120	Prehistoric	Chert flake
I-156	Prehistoric	Brown CCS flake
I-167	Prehistoric	Edge modified obsidian flake
I-864	Prehistoric	Quartz core
Iso-2	Historic	Church-key-opened can
Iso-7	Historic	Church-key-opened can
Iso-8	Historic	Church-key-opened can
Iso-9	Historic	Church-key-opened can
Iso-10	Historic	Church-key-opened can
Iso-11	Historic	5-gallon drum
Iso-12	Historic	Can Church-key-opened can
Iso-14	Historic	Church-key-opened can
Iso-15	Historic	Church-key-opened can
Iso-16	Historic	Church-key-opened can
Iso-17	Historic	Church-key-opened can
Iso-18	Historic	Church-key-opened can
Iso-19	Historic	Church-key-opened can
Iso-20	Historic	Church-key-opened can
Iso-21	Historic	5-gallon drum
Iso-23	Historic	Church-key-opened can

Please refer to the response to DR-ALT-48 for an evaluation of an alternative site located only north of Brown Road.

DR-ALT-47

Information Required:

Please describe in detail the engineering constraints, if any, to the development of revised configurations on the northern and southern portions of the site. A revised configuration may result in the rows of troughs not being as long and not configured in a solid rectangular area. As an example, it may be desirable to allow existing washes to pass through an undeveloped portion of the site.

a. Please define whether there is a specific minimum or maximum length that each individual solar collector loop assembly must be, and if it is necessary that the solar collector loops be identical in length. Please define both engineering and economic constraints to having variable collector loop lengths.

b. Please describe in detail whether there is flexibility in the lengths of the supply and return header piping or if these are specific to the solar collector assemblies, and if so, what is the flexibility.

c. Please describe whether there is a distance between components of the solar field and the power block that would result in a loss of heat in the heat transfer fluid such that extending it would reduce the economic or engineering feasibility of the project.

d. Please describe if there is a minimum number of rows of solar collector loops that would make up a unit or if there is flexibility in the number of units that could be arranged to create a 500 MW power plant.

e. Please describe if it is possible to have multiple and smaller power blocks (e.g., 50 or 100 MW) and describe how this would increase the flexibility of the solar field arrangement.

f. Please explain the difference between the crossover pipe, HTF loops, and Heat Collection Elements. If a reconfigured solar array were developed, discuss whether these components would traverse undeveloped desert washes to reach the power block.

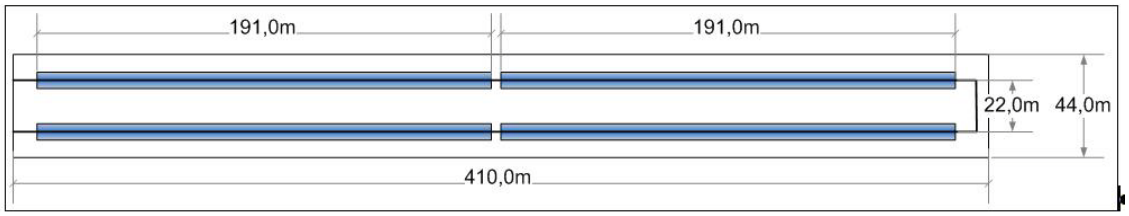
Response:

<u>Solar Field Design Criteria</u>

The basic building block of a parabolic trough solar field is the so-called “loop.” Each loop is made up of 4 solar collector assemblies with a total aperture area of 5,025 square meters. A loop is carefully engineered with the specified collector area and a range of flow rates to raise the temperature of the heat transfer fluid (HTF) circulating in the solar field from the “cold “ temperature that exists at the first preheater in the steam generation train to the maximum, design point temperature of the system. In the case of the proposed Project (and all other solar trough plants that use Therminol® VP1 or equivalent synthetic oil as the HTF[1]) the cold return HTF temperature is approximately 300 degrees Celsius (°C) and the hot design point temperature is approximately 400°C.

1. Steam cycles have improved efficiency with higher peak operating temperature. So system designers strive to achieve peak operating temperatures up to 550°C (1000 degrees Fahrenheit). However, synthetic oils such as Therminol start to break down at temperatures above 400°C. As this happens, hydrogen evolves from the oil and slowly destroys the vacuum in the annulus of the solar receiver tubes that carry the HTF oil in the solar field. In the extreme, lost vacuum across an entire solar field renders it useless.

Each Heliotrough loop is made up of 4 collectors 191 meters in length with an aperture width of 6.77 meters. To ensure optimal annual energy capture, it is critical that loops be oriented in a precise north-south alignment. The "U" shaped loop illustrated below is optimal from a pressure drop standpoint. This loop system allows the hot and cold headers to be routed in the same header pipe corridors, with the delivery and return points of the HTF at roughly the same location. While it is possible to double each collector section back on itself, in a double-U layout, this results in large additional pressure drop and heat loss in each loop. Furthermore, an optimal layout will have opposing loops on the north and south side of an east-west header. An optimal solar field will therefore be laid out in 820 meter (approximately ½ mile) north south increments.



Ideal HelioTrough Loop Geometry and Layout

Multiple studies in the history of solar trough technology development have shown that the north-south orientation is optimal. Comparisons to an east-west orientation have shown extreme deviations between summer and winter performance due to the sun angles. This east-west orientation would require that the solar field be much larger or overdesigned to reach the same annual energy as a north-south oriented field. Setting the collectors to any angle deviating between perfect north-south reduces annual energy production and causes operational and control problems. Difficulties will be encountered in controlling temperature due to complex shading of collectors during mornings and evenings specific to each day of the year (and also differing year to year). This often can lead to an inefficient use of land and additional heat and pressure losses, since interconnecting piping will be lengthened to provide necessary clearance for maintenance and movement of the collectors themselves.

While it is possible to mix and match loops of different sizes, a large solar field for utility scale electric generating facility is best designed with loops of identical size. The solar radiation incident on each loop varies between approximately 300 watts/meter^2 to over 1000 watt/meter^2 during plant operations. To maintain a constant temperature increase across each loop of 100°C (300°C up to 400°C), the flow rate is varied up or down to accommodate the precise level of solar power incident on the loop[2]. For this reason it is critical that the fluid flow in each loop throughout the entire solar field be <u>identical</u>.

Loops of shorter or longer length are possible, but would require a unique HTF flow to achieve the design-point temperature rise. Each loop would then have limited maximum and minimum power performance with respect to one another and also a unique pressure drop. This would reduce overall performance and lead to extreme flow control difficulties.

In order to achieve identical flow in every one of the approximately 290 loops in a 250-megawatt (MW) solar plant, it is critical that the solar field is "balanced". Adjusting flow at the entrance of each loop with automated flow control valves is not practical. A balanced solar field requires that the pressure drop from the central pumping station to each subfield be the same. A key criteria to achieve such balance is that that the main headers that carry HTF to and from the central pumping station to the outer reaches of the solar field be identical (or close to it) in length and include equal number of loops.

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2. The central pumping station utilizes variable speed drives for HTF pumping, making a wide range of flow rates possible to accommodate a wide range of incident solar radiation.

The length of the header pipes and the number of loops determine the volume of HTF necessary for the operation of the solar plant. Any additional length of large header piping needed to accommodate suboptimal field layouts, unbalanced solar fields, or odd loop configurations creates a "dead volume" of HTF. This extra mass of HTF needs to be heated up each morning, expands the size of the overflow and ullage system, burdens the freeze protection system, and creates additional capacity requirements in the pumping system. Additionally, when loops are set opposing one another, a single cold or hot header can be shared between a north and south field reducing the need for additional pipe, as well as for additional pipe supports, insulation, foundations and all the labor involved in welding and constructing the headers. Thus, each deviation from the optimal configuration can have compounding negative effects of increasing capital cost and decreasing plant performance.

There is a hierarchy of design features for a solar field ranging from "desirable" features to those that are considered "critical":

Desirable Solar Field Design Features

- Loops assembled in "opposing pairs" along east-west headers
- Solar Field is a perfect rectangle, preferably close to square
- Power Block is located in the center of the solar field

Important Solar Field Design Features

- Pumping station is at the hydraulic center of peripheral loops
- Loops are laid out in a "U" configuration

Critical Solar Field Design Features

- Perfect north-south alignment of collector rows
- All loops are the same size

<u>Design and Capital Cost Impacts</u>

In summary, deviations from optimal collector configurations and solar field layouts cause the following negative impacts on cost and performance:

Additional Capital Cost

- Longer main headers, with expansion loops, insulation and foundations
- Additional HTF volume
- Additional expansion vessel capacity
- Additional pumps – split pumping station with loss of system redundancy
- Additional instrumentation and controls
- Additional grading and storm water management costs

Performance Impacts

- Decrease in annual energy capture
- Pressure loss in additional piping
- Heat loss in additional piping
- Delayed Startup each day – while additional HTF volume is brought to operating temperature

Overall Impacts:

Depending on the specific deviation from optimal designs, capital costs can rise by approximately 3 to 5 percent. Plant output will decrease by an additional 2 to 6 percent. The overall impact is an increase in electricity cost of approximately 5 to 10 percent.

a: Collector Loop Length

Solar collector loops have been carefully designed to maintain the optimal heat transfer flow ranges that can heat the transfer fluid by approximately 100°C for the typical range of solar radiation that occurs throughout the day. The loop unit is made up of four collector assemblies. It is possible to decrease the number of solar collector elements within loop assemblies to create loops of slightly different total length. However, this will require a different design HTF flow rate to achieve the design point temperature rise. For this reason, it is critical that all subfields be designed with loops of equal length.

In plants where each subfield is made up of loops of different lengths, separate pumping stations are required to serve each subfield. While this is physically possible, it creates the following problems:

- Since the entire solar field is no longer a single, pressurized system, the individual subfields have to be operated independently and in parallel from a hydraulic perspective.
- In order to use a common steam generation system, the hot HTF return pressure has to be identical for all subfields. This would likely require use of additional automated throttle/control valves.
- Alternatively, parallel, independent steam generation trains would be required, increasing cost and complexity.

In summary, subfields made up of distinct loop geometries are technically feasible. However, such a design increases capital cost and decreases operational flexibility.

An additional flexibility that exists within the Applicant-proposed standard collector loop design is the ability to set the loop in a double-U layout, whereby four single collectors are set side-by-side instead of two series sets of collectors in a single-U design. This would result in additional pressure loss and heat loss in the loop as well as twice the amount of installed header piping per loop (see header impacts discussion in item “b” below).

b: Header Piping Flexibility

The length of supply and return (cold and hot) headers is dictated by the number of loops in the plant. It is very desirable to maintain equal header length from the power block to the farthest most loop. When a single header is increased or decreased in length, with a corresponding change in the number of connected loops, the hydraulic system becomes imbalanced. This requires additional pumping power to overcome the additional pressure loss in the longest header. This comes in conjunction with an increase in total HTF volume and associated heat loss. Auxiliary power consumption increases dramatically as header length increases, which can quickly lead to an infeasible performance-to-investment ratio. Very small changes in the header length will have significant impact on project economics.

c: Potential for impact on Project feasibility of distance between Project components

As described in the introduction and in the response to item “b” above, increasing the length of the header between components, the loops or solar field, and the power block as systems will lead to a compounded negative effect of additional heat loss, auxiliary pumping power and increased investment. While it is

possible to design engineering solutions for this, the increased cost in custom engineering of a unique and non-optimal solar field design will increase project cost. The critical point at which such changes may render a project infeasible depends on the specifics of the header layout.

d: Possibility of multiple, smaller power blocks and effects on solar field flexibility

Multiple power blocks for a large solar field can provide operational benefits (which depend on how the individual blocks are positioned with the field), but inevitably increase overall project costs. If individual small power blocks are positioned at or near the center of the sub-solar field that is providing the necessary solar power, HTF header piping, HTF volume, and HTF pumping requirement can be reduced somewhat. These factors will reduce capital cost, reduce daily startup times, and increase annual energy production. However, if all of the power blocks are located together in a central location, these benefits are largely eliminated.

Steam turbine generators have well known and significant economies of scale, meaning that the unit installed cost of small systems are significantly higher than large systems. This is clearly illustrated in today's power markets. Combined cycle plants are typically "2 on 1", meaning that although there are often two gas turbines, they are matched up to only one steam turbine. The power plants at Diablo Canyon and San Onofre have single 1,100-MW steam turbine-generators matched up with each nuclear steam supply system.

Three steam turbines vs. one large turbine requires three sets of feedwater heaters, three sets of boiler feed pumps, three turbine pedestals, and three step-up transformers. If the small turbines are distributed throughout the solar field, there is also a need for three individual air-cooled condensers, three water treatment systems, three HTF pumping stations, three HTF expansion systems and three ullage systems. In short, when the installed cost of all of this additional equipment is considered, the cost increase in the power island dwarfs the cost savings in the HTF header system.

Typically, large steam turbines also have cycle efficiencies that are superior to small ones (this also is a key driver in steam turbine size selection with combined cycle, coal and nuclear plants). The steam cycle efficiency is leveraged against the entire solar field. A decrease in cycle efficiency by one percentage point (typical of the difference between a 100-MW and 270-MW turbine), requires that the solar field be 35,000 square meters (aperture area) larger to produce the same annual energy.

There are alleged operational benefits with multiple small turbines. We believe that these benefits are small, and potentially negative. Even on winter days, solar field power ramps up quickly such that all three turbines in a three- turbine plant would need to start up in rapid succession. On summer mornings, the turbines would need to be brought up simultaneously. While a large turbine has a longer startup time than a small turbine, the complexities of starting up three small turbines simultaneously are significant. This is illustrated with new combined cycle plants that are designed for daily startup – they employ one large turbine, not two.

In summary, multiple small turbines vs. one large turbine can have small cost and operational benefits for the HTF system, but they also have cost and performance penalties for the power island that are much more significant than the benefits.

While Solar Millennium has experience with the Andasol plants which are lower capacity solar plants than RSPP, there are many differences to be noted. The Spanish law limits the maximum solar power plant size to 50MW to which Andasol units 1 through 3 were designed. Furthermore, the Spanish government subsidizes the solar power production through a feed-in tariff, making solar power production in general much more viable. The Andasol projects 1 through 3 also have the ability to store up to half the peak energy

produce during the day allowing it to run late into the night. That is, the solar field is twice as large as is needed to supply the 50MW in solar only mode. This makes economics with respect to scale of the plant much different, i.e. making smaller scale plants economically feasible.

e: Difference between the crossover pipe, HTF loops, and Heat Collection Elements? and could these components traverse desert washes

The crossover pipe is simply the pipe that flows partially heated heat transfer fluid from the first leg of the collector loop to the second leg (the bottom of the "U" shape). The Collector Loop is described in detail in the introduction. The Heat Collecting Elements (HCE) are part of the solar collector assemblies. They are mounted in front of the mirrors at the focal line of the parabola. HCEs are the same length as the collector itself.

A loop that contains both the HCE and is linked together by the crossover pipe is the precisely laid out building block of the overall solar collection system. The precision required for the loop layout and construction requires that it be sited on a flat, compacted plain of earth surface. As such, loops cannot be constructed with washes flowing through them.

It is, however, possible to lay out groupings of loops (subfields) on opposite sides of washes and to connect subfields together and back to the central pumping station with header pipes that traverse washes. However, there are losses associated with such a configuration.

DR-ALT-48

Information Required:

Please identify where a transmission interconnection would occur if only the northern portion of the site was developed, including an Inyokern substation interconnection. Provide California National Diversity Data Base (CNDDB) data and an Information Center search (Class I) for recorded sites for the potential interconnection routes.

Response:

A north-of-Brown-Road-only alternative would require relocation of the interconnection switchyard at a location abutting and to the east of the SCE ROW immediately north of Brown Road (Figure DR-ALT-48-1). The interconnection with the existing 230 kV/115kV SCE transmission lines would be made at this location. A variation on this design would be to make the interconnection with SCE at their Inyokern Substation, eliminating the need for a separate interconnection switchyard in the Project ROW (Figure DR-ALT-48-2). This route, which was identified in the CAISO Phase I Study as the only "competitive" alternative, was rejected because it would require the construction of five additional miles of new transmission line. Such a new line would have to be constructed either in the existing ROW for the SCE 230 kV line or a new ROW would have to be obtained. The existing ROW is occupied by a 115 kV transmission line in addition to the SCE 230 kV line. It is uncertain if this ROW could support a new 230 kV transmission line. Constructing a new 230 kV transmission outside of the existing ROW would be extraordinarily difficult if not infeasible since it likely would require obtaining the permission of dozens of private landowners. The route would be much longer than the alternative that would directly connect to the existing 230kV/115kV SCCE transmission line, which would be selected because it was the shortest route and most suitable location to interconnect to the SCE 230 kV line while minimizing environmental impacts and costs.

There are no CNDDB species located within the potential interconnection route to the existing 230kV/115 kV lines. CNDDB species located within the potential interconnection route to the Inyokern Substation are the Mohave ground squirrel and San Joaquin kit fox.

An information center search (Class I) for the potential interconnection routes will be provided to the CEC on February 5, 2010.

DR-ALT-49

Information Required:

Staff has identified a potential alternative that avoids the El Paso Wash in both the northern and southern fields, and adds additional arrays to offset the eliminated portions of the fields. Staff will provide separately a map for consideration. Please provide a detailed description and figure showing the layout of such an alternative, including the solar field, power block, main office building and parking lot, main warehouse and laydown area, onsite access roads, tie-in switchyard and land treatment unit for bioremediation or land farming of HTF-contaminated soils. Please quantify any losses in efficiency or economics. In order for the Energy Commission and BLM to evaluate this potential alternative that avoids effects on the El Paso Wash without reducing generation output, surveys must be completed within the portions of these areas that are outside of the current project footprint.

Please complete biological and cultural resources surveys (as defined in Title 20, Section 1704, and Division 2, Chapter 5, Appendix B of the CCR for the 12 month process) for the areas shown on map.

Response:

To address resource management agencies' comments regarding habitat values, the RSPP site plan has been reconfigured to avoid the impacts to natural stormwater flows across the El Paso Wash. South of Brown Road, this avoidance will be accomplished by shifting the south solar field slightly to the north and west, placing it entirely out of and to the west of the Wash. This adjustment results in an approximate 4% reduction in the area of disturbance of the southern solar field. The reconfiguration also includes relocation of the power block to the north of Brown Road. The main site access road and main office are also moved to north of Brown Road. The reduced footprint of the south solar field requires the number of solar collector array loops, which individually have dimensions of approximately 1,300 feet long by 140 feet wide, to be decreased from 133 to 119. A new site plan was submitted to the CEC on January 11, 2010 and is provided at the end of this section as Figure DR-ALT-49-1 and -2.

The design of the 230 kV switchyard has been optimized, resulting in a reduction of the footprint to 3.2 acres (425 ft x 325 ft) from 5.5 acres (600 ft x 400 ft). The new location of the switchyard is such that its western boundary limit will be contiguous with the eastern boundary line of the proposed SCE permanent easement. Modifications to the planned reroute of the existing SCE lines west of the south solar field are consistent with the original intent to closely follow the western limits of the field. The length of the existing lines that will need to be relocated (through a shift to the west) is now 8,600 feet (compared to 8,000 ft in the original site configuration. The length of the proposed realigned segments of the existing SCE 115 kV and 230 kV transmission lines will run 9,060 ft around the southwest corner of the south solar field.

North of Brown Road, the north solar field is shifted north and east to move the field entirely out of the El Paso Wash. The area of disturbance associated with the north solar field has increased by approximately 25% to offset the reduction of the south solar field. The number of solar collector array loops in the north solar field has increased from 145 to 167. In order to contain the entire field between the east side of the El Paso Wash and US Highway 395, the east-west dimensions of the two original segments of the north solar field are reduced and the field is reconfigured into a total of six segments, with some segments of the field shifted east. The reconfiguration of the RSPP results in a slight increase in the ROW to 3,995 acres. Engineered drainages along the perimeters of both the north and south solar fields are being redesigned to accommodate the new solar field configuration. Total disturbed acreage for the project will be increased from approximately 1,760 acres to 1,944 acres (a 10% increase).

Several factors contributed to the increase in disturbance area of the north field. The greatest factor is more unused space within the fence lines of the solar fields due to segmentation of the field to avoid the wash and fit into the remaining available area. The new design is not as efficient as the previous design, in both use of land area and conversion of solar radiation into electricity. Process efficiency is reduced, requiring approximately 3% more solar loops due to the heat transfer requirements associated with the solar collection and pumping inefficiencies that occur with the staggered field configuration.

To mitigate the overall losses in process efficiency resulting from the new configuration, the process performance of the steam cycle was improved by adding cells to the air-cooled condenser (ACC). This change approximately doubled the area occupied by this piece of equipment, from about 1.66 acres to 3.27 acres; ACC height remains at 120 feet. The increase in ACC size will reduce the steam system backpressure. To accommodate the larger ACC, the layout within the power block was rearranged somewhat, although the overall impact to the power block footprint is negligible.

In addition, regarding the less efficient use of land area, the staggered field configuration results in triangular spaces at the “offsets” in the field design that may be disturbed in the process of grading the site. These areas are currently being evaluated to minimize any impact. The segmentation in the north field has also increased the number of subfields of solar arrays from 4 to 6, resulting in additional terraces, access roads, and on-site drainage channels being required between the subfields. Also, the new SCE lines have been pushed further to the west, which also has resulted in some space inefficiencies and corresponding increase in total disturbance area. The areas of disturbance associated with the relocated SCE transmission lines are included within the total disturbance area cited above. The disturbed areas west of the south field may be able to be further reduced at such time as SCE has finalized their design for the re-alignment.

The movement of the power block to the north of Brown Road will result in a longer gen-tie line alignment and a greater number of monopoles between the power block and the switchyard. The length of the t-line alignment will increase from approximately 1,250 ft to 3,900 ft, and the number of poles will increase from 3 to 4. The reconfiguration will also result in the need for the gen-tie line to cross over Brown Road. The longer north-south dimensions of the north solar field will result in an overall longer run of in-field HTF piping, and the new relative positioning of the two solar fields will result in a longer run of out-of-field HTF piping. The major length of out-of-field piping is a 2,200-foot run from the power block, spanning over El Paso Wash via a new pipe bridge, under Brown Road via a pair of culverts, and onward into the south solar field.

Because the offsite portion of the water pipeline is shortened in the new design, total disturbed acreage for the offsite water line will be reduced from approximately 18 acres to approximately 16.3 acres. The diameter for the water pipeline has increased from 12” to 16” to accommodate a request from the Indian Wells Valley Water District.

The majority of the reconfigured Project site has been previously surveyed and biological and cultural information has been provided to the CEC. Project biologists will conduct spring 2010 surveys for all sensitive biological resources, including special status species and sensitive habitats, on all portions of the reconfigured Project footprint not previously surveyed. Dates for when specific species surveys will be conducted are described in the introduction to the Biological Resources response of this document. For the unsurveyed portions of the reconfigured site, a Class III survey of the Project redesign area is currently underway and the survey report will be provided to the CEC in June, 2010.

DR-ALT-50

Information Required:

> Please provide detailed information regarding any alternative configurations or engineering considered but rejected by the applicant. Please include details regarding the engineering constraints to each alternative configuration

Response:

Initially in 2007, the RSPP was designed for three plants with a ROW of 8,000 acres. This configuration was eliminated and reduced due to two existing washes that run through the northeast portion of the site. Additionally, the far north location was determined to be too close to the residential communities to the northeast boundary and was eliminated..

Another configuration that was considered was the design that was submitted with the AFC on September 1, 2009. This option is not rejected; however it is now an alternative to the reconfigured design submitted on January 5, 2010. The September 1, 2009 design is a reduction in the capacity of the site to 250MW with one plant. There are multiple constraints that exist with this design. These include: mountains and rapidly increasing slopes to the east and south; two existing transmission lines to the west; California Highway 395 traversing the northern boundary of the site along a southeast-northwest direction; Brown Road bisecting the site diagonally in an east-west direction; and a large wash. The constraints of this property required a 'split' solar field on either side of Brown Road, which required careful design of the HTF system to ensure plant balance and efficiency. This option was able to be engineered and designed to fit within the boundaries and surrounding constraints.

An additional alternative that was considered and rejected was eliminating the southern solar field completely and exclusively placing the project North of Brown Road. This option was eliminated as there was insufficient space to accommodate collectors necessary for economic viability, and constraints of: Highway 395, rising slopes to the west and east, and proximity to residences. The solar field for such a project would need to cover the entire ROW area we applied for, including the entire area of El Paso Wash. Upon examining the construction costs and environmental impacts of completely filling the entire wash with cuts from the southern portions of the site, and rerouting the entire wash to the west and east of the solar field, this option was abandoned.

Solar Millennium briefly considered a split solar field, north and south of Highway 395, but found major HTF pipe crossings of 395 to be impractical. Solar Millennium concluded that a large solar field exclusively north of Brown Road and south of 395 was not at all practical from an economic or environmental perspective.

The current reconfigured design submitted January 2010 has similar constraints as the September 1, 2009 design with a few additional. The reconfigured design submitted January 2010, shifted the collectors entirely out of the El Paso Wash for environmental preservation and at the request of multiple agencies.

This design ensures habitat viability and connectivity for biological and plant species in the local area. The additional constraints with this design include rebalancing of the solar field to ensure efficiency, a small increase in total acreage and disturbance area, and increased length and width of transmission line relocation.

DR-ALT-51

Information Required:

In order to determine the feasibility of a natural gas pipeline as an alternative to the propane delivery and storage option, please discuss whether the two pipelines could be co-located.

Response:

The proposed 30-foot wide construction easement along Brown Road and China Lake Blvd. would provide adequate space to install up to a 16-inch diameter water line and a 4-inch natural gas pipeline in a common corridor. The two pipelines could potentially be installed in the same trench, provided adequate separation for maintenance is made, and minimum natural gas pipelines code requirements are met.

The water line route leaves China Lake Blvd. to terminate at the IWVWD facility. A tie-in point for the gas pipeline would require an additional 2.6 miles of gas pipeline continuing north on China Lake Blvd., terminating near the intersection with East Bowman Road. The gas pipeline was determined infeasible due to environmental impacts and economic cost of the length of the pipeline.

DR-ALT-52

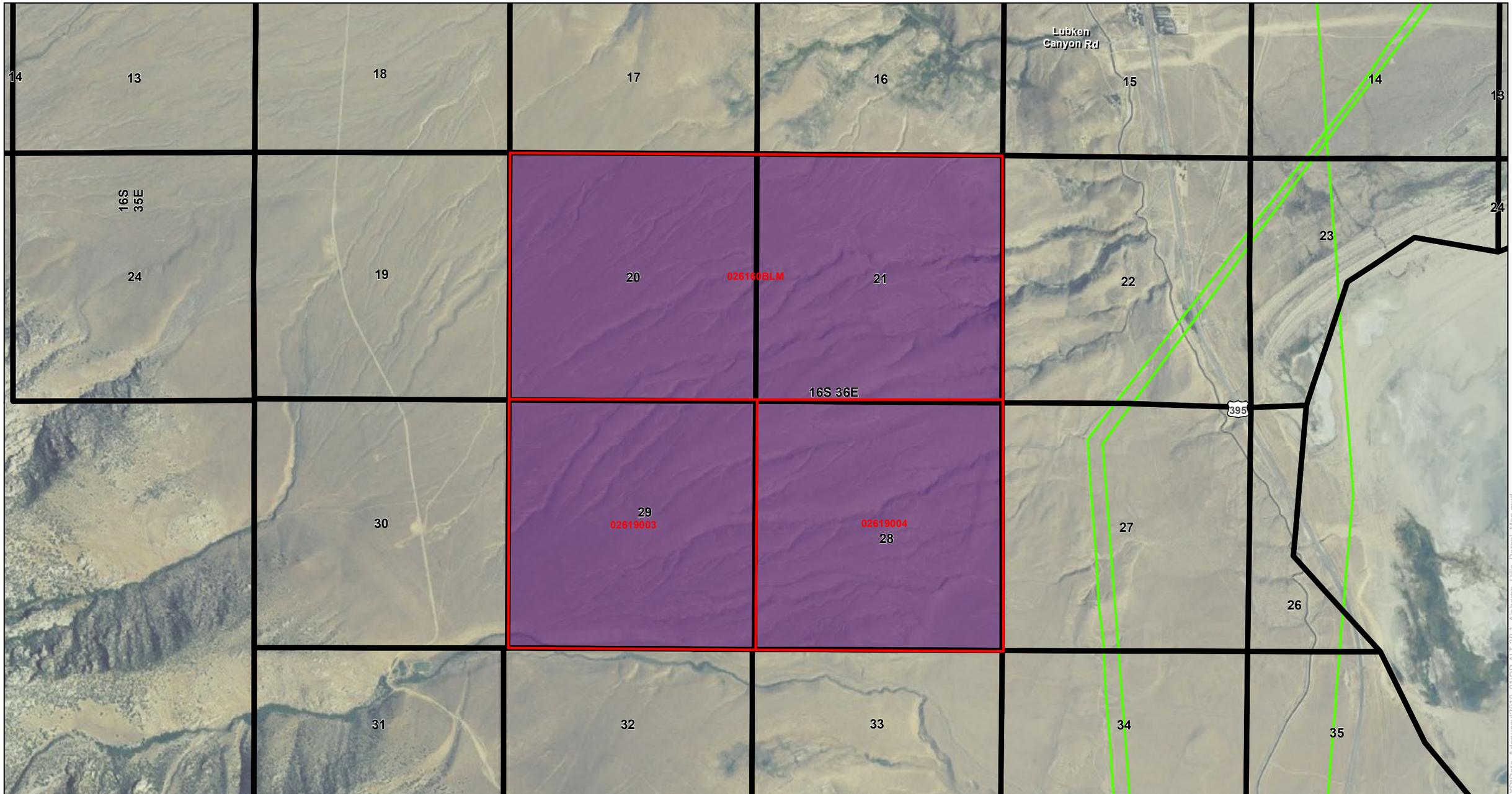
Information Required:

Please indicate the relative costs of the natural gas pipeline alternative and the propane alternative over the life of the project.

Response:

Ridgecrest Solar I, LLC obtained a conceptual cost estimate from Pacific Gas and Electric to provide natural gas service to the site, including pipeline and metering costs. The natural gas option was compared to trucking and storing propane to the site. The relative cost of the two options is indicated below.

1. Natural Gas Option: total capital cost - $5.01 M (including pipeline), annual fuel cost - $421k.
2. Trucking and Storing Option: Propane alternative total capital cost - $2.97 M (infrastructure), annual fuel costs - $458k.



Map Location

Legend

- Parcels
- Section/Township/Range
- Alabama Hills Alternative ROW
- Existing Transmission Line

N
W E
S

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

Ridgecrest Solar Power Project

Figure DR-ALT-38-1
Alabama Hills Alternative
Parcel Map

Solar Millennium

AECOM

Date: January 2010

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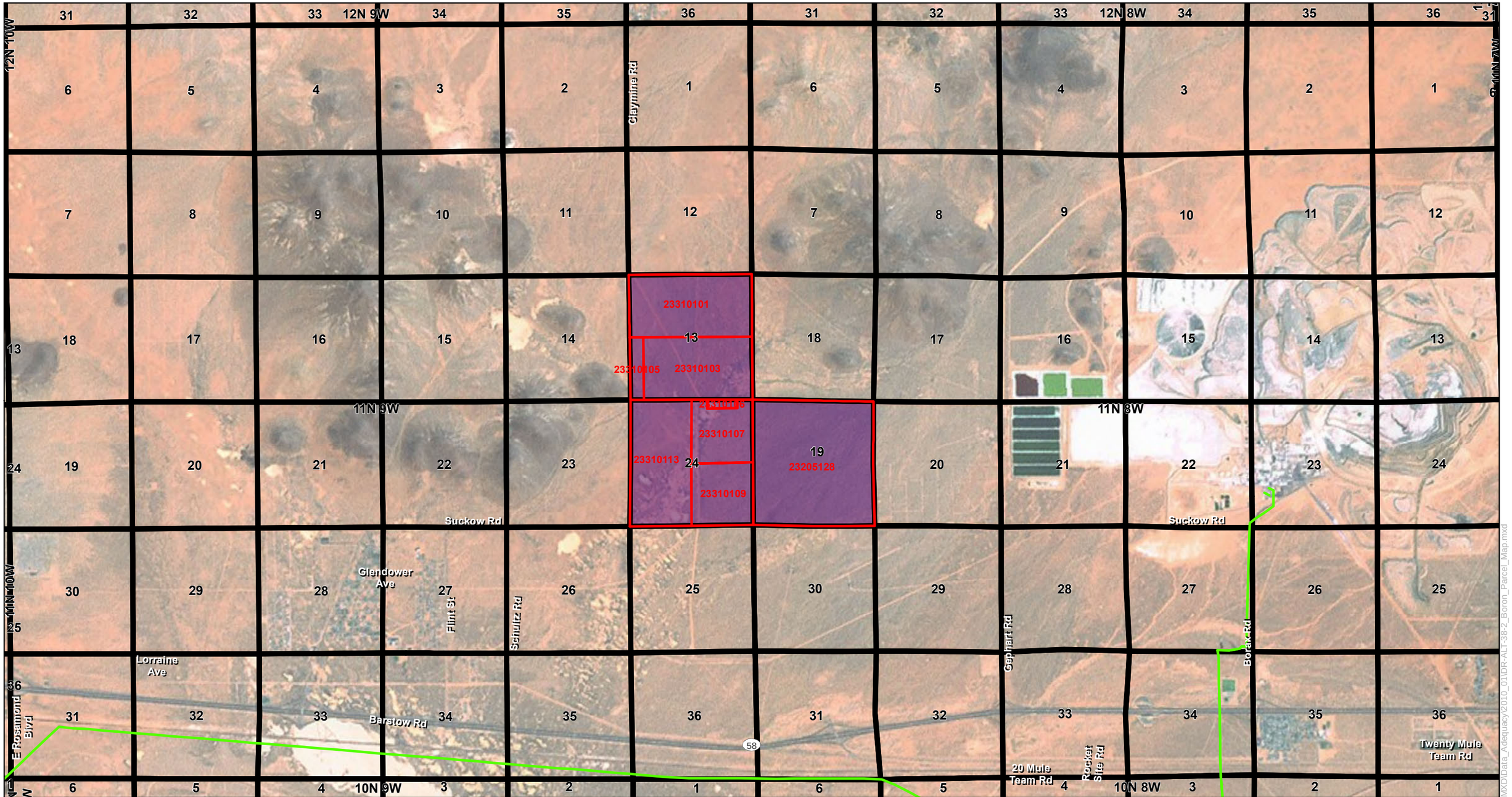

Map Location

Legend

- Boron Alternative ROW
- Parcels
- Existing Transmission Line
- Section/Township/Range

N W E S

1 inch = 4,000 feet

0 2,000 4,000 8,000 Feet

Ridgecrest Solar Power Project

Figure DR-ALT-38-2
Boron Alternative
Parcel Map

Solar Millennium

AECOM

Date: January 2010

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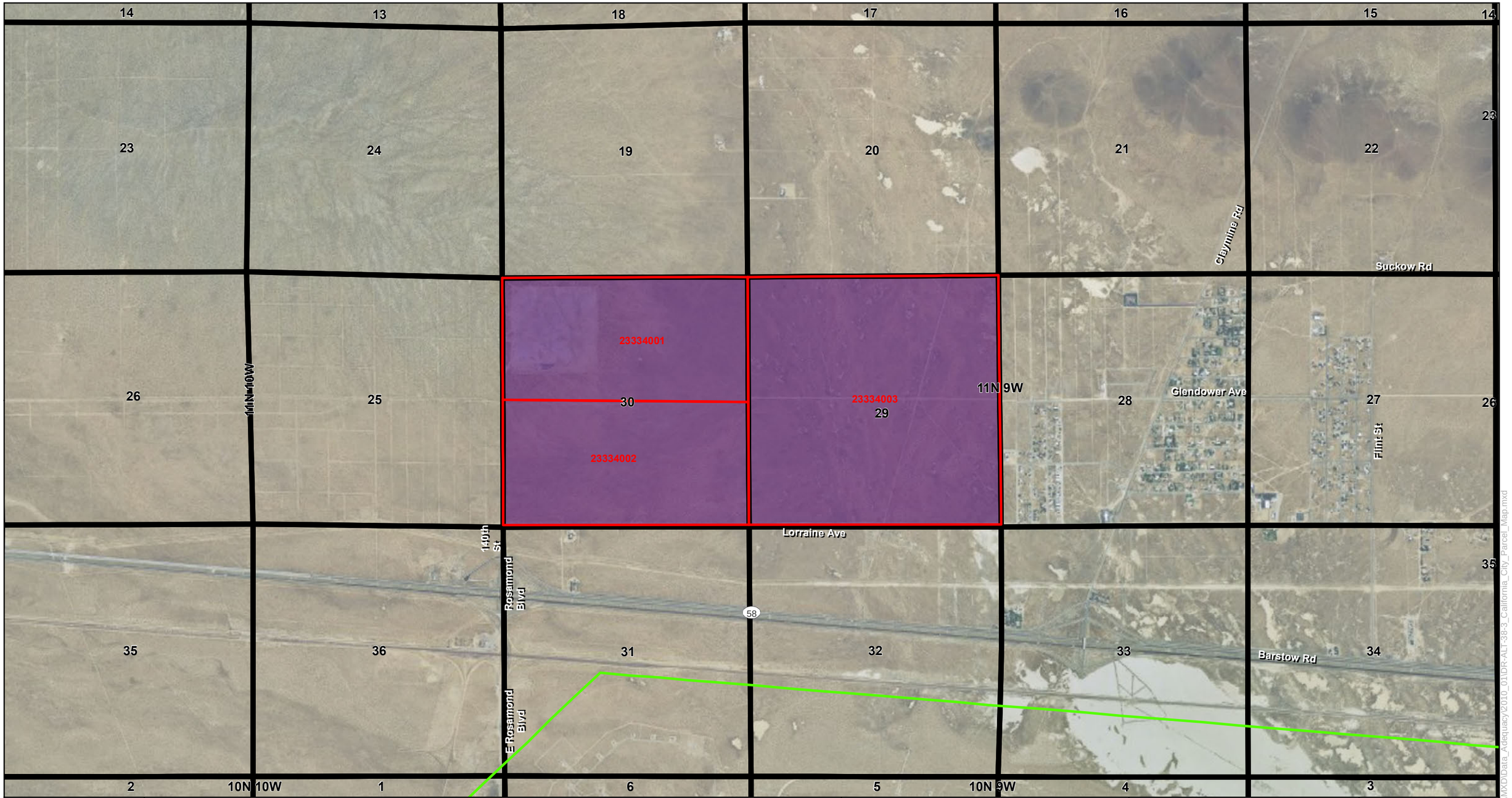

Map Location

Legend

- California City Alternative ROW
- Parcels
- Existing Transmission Line
- Section/Township/Range

N
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S

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

Ridgecrest Solar Power Project

Figure DR-ALT-38-3
California City Alternative
Parcel Map

Solar Millennium

AECOM

Date: January 2010

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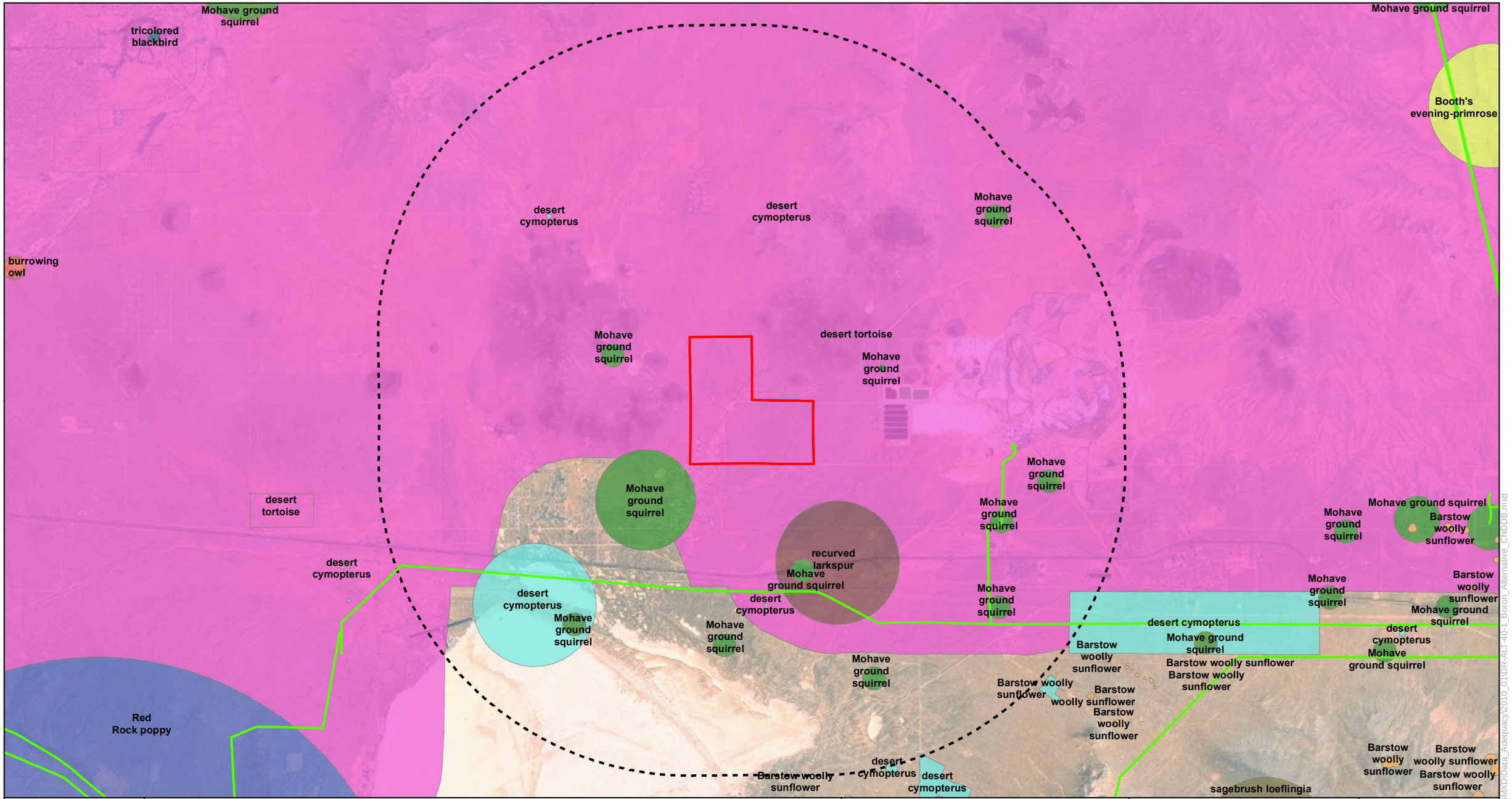

Map Location

Legend

- Existing Transmission Line
- Gen Tie to Transmission Line
- 5 mile Radius
- Boron Alternative ROW

CNDDB Record

- Barstow woolly sunflower
- Booth's evening-primrose
- Mohave ground squirrel
- Red Rock poppy
- burrowing owl
- desert cymopterus
- desert tortoise
- recurved larkspur
- sagebrush loeflingia
- tricolored blackbird

N W E S

1 inch = 2 miles

0 0.75 1.5 3 Miles

Ridgecrest Solar Power Project

Figure DR-ALT-40-1
CNDDB Records with 5 miles of Boron Alternative

Solar Millennium

AECOM

Date: January 2010

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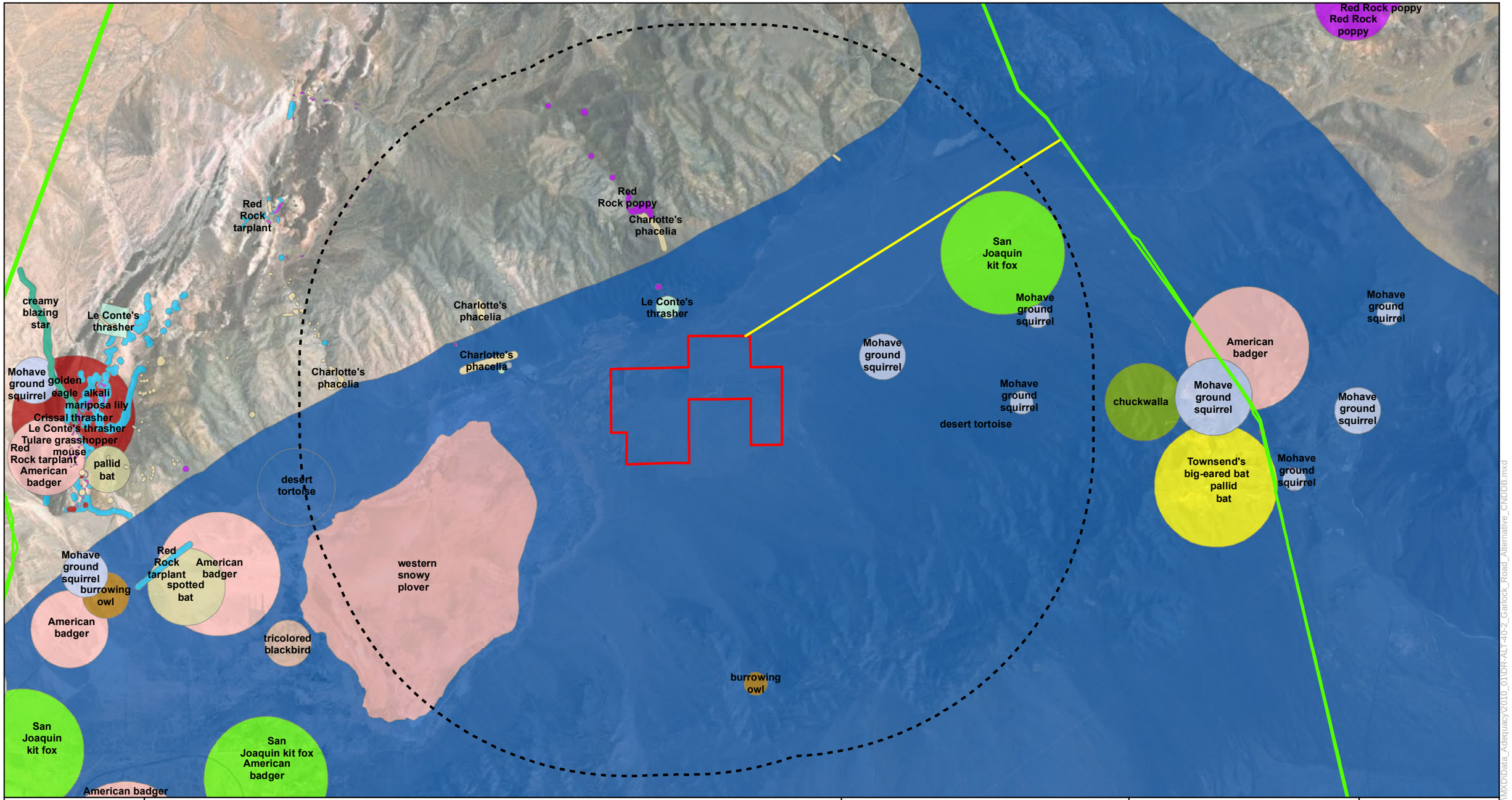

Map Location

Legend

- Existing Transmission Line
- Gen Tie to Transmission Line
- 5 mile Radius
- Garlock Rd Alternative ROW

CNDDB Record

- American badger
- Charlotte's phacelia
- Crissal thrasher
- Le Conte's thrasher
- Mohave ground squirrel
- Red Rock poppy
- Red Rock tarplant
- San Joaquin kit fox
- Townsend's big-eared bat
- Tulare grasshopper mouse
- alkali mariposa lily
- burrowing owl
- chuckwalla
- creamy blazing star
- desert tortoise
- golden eagle
- loggerhead shrike
- pallid bat
- spotted bat
- tricolored blackbird
- western snowy plover

N W E S

1 inch = 2 miles

0 0.75 1.5 3 Miles

Ridgecrest Solar Power Project

Figure DR-ALT-40-2
CNDDB Records with 5 miles of Garlock Rd Alternative

Solar Millennium

AECOM

Date: January 2010

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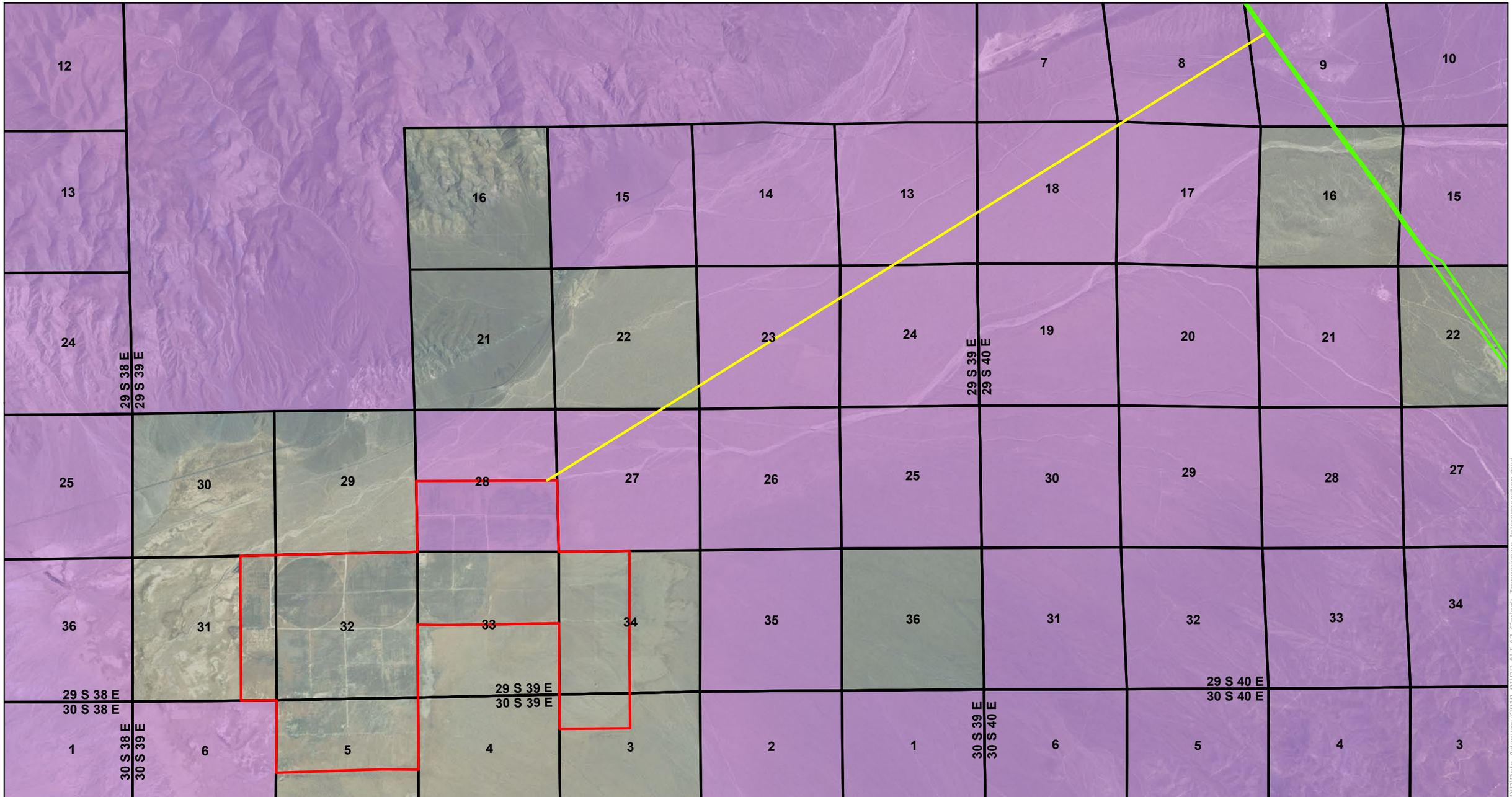

Map Location

Legend

- Existing Transmission Line
- Gen Tie to Transmission Line
- Garlock Rd Alternative ROW
- Section Township & Range
- BLM Land Management

N
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S

1 inch = 3,500 feet

0 1,750 3,500 7,000 Feet

Ridgecrest Solar Power Project

Figure DR-ALT-43
Garlock Road Alternative
Transmission Line Interconnection

Solar Millennium

AECOM

Date: January 2010

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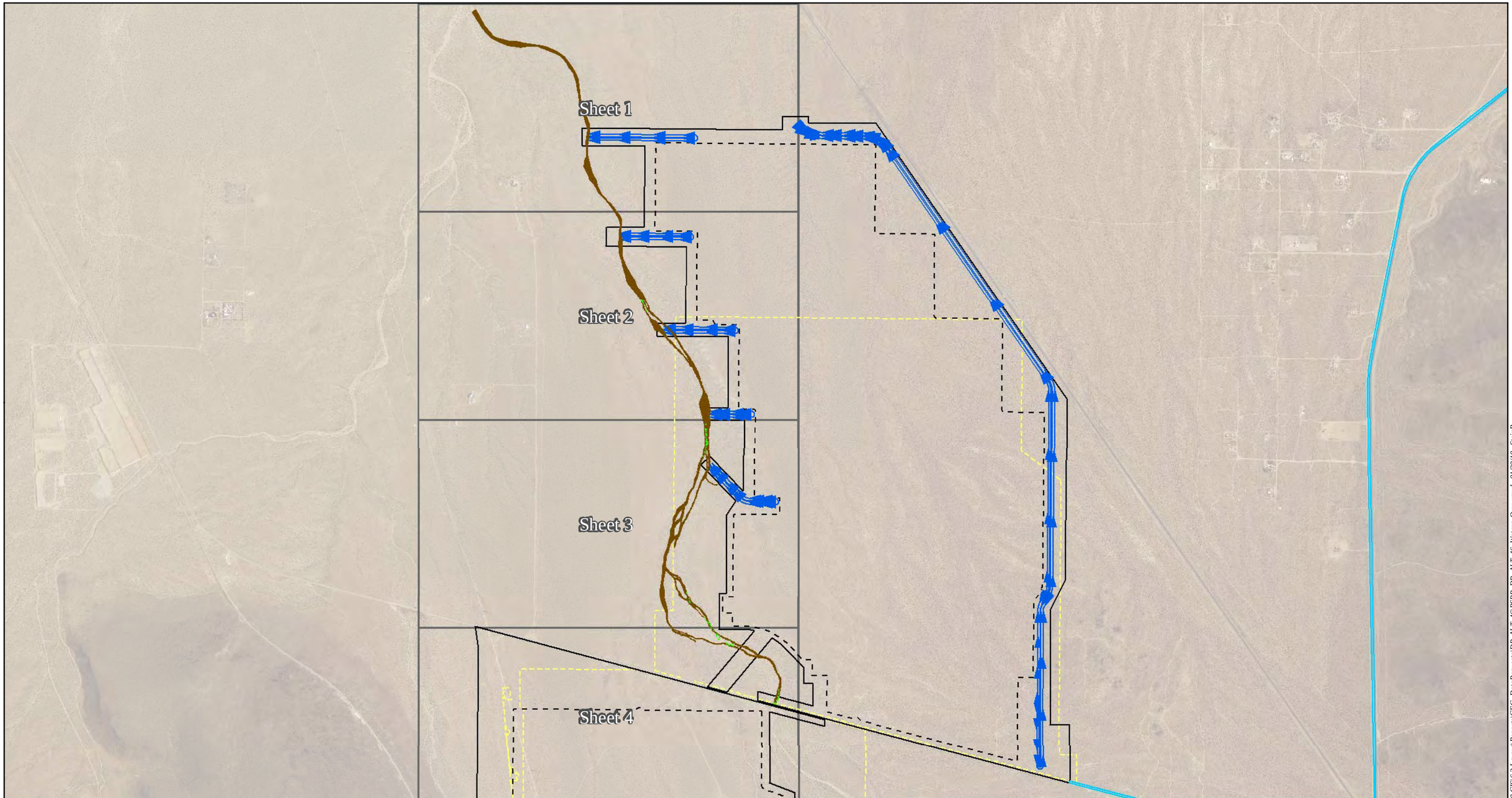

Map Location

Legend

- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Facility Footprint
- Surveyed Disturbance Area
- Rerouted Drainages

Jurisdictional Waters of the State

- Mojave Desert Wash Scrub
- Unvegetated Ephemeral Dry Wash
- Wash Dependent Vegetation (Subsampled Areas)

Source: ESRI; USFWS; BLM; AECOM

Note: Features South of Brown Road are not displayed

N W E S

1 inch = 1,500 feet

0 1,500 3,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-ALT-46-1
Jurisdictional Waters of the State and Rerouted Drainages Overview

Solar Millennium

AECOM

Date: January 2010

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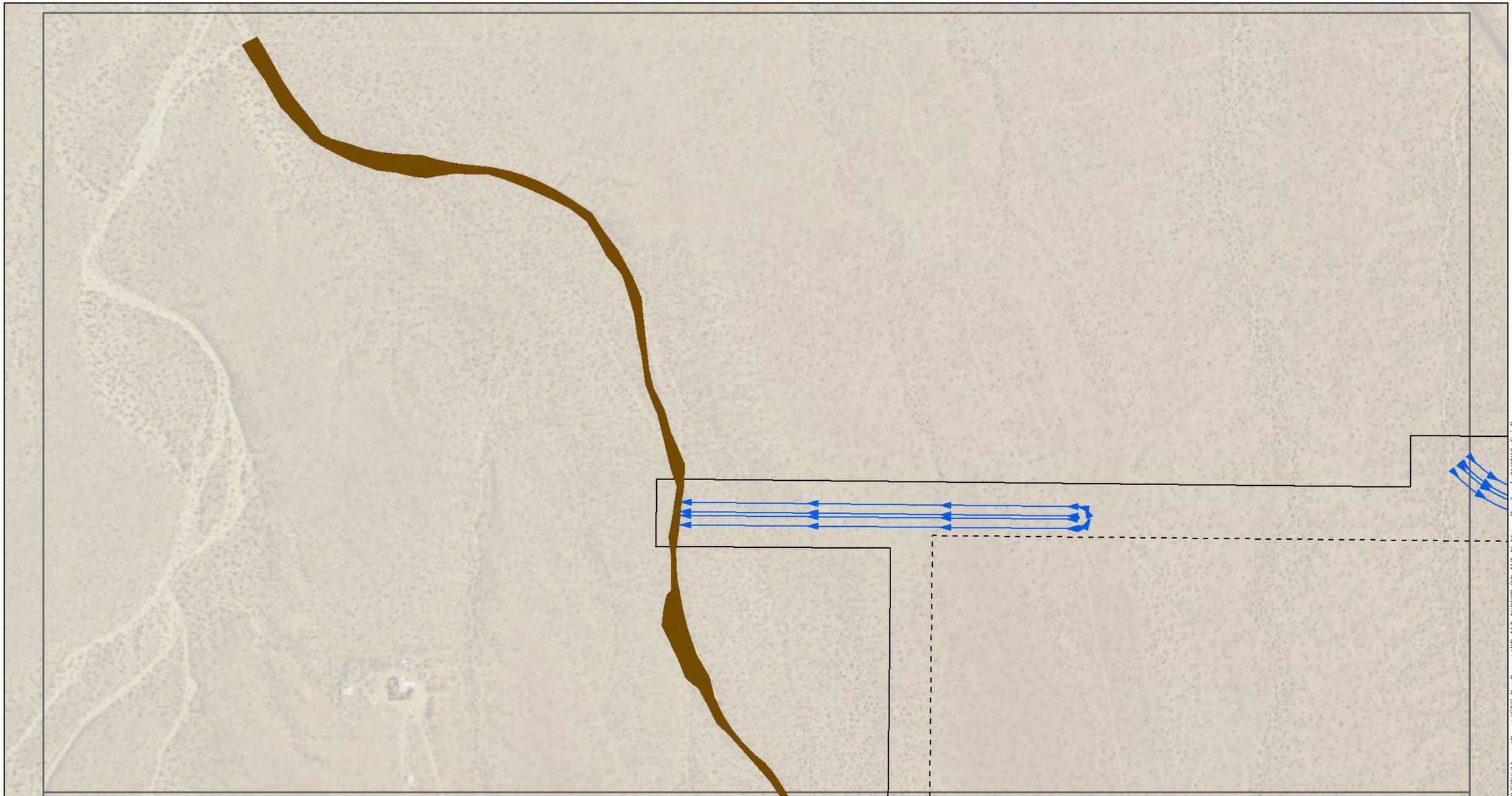

Map Location

Legend

See Overview figure for legend

Source: ESRI; USFWS; BLM; AECOM

Note: Features South of Brown Road are not displayed

N
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1 inch = 400 feet

0 400 800 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-ALT-46-1
Jurisdictional Waters of the State and Rerouted Drainages
Sheet 1

Solar Millennium

AECOM

Date: January 2010

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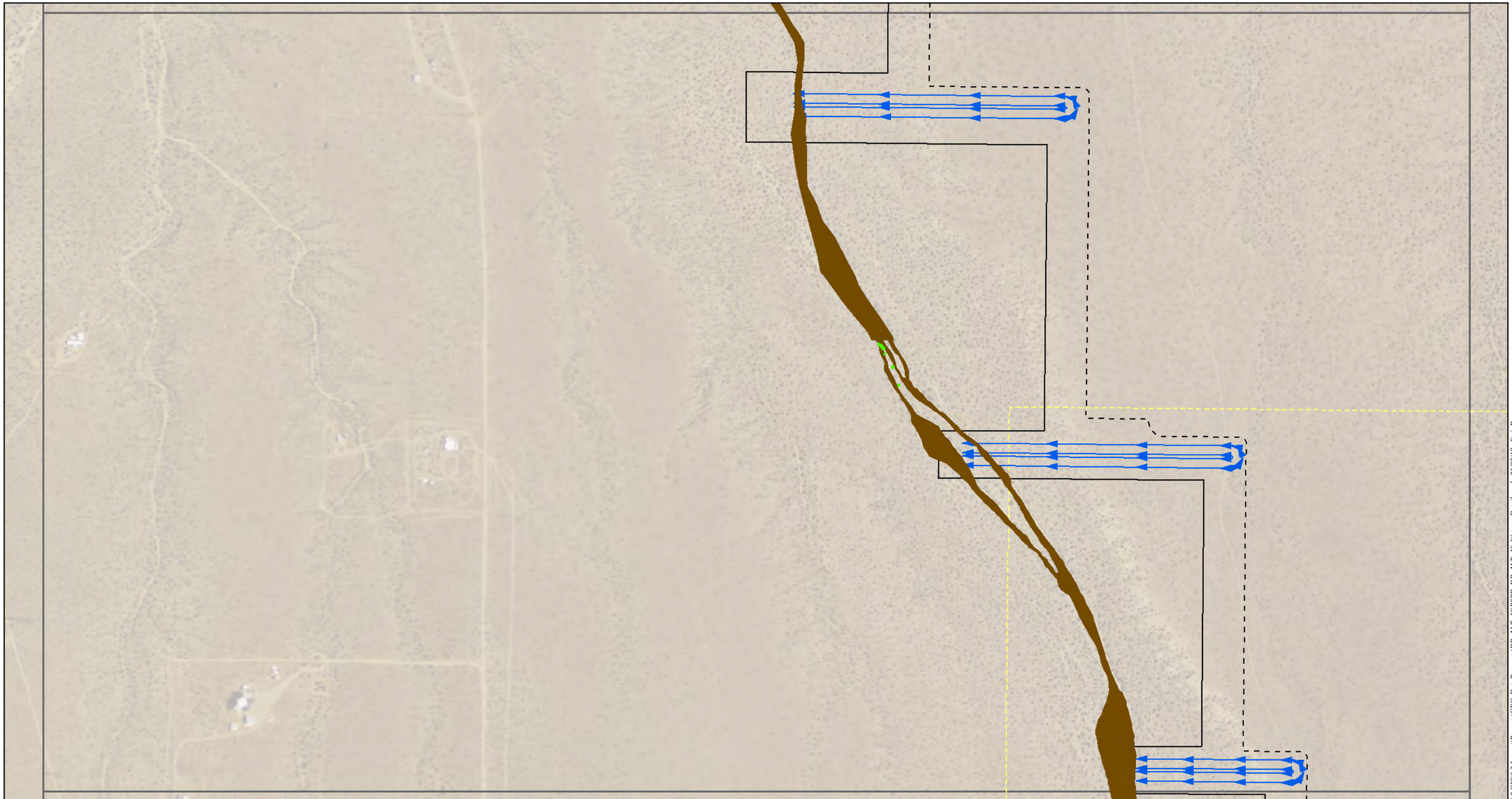

Map Location

Legend

See Overview figure for legend

Source: ESRI; USFWS; BLM; AECOM

Note: Features South of Brown Road are not displayed

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1 inch = 400 feet

0 400 800 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-ALT-46-1
Jurisdictional Waters of the State and Rerouted Drainages
Sheet 2

Solar Millennium

AECOM

Date: January 2010

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Map Location

Legend

See Overview figure for legend

Source: ESRI; USFWS; BLM; AECOM

Note: Features South of Brown Road are not displayed

N
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1 inch = 400 feet

0 400 800 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-ALT-46-1
Jurisdictional Waters of the State and Rerouted Drainages
Sheet 3

Solar Millennium

AECOM

Date: January 2010

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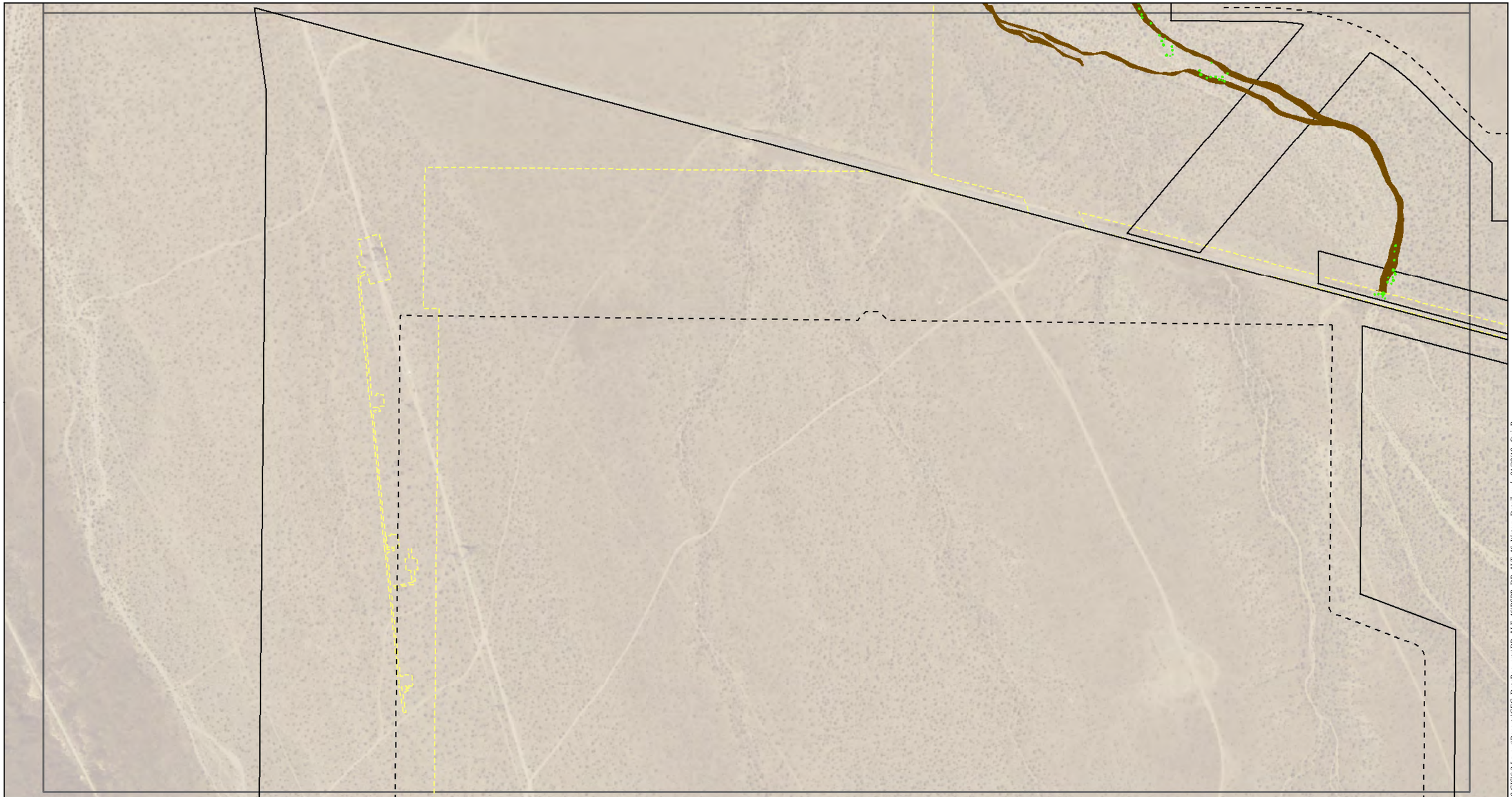

Map Location

Legend

See Overview figure for legend

Source: ESRI; USFWS; BLM; AECOM

Note: Features South of Brown Road are not displayed

N
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1 inch = 400 feet

0 400 800 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-ALT-46-1
Jurisdictional Waters of the State and Rerouted Drainages
Sheet 4

Solar Millennium

AECOM

Date: January 2010

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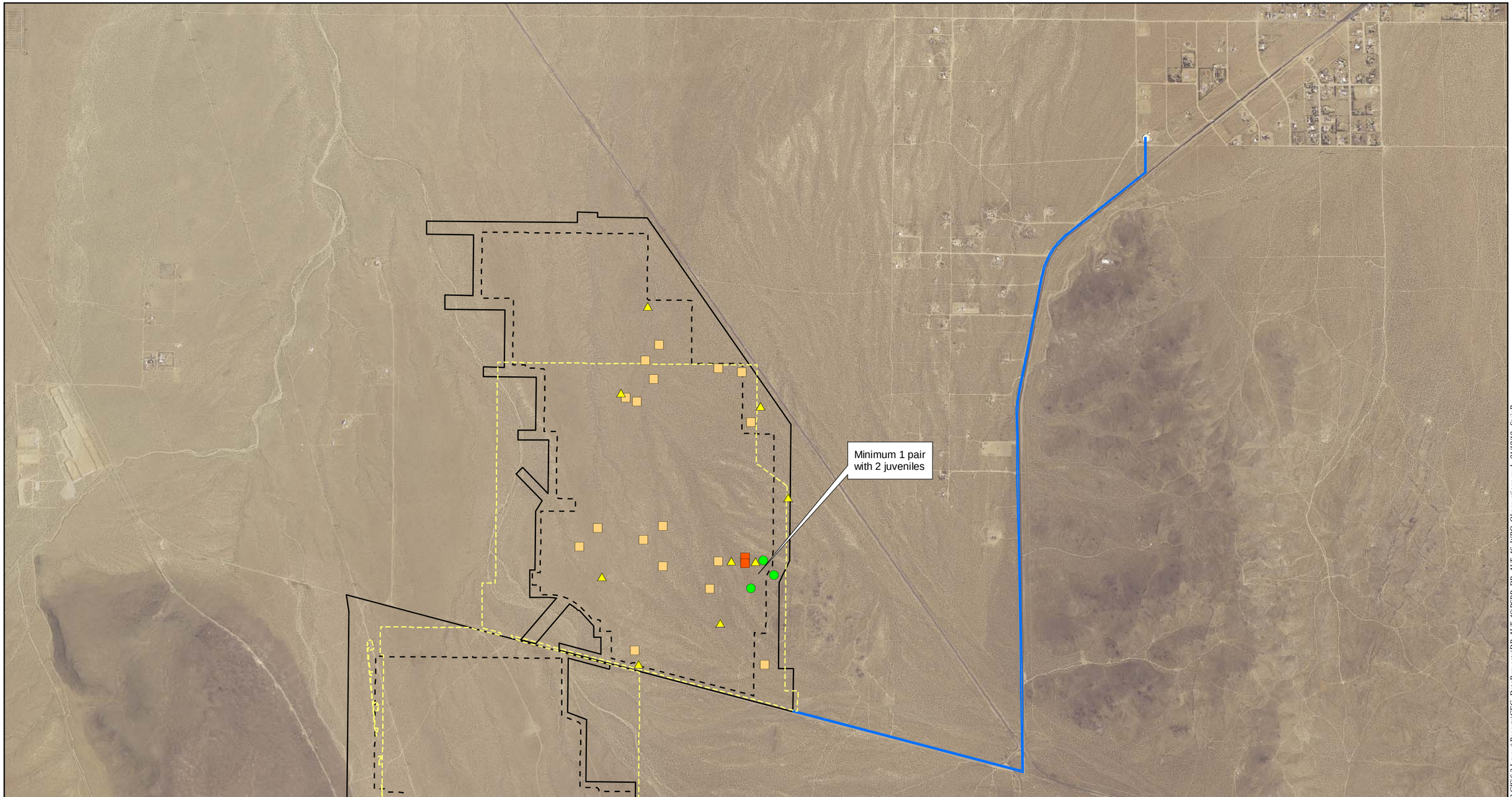


Map Location

Legend

- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Burrowing Owl Observations

- Active Burrow (Main)
- Active Burrow (Satellite)
- Burrow with Abundant Sign
- Burrow with Sign

Source: NAIP 2005; AECOM 2009; EDAW 2009

N W E S

1 inch = 2,000 feet

0 2,000 4,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

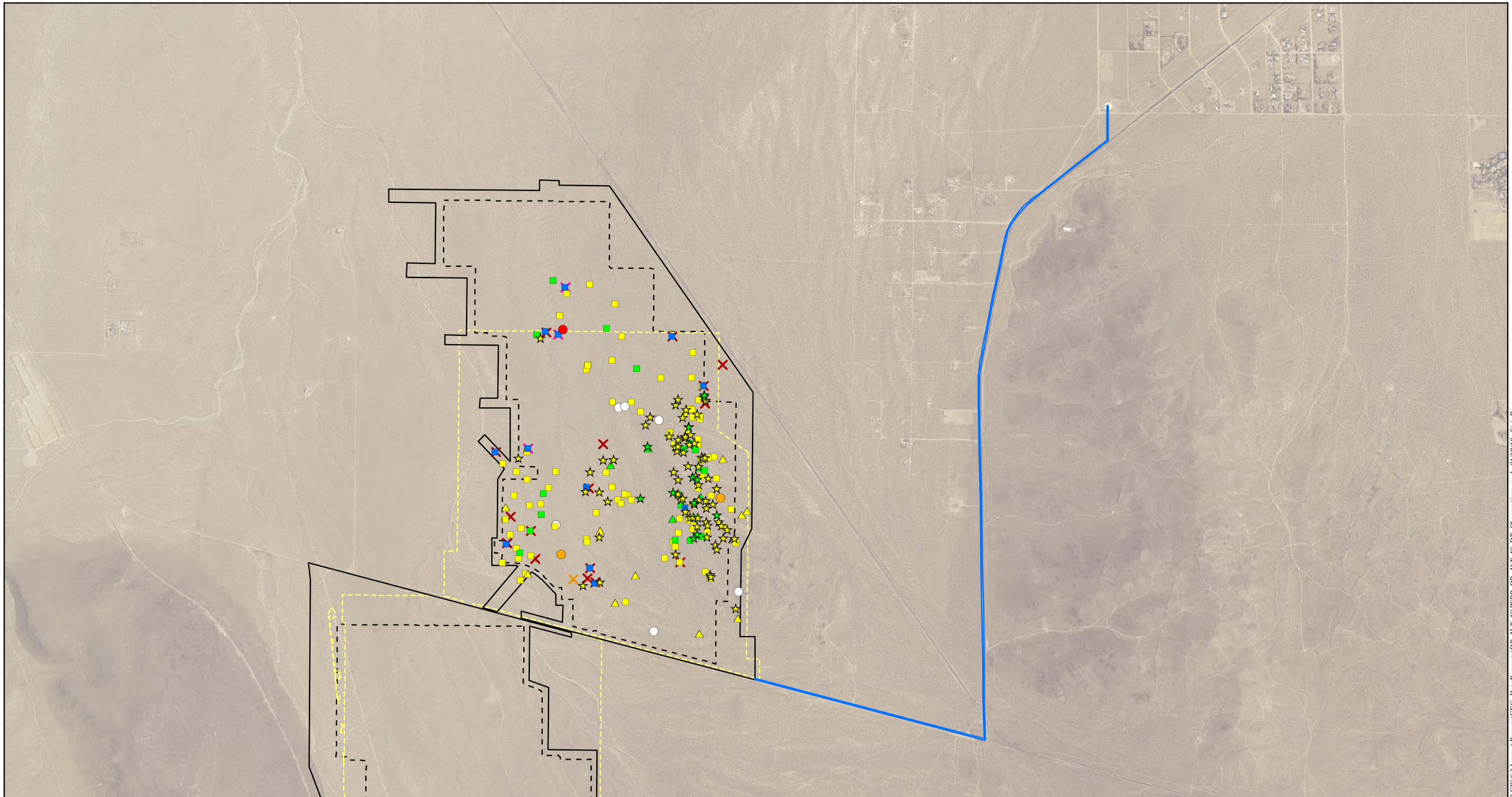
Figure DR-ALT-46-2
Burrowing Owl Observations

Solar Millennium

AECOM

Date: January 2010

Path: P:\2009\09080080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\DR_ALT_46\RSPP_DR_ALT_46_WBO_Observations.mxd, 01/18/10, SteinB



Map Location

Legend

- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Desert Tortoise Observations

- Adult Tortoise
- Juvenile Tortoise
- Tortoise (Unknown Age)
- Tortoise Burrow - Active
- Tortoise Burrow - Occupied
- Tortoise Burrow
- Tortoise Pallet
- Tortoise Pallet - Active
- Tortoise Scat
- Tortoise Scat - Fresh
- Tortoise Bone Fragments
- Tortoise Carcass - Adult
- Tortoise Carcass - Juvenile

Source: NAIP 2005; AECOM 2009

N W E S

1 inch = 2,000 feet

0 2,000 4,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-ALT-46-3
Desert Tortoise Observations

Solar Millennium

AECOM

Date: January 2010

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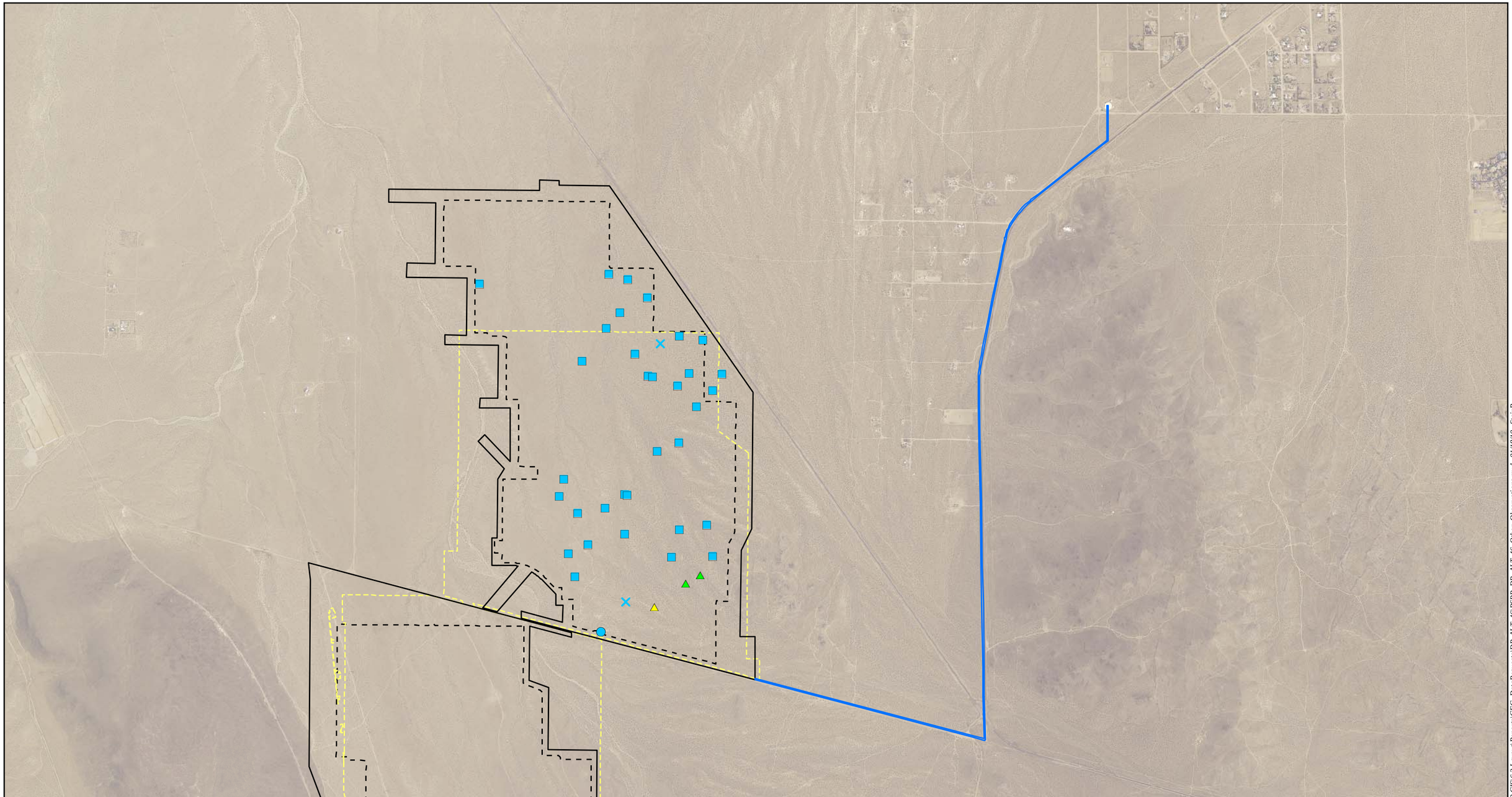


Map Location

Legend

- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Resident Special-Status Wildlife Species

- Active Kit Fox Burrow Complex
- Kit Fox Burrow
- Kit Fox Burrow Complex
- Loggerhead Shrike
- Le Conte's Thrasher

Source: NAIP 2005; AECOM 2009

N W E S

1 inch = 2,000 feet

0 2,000 4,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

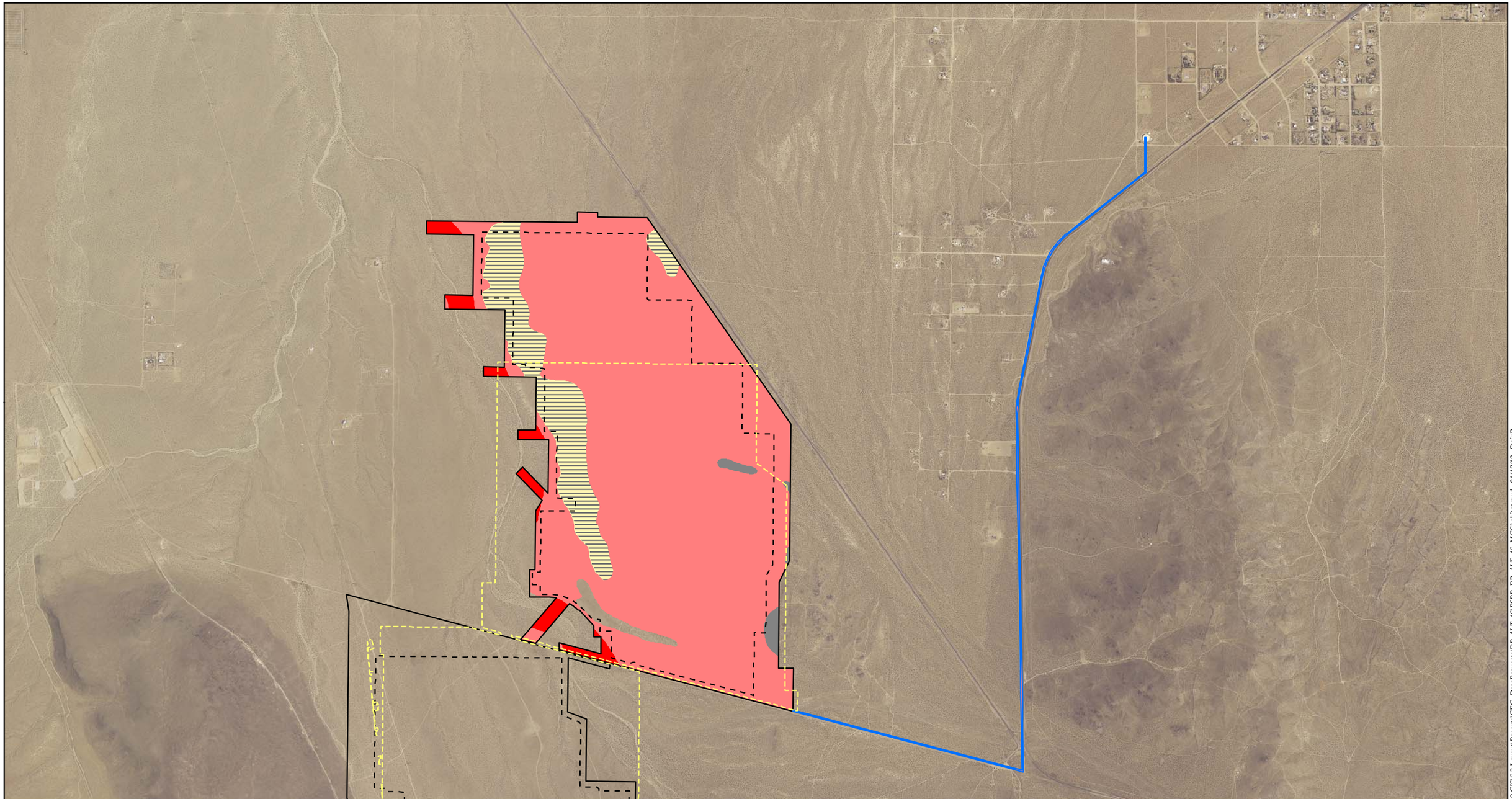
Figure DR-ALT-46-4
Other Resident Special Status
Wildlife Species Observations

Solar Millennium

AECOM

Date: January 2010

Path: P:\20090980080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\DR_ALT_46\RSPP_DR_ALT_46_Other_Observations.mxd, 01/18/10, SteinB



Map Location

Legend

- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Source: NAIP 2005; AECOM 2009; EDAW 2009

Habitat Quality selection

Mohave Ground Squirrel

- High - Desert Washes and Adjacent High Diversity Creosote Bush
- Medium - Low Diversity Creosote Bush
- Low - Monotypic Creosote Bush
- Unsuitable - Rocky Terrain

N W E S

1 inch = 2,000 feet

0 2,000 4,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

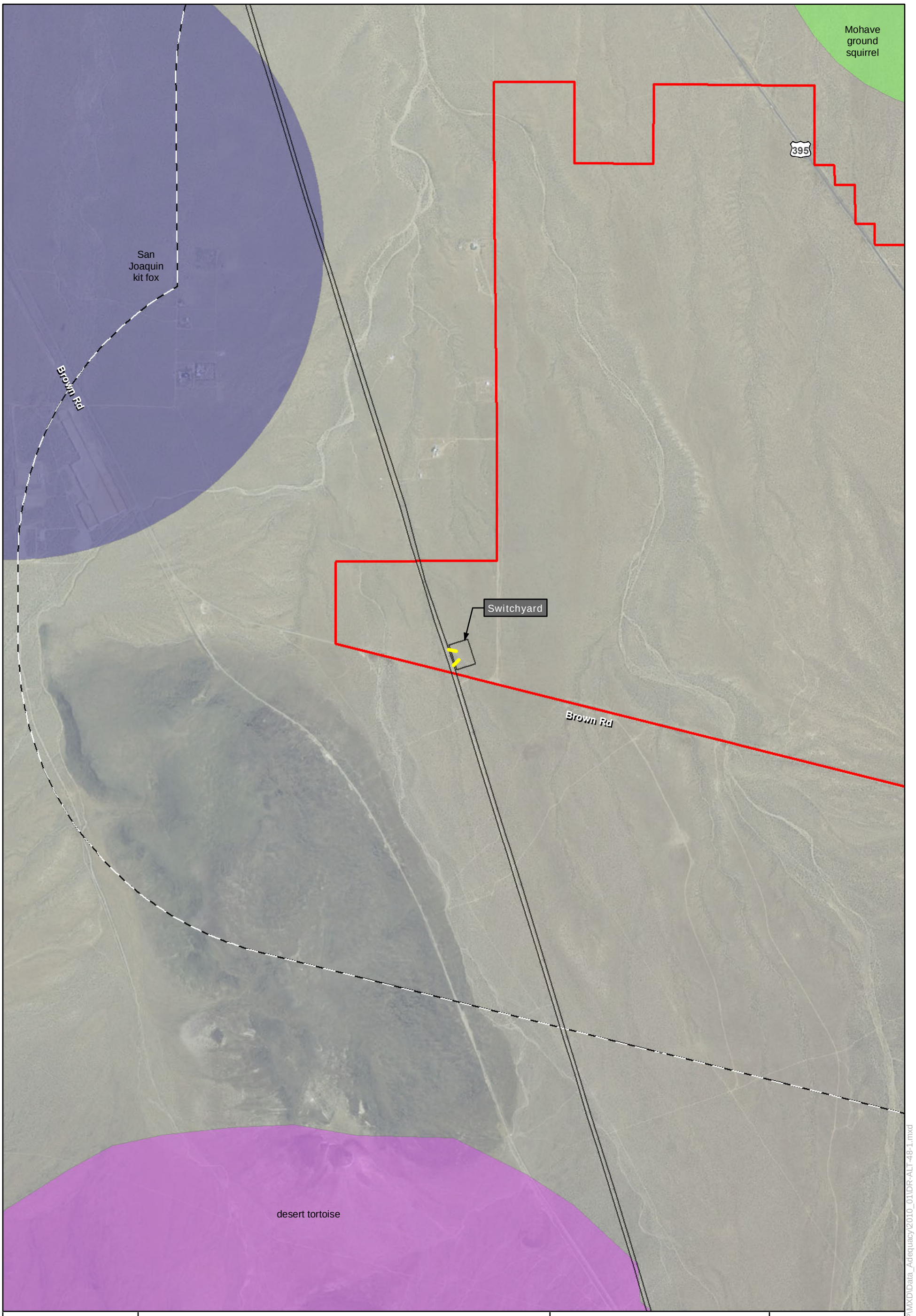
Figure DR-ALT-46-5
Habitat Quality
Mohave Ground Squirrel

Solar Millennium

AECOM

Date: January 2010

Path: P:\2009\09080080 Sol MI Ridgecrest\6.0 GIS\6.3 Layout Reports\CEC_DataRequests\DR_ALT_46\RSPP_DR_ALT_46_MGShabitat.mxd, 01/18/10, SteinB



Map Location

Legend

- Proposed Transmission Line
- 1 Mile Radius
- ROW

CNDDB Recoreds

- American badger
- Le Conte's thrasher
- Mohave ground squirrel
- San Joaquin kit fox
- burrowing owl
- desert tortoise

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

Ridgecrest Solar Power Project
DR-ALT-48-1
Transmission Interconnection to SCE 230 kv and 150 kv Lines

Note: Interconnection details to be designed by SCE; not shown here.

Solar Millennium

AECOM

Date: January 2010

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Inyokern Substation

Le Conte's thrasher

Mohave ground squirrel

Mohave ground squirrel

Mohave ground squirrel

Mohave ground squirrel

Mohave ground squirrel

Mohave ground squirrel

Mohave ground squirrel

Le Conte's thrasher

American badger

burrowing owl

Mohave ground squirrel

San Joaquin kit fox

desert tortoise

desert tortoise

178 Inyokern Rd

Inyokern Rd 178

N Jacks Ranch Rd

N Brady St

N Mahan St

Drummond Ave

W Ridgecrest Blvd

Ridgecrest Blvd

S Brady St

S Mahan St

Jacks Ranch Rd

Bowman Rd

Brady St

395

W Springer Ave

Brown Rd

S China Lake Blvd

Brown Rd

Map Location

OR ID NV UT CA AZ

Legend

Proposed Transmission Line

1 Mile Radius

ROW

CNDDB Recoreds

American badger

Le Conte's thrasher

Mohave ground squirrel

San Joaquin kit fox

burrowing owl

desert tortoise

1 inch = 3,500 feet

0 1,750 3,500 7,000 Feet

Ridgecrest Solar Power Project
DR-ALT-48-2
Transmission Line Interconnection to Inyokern Substation

Solar Millennium

AECOM

Date: January 2010

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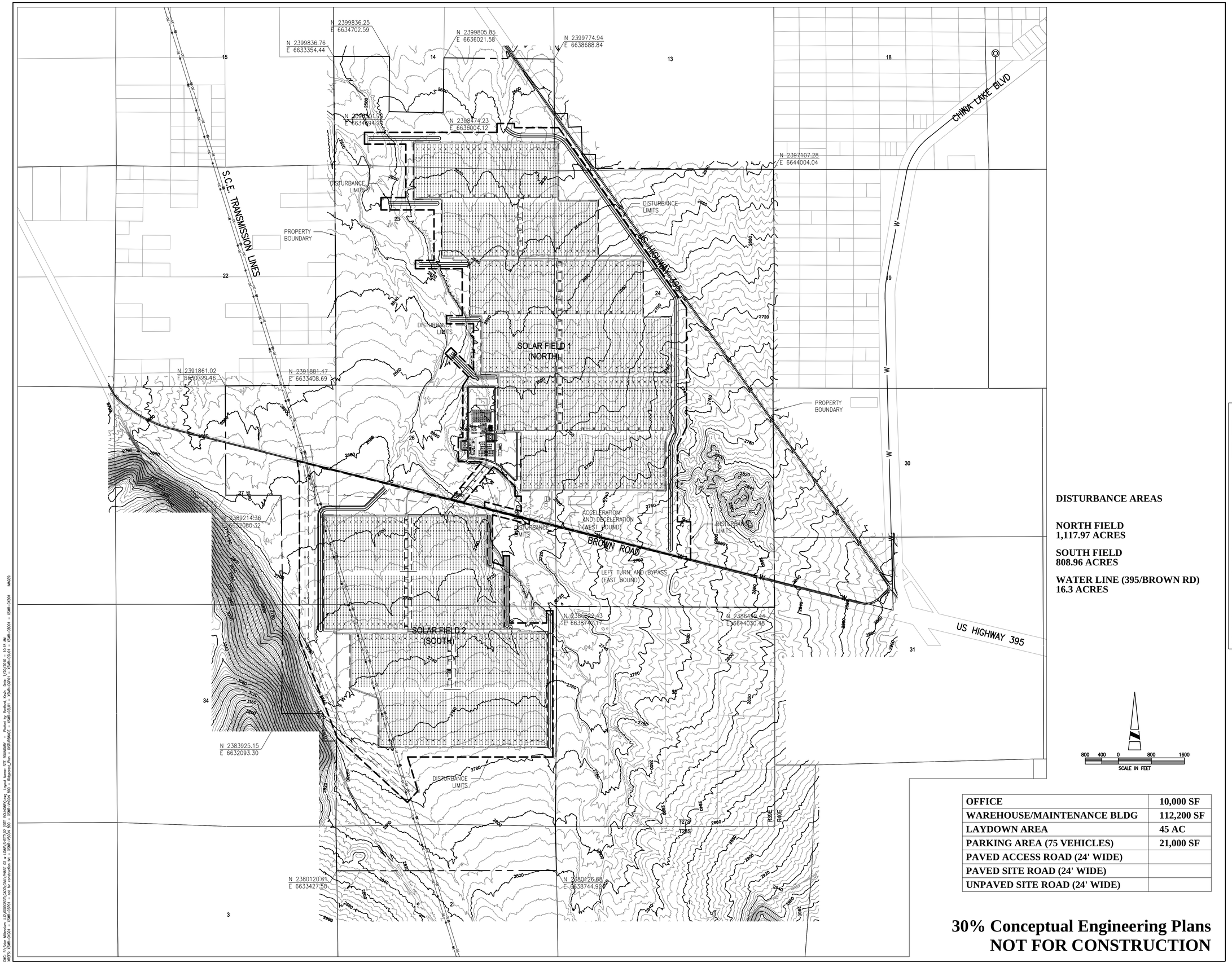

DISTURBANCE AREAS

NORTH FIELD
1,117.97 ACRES

SOUTH FIELD
808.96 ACRES

WATER LINE (395/BROWN RD)
16.3 ACRES

800 400 0 800 1600
SCALE IN FEET

OFFICE	10,000 SF
WAREHOUSE/MAINTENANCE BLDG	112,200 SF
LAYDOWN AREA	45 AC
PARKING AREA (75 VEHICLES)	21,000 SF
PAVED ACCESS ROAD (24' WIDE)	
PAVED SITE ROAD (24' WIDE)	
UNPAVED SITE ROAD (24' WIDE)	

30% Conceptual Engineering Plans
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REGISTERED PROFESSIONAL ENGINEER
WILLIAM DARRIUS BLACK
No. C31465
EXP. 12-31-10
CIVIL
STATE OF CALIFORNIA

Designed:	W. BLACK
Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

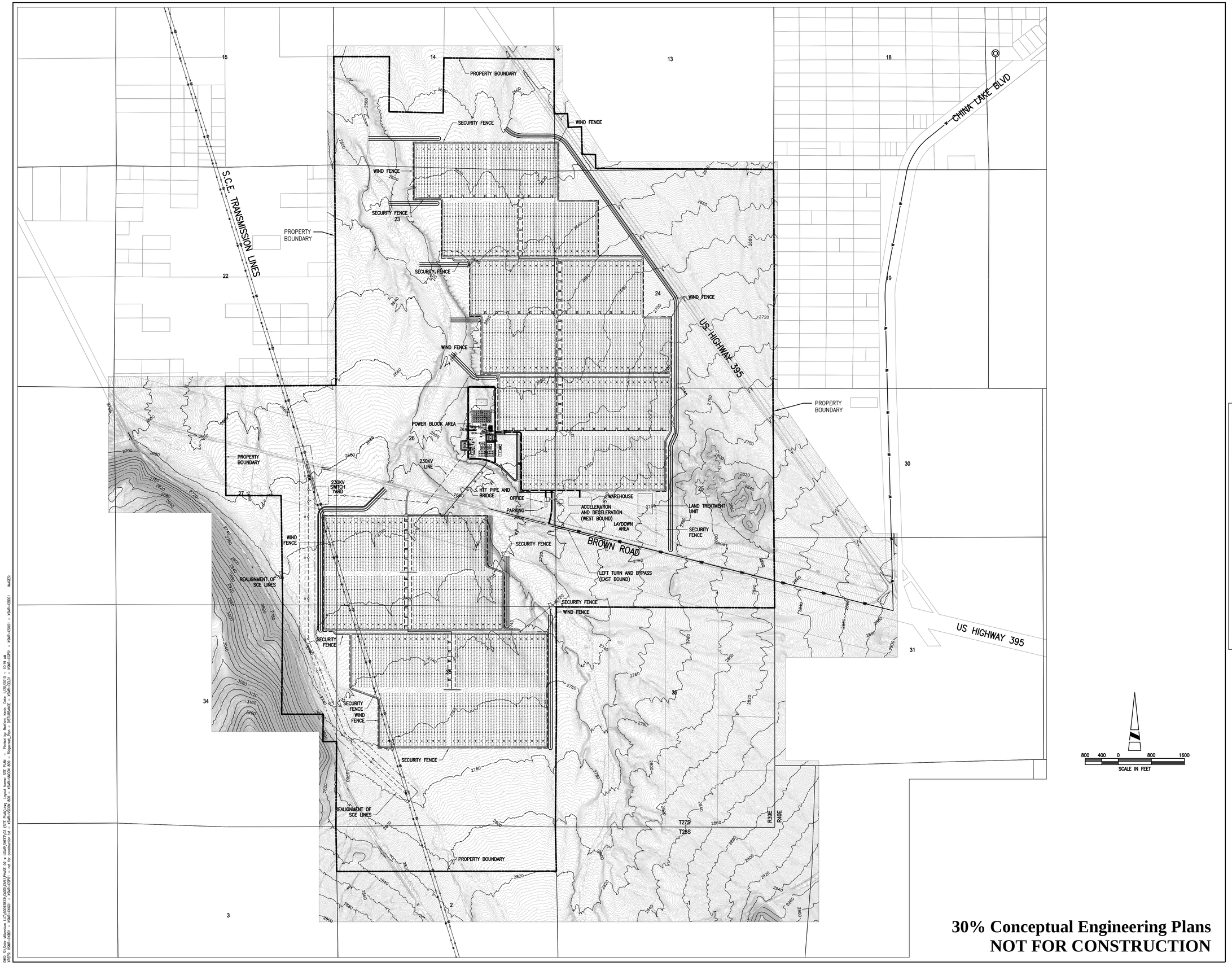
- SOLAR FIELD PARABOLIC TROUGH
- BALANCE OF PLANT FACILITIES
- PROPOSED ACCESS ROAD (PAVED)
- PROPOSED ACCESS ROAD (GRAVEL)
- RAILROAD
- PROPOSED GAS
- PROPOSED WATER
- PROPOSED TELEPHONE
- PROPOSED ELECTRIC
- EXISTING ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED WIND FENCE
- EXISTING CONTOURS (10 FOOT INTERVALS)
- PROPOSED DRAINAGE CHANNEL/FLOW DIRECTION
- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- HEADER PIPING
- ACCELERATION LANE

Ridgecrest Solar Power Project

Kern County, California

Site Boundary and Legend

Date: 01/19/10
Sheet: ALT-49-1 (C-02)



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- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- HEADER PIPING
- ACCELERATION LANE

Ridgecrest Solar Power Project

Kern County, California

Preliminary Site Plan

Date: 01/19/10
Sheet: ALT-49-2 (C-03)

Introduction

To address concerns expressed by the resource agencies, the Ridgecrest Solar Power Project (RSPP or Project) site plan has been reconfigured to minimize Project impacts to the El Paso Wash. South of Brown Road, this will be accomplished by shifting the south solar field slightly to the north and west, placing it entirely to the west of the wash. North of Brown Road, the north solar field has been shifted north and east to move the field entirely out of the wash. As a result of the site reconfiguration, impacts to the El Paso Wash will be largely avoided, with the exceptions of the road culvert crossing at Brown Road, the heat transfer fluid (HTF) pipe bridge, the new 230-kilovolt (kV) transmission line, and 8 to 10 drainage channel tie-ins. These drainage tie-ins are proposed to aid in maintaining natural flow diverted from swale complexes within the Project footprint that would be impacted by construction activities for the RSPP. Further details regarding the impacts associated with the reconfigured site plan, including construction of crossings and tie-ins, are being developed and will be provided in February. To further minimize impacts on sensitive biological resources, a natural vegetated buffer around the El Paso Wash is being incorporated into the site plan. Natural flow would not be effectively diverted away from the El Paso Wash, and impacts to the natural communities supported by the wash would be substantially reduced when compared to the original site plan. The reconfigured site plan (Figure DR-ALT-39) would retain the wash's hydrologic and ecological functions and allow for the continued use of the El Paso Wash as a wildlife movement corridor.

New surveys to address changes to the Project footprint as a result of the site plan reconfiguration have yet to be conducted. Protocol surveys of the 3.6 miles of water pipeline and approximately 200 acres of disturbance area resulting from solar field redesign not yet subject to focused studies will be conducted during the appropriate seasonal windows in spring 2010. Surveys of any proposed translocation or compensatory mitigation sites would also be required. The following table summarizes surveys that would be required by resource area and the optimal timeframes (i.e., survey windows) for surveys.

Resource	Surveys to be completed	Survey window
Desert tortoise	• Protocol survey of newly proposed areas within the revised project disturbance area (not overlapping with previous survey areas) and associated CEC buffer transects • Protocol survey of proposed translocation site(s) and habitat compensation site(s)	March 25 to May 31, 2010 (one survey visit at 100 percent coverage)
Western burrowing owl	• Protocol survey of newly proposed areas within the revised project disturbance area (not overlapping with previous survey areas) • Protocol survey of proposed translocation site(s) • Habitat suitability justification (e.g., habitat assessment) of habitat compensation site(s)	April 15 to July 15, 2010 (minimum 4 survey visits)
Mohave ground squirrel	• Habitat suitability assessment/mapping of newly proposed areas within the revised project disturbance area (not overlapping with previous survey areas) • Habitat suitability assessment/mapping of translocation site(s) and compensation site(s)	No survey timing restrictions
Vegetation Communities	• Vegetation mapping within newly proposed areas within the revised project disturbance area or 1-mile CEC buffer	No survey timing restrictions
Flora	• Focused botanical surveys within newly proposed areas of the revised project disturbance area or 1-mile CEC buffer that contain suitable habitat for special-status species or potential for invasive weeds	Spring and Fall 2010 (To be determined based on rainfall patterns and optimum flowering times in 2010; minimum of three survey visits)
Jurisdictional Waters	• Delineation of jurisdictional waters within newly proposed areas of the revised project disturbance area • Follow-up surveys within previously delineated jurisdictional waters to determine functions and values • Delineation of jurisdictional waters within proposed compensation site(s)	No survey timing restrictions

The following terms will be used throughout the biological resources section of this Data Request response document to refer to the components of the RSPP:

- **AFC Biological Disturbance Area:** the total disturbance area reported in the Application for Certification (AFC) Biological Resources Section, which was reported as 1,738 acres the AFC document. The AFC Biological Disturbance area differed from the total disturbance area provided in other sections of the AFC because the water line disturbance area had not yet been surveyed and thus was not added to the disturbance area.

- **Project Disturbance Area:** the total Project Disturbance Area described in the AFC has been revised to include site reconfigurations discussed in the preceding text. The new project disturbance area, not including the Water Line Disturbance Area, is approximately 1,944 acres.

- **Water Line Disturbance Area:** includes the disturbance area for the entire water line line (~4.6 miles) and associated substation. The total Water Line Disturbance Area is 16.3 acres.

- **Biological Resources Survey Area (BRSA):** the total acreage for the BRSA described in the AFC has also been revised to include the additional Water Pipeline Disturbance Area and associated 1,000-foot survey buffer. The revised BRSA is approximately 9,785 acres (an increase of 473 acres from the BRSA presented in the Biological Resources Technical Report for the AFC [AECOM 2009]).

- **Spring 2009 Survey Area:** the area surveyed for the original site design during spring 2009, including the original disturbance area where focused resource surveys were conducted, and the associated CEC-required buffer areas (e.g., within 1,000 foot of linear Project elements and 1-mile of non-linear Project elements) where reconnaissance level surveys were conducted to characterize habitat. Results of surveys conducted in the spring 2009 survey area were reported in the AFC. The spring 2009 survey area includes only a portion of the current water pipeline disturbance area and associated 1,000-foot buffer; survey results from these areas were included in the AFC. See “October 2009 Reconnaissance Level Survey Area” for surveys conducted within the remaining portions of the current water pipeline disturbance area and 1,000 foot buffer.

- **October 2009 Reconnaissance Level Survey Area**: covers the portions of the water pipeline and 1,000-foot buffer not previously surveyed, the results of which were not included in the AFC. The results were included in the Data Adequacy Supplement submitted to the CEC on October 26, 2009. Note that surveys within this area were reconnaissance level only; protocol level surveys for some biological resources within this area remain outstanding and will be completed in spring 2010.

DR-BIO-53

Information Required:

Please provide maps and describe the importance of the project site to the local and regional desert tortoise populations regarding maintaining adequate connectivity for local and regional desert tortoise movement and genetic exchange.

Response:

The following response was prepared by Dr. Alice Karl, an expert on desert tortoise (DT) life history. Figure DR-BIO-53, which depicts regional and local desert tortoise connectivity, is provided in Attachment DR-BIO-53.

The importance of a site to the local population and species is defined by the following factors. Each is discussed in detail below.

1. Abundance of animals relative to other locations within the population.
2. Identified importance of the area for recovery and tortoise conservation, by the California Department of Fish and Game (CDFG) and United States Fish and Wildlife Service (USFWS).
3. Existing impacts to the site's DTs and relative longevity of the population in light of these impacts, irrespective of the Project.
4. Disruption to genetic connectivity within the population that would occur due to the Project.
5. Cumulative population fragmentation, including the Project, that could result in decreased value of the habitat surrounding the Project.
6. Heightened anthropogenic or other impacts that could result should the Project be built.

1. *Tortoise Abundance.* There are no readily available DT density data for the project vicinity, but several sampling programs suggest low to very low local DT densities. Estimated DT density at the RSPP site, based on 2009 surveys and prior to reconfiguration, is 8.1 adult DT per square kilometer (km^2) using the USFWS calculation (USFWS 2009a) and based on the 23 adult DT found in 702.1 hectares (1734.8 acres) (AECOM 2009). Based on statistical data for nine mark-recapture plots in the western Mojave Desert (Karl 2002) and assuming comparable survey quality, the actual density may be somewhat less, potentially about 6 adult DT per km^2, or a total of about 38 adults, rather than the 57 estimated.

   Historically, density transects for the Ridgecrest area, including the Project site, estimated densities at 8-19 DT per km^2 (20-50 DT per square mile [mi^2]) (Berry and Nicholson 1984). This was considered a relatively low tortoise density at the time. During this same sampling program, 7640 km^2 (2950 mi^2) in California were estimated to have over 19 DT per km^2 and nine areas were estimated to have over 58 DT per km^2 (150 DT per mi^2).

   More recent transects conducted for the West Mojave Plan (WMP) in 1999 consistently found very low sign counts in the RSPP vicinity and Indian Wells Valley (U.S. Bureau of Land Management [BLM] 2005). On 23 of 25 transects, zero to three sign were observed; on the remaining 2 transects, four to eight sign were observed. During this same sampling program, there were many areas in the WMP planning area that had higher to substantially higher sign counts, indicating that the RSPP vicinity (Indian Wells Valley, Ridgecrest) is a low DT density area.

Recent sampling near Red Rocks State Park, west of the RSPP, suggested very low DT densities, fewer than four adult DT per km^2 (Keith et al. 2005).

Even using the USFWS-calculated estimate of 8.1 adult DT per km^2 presented in the RSPP AFC, this would be considered a historically low density. Table DR-BIO-53 shows the five trend plots studied by BLM in the western Mojave Desert that historically had the highest DT densities. Adult DT densities from the period 1979 to 1982 ranged from 36 to 92 adult DT per km^2. The three plots closest to the RSPP (the Fremont Valley plot and the two Desert Tortoise Natural Area [DTNA] plots), approximately 18 to 75 km away, respectively, had the highest densities. The other high-density plots in California had 38 to 83 adult tortoises per km^2.

Table DR-BIO-53
Estimated adult tortoise densities (# per km^2) for historically high density plots in California[1].

Historically High Density Plot	#Adults/km^2		Time Span for Estimates
	Time 1	Time 2	
Western Mojave Desert			
DTNA[2] Interior Plot	92	5	1982 to 1996
DTNA Interpretive Center	69	47	1979 to 1993
Fremont Valley	45	13	1981 to 1991
Kramer Hills	42	13	1980 to 1995
Lucerne Valley	36	25	1980 to 1994
Elsewhere in California			
Chuckwalla Bench	75	---	1979
Goffs	83	---	1983
Upper Ward Valley	38	---	1980
Ivanpah	42	---	1979

1. Data Source: BLM (2005), Berry (1990, 1997)
2. Desert Tortoise Natural Area (DTNA)

While the available data are relatively old for the later time periods (early to mid 1990s) and current densities are unknown, these are the most recent available data. The RSPP adult DT density is substantially lower than four of five western Mojave plots. Based on the historic and WMP sampling programs, which consistently showed very low DT abundance in the RSPP vicinity over time, evidence is lacking that DT densities in the RSPP were substantially higher historically, although they probably were somewhat higher based on the pattern of range-wide DT declines in the past two decades (Karl 2004, McLuckie et al. 2006, Boarman et al. 2008).

2. *Designated Conservation Area for the Desert Tortoise.* The RSPP and surrounding area have not been identified by the USFWS (1994a and b) and the BLM (2005) as an important area for DT recovery and population persistence (Figure DR 53-1). Desert Wildlife Management Areas and designated critical habitat are both approximately 7 miles south of the RSPP.

3. *Existing Anthropogenic Impacts.* The site is located directly south of U.S. Highway 395, a heavily traveled, major commerce and transportation route in California. Heavily traveled roads are known mortality sinks for DT and other wildlife (Nicholson 1978, Karl 1989, Boarman 1992, LaRue 1993, Marlow and von Seckendorff Hoff 1997, Rosen et al. 2007).

In addition, the towns of Ridgecrest and Inyokern, the "ranchette" community that has expanded away from the towns proper, and local agriculture (Inyokern, mostly) degrade and fragment the area's DT habitat. Not only is habitat removed and fragmented, but dogs (which prey on DT), children, and motor-based recreational activity typically expand to areas immediately outside desert towns. The result of these activities is increased loss and degradation of habitat and increased DT depredations and collections. In addition, ravens are common in the area (A. Karl, pers. obs.), undoubtedly due to the subsidies provided by the town and agriculture (e.g., trash, roadkills, harvesting and tilling practices that provide prey and forage, water). These ravens likely already influence recruitment in the local DT population. For instance, clearance of DT for the Hyundai Test Track south of California City, where ravens are common due to the nearby towns (California City and Mojave) and the Mojave landfill, found no DT between the reproductive-sized tortDToises and the very small (<a few years old) juvenile stage. There appeared to be total lack of recruitment into this population, possibly due to raven predation.

4. *Connectivity Issues*. Based on the above analysis and aerial photographs, development of this site would not appear to impair connectivity within the population. First, there is no evidence that there are important population segments to connect given the low DT densities at the RSPP and a location that is already impacted by anthropogenic factors. Second, with the updated Project footprint refinement (Figure DR-ALT-49) connections to the El Paso Mountains Pass to the south would be conserved by minimizing impacts to the El Paso Wash assuming that Project mitigation also ensures that (a) DT are not funneled onto the highway and Brown's Road along these corridors, and (b) off-highway vehicles (OHV) traffic does not increase in these washes.

5. *mulative Population Fragmentation.* The RSPP would further fragment occupied DT habitat. Unlike some species of birds and mammals that are known to abandon an area if habitat fragmentation were to reach a certain threshold, the threshold at which fragmented habitat would become undesirable or unusable by DT is unknown. Furthermore, mere habitat fragmentation (i.e., patch size and connectivity) is typically difficult to separate from the suite of impacts affecting DT use of an area. (For instance, DT occupying fragmented habitats around towns are also subject to the other negative influences associated with towns [see above]). It does not appear that development of the RSPP would result in a level of fragmentation that would reduce surrounding habitat to unusable fragments. From aerial photographs, there appears to be ample habitat, even if somewhat degraded by anthropogenic activities, in the surrounding area to support the use of the area by DT should the RSPP be built.

6. *Heightened Anthropogenic or Other Impacts That Could Result.* No new types of resources for DT predators would be added by the RSPP that are not currently in the Project vicinity.

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---. 2009b. Range-wide monitoring of the Mojave Population of the desert tortoise: 2007 annual report. Desert Tortoise Recovery Office, Reno, NV.

DR-BIO-54

Information Required:

Please provide a draft Desert Tortoise Translocation Plan that incorporates the most recent guidance from the Bureau of Land Management (BLM), United States Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG). The goals of this translocation effort should be to:

- translocate all desert tortoises from the project site to nearby suitable habitat;
- minimize impacts on resident desert tortoises outside the project site;
- minimize stress, disturbance, and injuries to translocated tortoises; and
- assess the success of the translocation effort by attaching transmitters to the translocated desert tortoises (desert tortoises in the receiving population should also be monitored to determine survival rates of translocated tortoises and what effect the translocated desert tortoises have on the receiving desert tortoise population).

Please discuss translocation procedures and guidance in the plan, including a description of clearance survey protocol and desert tortoise transportation and release procedures, and develop a post-translocation monitoring and reporting plan. All methods discussed in the plan should be consistent with the *Guidelines for Handling Desert Tortoises During Construction Projects* (Desert Tortoise Council 1999) or the most recent handling guidance provided by the USFWS.

Generally, the translocation plan should include the following information:

1) Identify potential translocation sites based on the presence of suitable soils, vegetation community, vegetation density and abundance, perennial plant cover, forage species, geomorphology, and slope.
2) Surveys of resident populations at translocation sites, including health assessment sampling and attaching transmitters to individuals.
3) Description of measures that would be implemented to prevent translocated desert tortoise entering the site or other hazardous areas.
4) Description of quarantine facilities to provide individual quarantine for all tortoises prior to translocation.

5) Description of health assessments that would be performed by qualified biologist or veterinarian on each tortoise prior to translocation.
6) A treatment/disposition plan for each tortoise, including those unfit for translocation.
7) Description of translocation procedures, including timing (e.g., time of year, time of day).
8) Description of post-translocation monitoring and adaptive management activities.
9) Description of methods used to mark translocated tortoises and fit them with transmitters so that they can be located and identified during post- translocation monitoring.
10) Description of methods used to mark existing tortoises in the receiving population and fit them with transmitters so that they can be located and identified during post- translocation monitoring.
11) Description of how data would be compiled, synthesized, and reported to USFWS, CDFG, BLM, and Energy Commission staff.

The translocation site must:

a) be on public lands that are conserved in perpetuity or private lands that are managed by a CPM-approved, (in consultation with CDFG and USFWS) non-profit organization qualified pursuant to California Government Code section 65965. In the event an approved non-profit holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG; in the event an approved non-profit holds a conservation easement over the translocation site, CDFG shall be named a third party beneficiary;
b) satisfy the requirements of BLM and USFWS;
c) have no proposed rights-of-way or other encumbrances at the time of its establishment; and
d) be at least 15 kilometers away from major highways (e.g. Highway 395) to provide a safety buffer for long-distance movements that some desert tortoises are likely to make following translocation.

Response:

Please refer to Attachment DR-BIO-54, Draft Desert Tortoise Relocation/Translocation Plan, provided at the end of this section.

DR-BIO-55

Information Required:

Please provide a draft Raven Monitoring/Control Plan that describes methods to avoid attracting common ravens and/or providing associated facilities that may attract ravens during all phases of development and use, including construction, operation, and decommissioning. In situations where associated facilities such as power lines and structures for perching cannot be eliminated, the plan should require implementation of best management practices that reduce perching opportunities, monitor raven use of the area, and include raven nest removal. Potential attractions to be considered in the plan should include but not be limited to:

- availability of water from dust abatement activities, equipment cleaning and maintenance, evaporation and retention ponds, drainage areas or landscaping;

- potential perching, roosting, or nesting sites;
- avian carcasses from collisions with solar reflectors;
- food sources from soil disturbance and road kill (e.g., small mammals, insects); and
- food sources and attractants from human and animal food and waste.

To address the indirect and cumulative effects of the project, participation would also be recommended in a regional raven management plan either through monetary or in-kind contributions coordinated by the Desert Managers Group. The draft Raven Monitoring/Control Plan should incorporate the most recent guidance from the USFWS and include at least the following elements:

a) purpose/objectives of the Plan;

b) identification of project design features and other measures to manage potential introduction of anything that may attract ravens to the area;

c) identification of the area covered by the monitoring and raven control activities;

d) description of baseline data documenting the abundance of raven on the project site;

e) establishment of quantitative success criteria for achieving the objectives of the plan;

f) documentation of the effectiveness of project design features;

g) identification of triggers that will prompt implementation of management actions to control ravens, and a description of those management actions (e.g., nest removal, elimination of problem ravens);

h) description of a monitoring plan, including a discussion of survey methods and frequency, for establishing baseline data on pre-project raven numbers and activities and assessing post-project changes from this baseline;

i) description of adaptive management practices used to ensure effectiveness of accomplishing the purpose of the raven management plan;

j) regular reporting to document raven management measures that have been implemented and results of raven abundance and effectiveness monitoring throughout the life of the project; and

k) description of worker education, at all phases of development, as it pertains to avoiding and reducing attractions for ravens and promoting desert tortoise awareness.

Response:

Please refer to Attachment DR-BIO-55, Draft Raven Monitoring & Control Plan, provided at the end of this section.

DR-BIO-56

Information Required:

Please provide a Burrowing Owl Translocation and Management Plan that includes at least the following components:

a) Translocation Area Habitat Description: Provide a description of the habitat characteristics of the translocation area with respect to burrowing owls (for example, vegetation, topography, soils, level of disturbance, presence of suitable burrow sites). Include a figure depicting the location of the proposed translocation area and existing land use in and near the area.

b) Surveys of Translocation Area: Characterize the existing use of the proposed translocation site by burrowing owls, including surveys conducted in accordance with Phase II and Phase III Burrowing Owl Consortium Guideline protocols (CBOC 1993).

c) Habitat Modifications at Translocation Area: If artificial burrows for burrowing owls are proposed at the translocation site, provide a figure showing the location of the proposed burrow construction. Include survey information to verify that construction of burrows would not affect desert tortoise or Mohave ground squirrel habitat. Design of the artificial burrows should be consistent with CDFG guidelines (CDFG 1995).

d) Translocation Procedures: Provide a detailed description of clearance protocol, including trapping, transportation and release procedures, and provide a post-translocation monitoring and reporting plan. The plan should discuss attaching transmitters to burrowing owls that are being translocated and burrowing owls in the receiving population in order to determine effectiveness of the translocation effort. All methods discussed in the plan should be consistent with the most recent guidance from CDFG and USFWS.

e) Management and Monitoring Plan: Provide a long-term management and monitoring plan for the translocated population of owls which reflects site-specific conditions, and which provides details on methods for measuring compliance goals and remedial actions to be taken if management goals are not met.

Response:

Please refer to Attachment DR-BIO-56, Draft Burrowing Owl Relocation/Translocation Plan, provided at the end of this section.

DR-BIO-57

Information Required:

Describe how the mitigation for this project reduces the incremental cumulative impacts of this project and all reasonably foreseeable projects in the area on the regional burrowing owl population and how it maintains adequate connectivity for the regional population.

Response:

Potential cumulative impacts to biological resources, including western burrowing owl (WBO), as a result of Project implementation are discussed in Section 5.3.3.4, “Cumulative Impacts,” of the AFC. Cumulative impacts of the Project and all reasonably foreseeable projects in the area would be reduced through implementation of several mitigation measures. Potential direct and indirect impacts to WBO would be reduced through implementation of the avoidance, minimization, and mitigation measures described in Section 5.3.4 of the AFC; implementation of these measures would also reduce the Project’s contribution to a significant cumulative effect. In addition to the AFC mitigation measures, the Applicant is developing a compensatory mitigation approach to fully mitigate residual (i.e., unavoidable) direct, indirect, and cumulative effects on DT and Mohave ground squirrel (MGS), as well as WBO and other target species.

Land acquisition, preservation, enhancement, and management is anticipated to be the primary compensatory mitigation approach, combined with fee programs designated for specific activities that would promote the conservation of DT, MGS, WBO, and other sensitive resources. A comprehensive Habitat Mitigation and Monitoring Plan (HMMP) for the RSPP is presently in development and the Applicant has solicited direct input from the agencies. The Applicant has received several good ideas for mitigation but there remains internal conflict among the agencies regarding a uniform approach that all of the wildlife agencies can support. Even without that guidance, the Applicant is attempting to develop an HMMP that will describe the proposed approach to compensatory mitigation planning and design, including proposed minimum compensation amounts and criteria for identifying mitigation lands; an implementation plan; monitoring, adaptive management, and contingency measures; and enhancement and long-term management of mitigation lands. A preliminary draft HMMP will be provided on February 12, 2010; the compensatory mitigation approach for the HMMP is provided in the response to DR-BIO-72, below. Preservation and enhancement of lands that would maintain adequate connectivity for the regional populations of WBO, DT, and MGS would be a priority for acquisition.

DR-BIO-58

Information Required:

Please provide maps and describe the importance of the project site to the local and regional Mohave ground squirrel populations regarding, habitat quality and value, habitat fragmentation, and maintaining adequate connectivity for local and regional Mohave ground squirrel movement.

Response:

The requested maps are provided in Attachment DR-BIO-58 at the end of this section.

DR-BIO-59

Information Required:

Please provide a comprehensive and detailed Mohave ground squirrel active translocation plan. Development and implementation of this plan will reflect close coordination with CDFG. The plan should:

- identify the translocation site(s) and discuss why it (they) was chosen and found acceptable;
- describe the existing habitat suitability and if available, information regarding the population of Mohave ground squirrels on the translocation site(s);
- describe the protocol for trapping and transporting Mohave ground squirrels;
- describe the protocol for attaching transmitters to Mohave ground squirrels in order to determine effectiveness of the translocation effort; and
- include a monitoring and reporting plan for the transmittered Mohave ground squirrels.

Response:

MGS is not known to be currently occupying the Project site but could occur. Dr. Phil Leitner, an expert on the life history of the MGS, has expressed serious concerns regarding the effectiveness of any attempt to translocate this species. Nonetheless, the Applicant has directed Dr. Leitner to prepare a translocation plan to comply with the Data Request. Dr. Leitner incorporated many of his concerns regarding MGS translocation into his response below. Based on these concerns, the feasibility of implementing an effective translocation program appears to be highly questionable. The Applicant is committed to implementing reasonable avoidance and minimization measure to reduce Project impacts to MGS. However, rather than attempting to implement a translocation program that would have little, if any, chance of success, the Applicant proposes to proceed with grading without trapping, recognizing that any incidental take of MGS could be covered by a California Endangered Species Act (CESA) incidental take permit.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, California, about 5 miles southwest of the City of Ridgecrest, California (Figure DR-BIO-56-1). The Project right-of-way, for which the Applicant has applied to the BLM, includes approximately 3,920 acres of public lands owned by the Federal government. The total disturbance area is estimated at 1,944 acres including an additional 16.3 acres resulting from construction of the water pipeline off site.

One or more translocation sites will be selected that is/are suitable for and can accommodate all species to be actively translocated from the Project site, including DT, MGS, WBO, desert kit fox, and American badger.

Since the translocation site(s) has/have not yet been selected, it is not possible at this time to describe habitat suitability or any MGS population that may exist on the site(s).

The protocol for trapping MGS and translocating them from the project site will include the following elements:

1. The entire disturbance area of 1,944 acres will be trapped for 10 days, by a qualified biologist, in order to have a reasonable chance of capturing all MGS present. This trapping will require approximately 55-60 grids of 100 traps at the standard spacing of 35 meters, since 100 traps is the maximum that can be operated by a qualified biologist. Because of logistical difficulties concerning the number of qualified biologists and traps available, it will be necessary to set up 5 trapping sessions with 11-12 grids per session. Allowing a day to set up grids and a day to take them down, plus 3 days of rest for the trapping personnel, it will take approximately 2.5 months to complete the trapping effort.

2. In order to prevent MGS from moving into areas that are currently being trapped or have been trapped, it will be necessary to construct a squirrel-proof fence around the entire disturbance area and around each of the 5 trapping areas prior to trapping. Since MGS are excellent at climbing and burrowing, these fences will be constructed of smooth sheet metal at least 4 feet in height and extending at least 3 feet into the soil. The metal sections will be attached laterally with no gaps and inspected daily to ensure that they remain squirrel-proof. Because there has never been any attempt to construct a squirrel-proof fence, there can be no guarantee that this proposed design will work. A potential side effect of constructing and maintaining a secure fence will be to trap other wildlife species such as white-tailed antelope squirrels, black-tailed jackrabbits, and kangaroo rats.

3. Timing of the trapping effort will be critical. MGS are dormant underground beginning as early as May (adult males) or as late as September (juveniles). Adult males become active as early as February 1, while adult females usually do not emerge until about February 15. Therefore, the time period for trapping and translocation would extend from February 15 until May 15, or about 3 months. Mating occurs from about February 15-March 7 and females are pregnant for about 4 weeks, during which time they construct special natal burrows. Young are born in the natal burrows from about March 25 through April 10. The mothers lactate for about 5 weeks, while the litter of young shelter in the natal burrows. Weaning occurs in early May and the litters continue to use the natal burrows until mid-May. In late May and early June, the young may undertake dispersal movements of up to 5 miles. In order to accomplish 2.5 months of trapping, it will be necessary to pursue this trapping effort during the period when pregnant females are constructing natal burrows and during the subsequent weeks when lactating females and their litters are utilizing these natal burrows. The stress of translocating adult females during this period may result in some level of reproductive failure and possible mortality, while removal of lactating females could lead to death of their litters. It is not possible to quantify these adverse impacts, but the risks should be clearly understood.

4. Captured MGS will be transferred from the trap to a wire mesh cage provided with bedding and food. The cage with be covered with a cloth to reduce stress on the animal. They will normally be transported to the translocation site and released on the day of capture in an area where burrows are available. If an animal is captured late in the day, it will be kept in the cage in a quiet area until the next morning when it will be released. The transfer will be accomplished by a qualified biologist.

In order to evaluate the effectiveness of the translocation effort, translocated MGS will be monitored by radio-telemetry after their release at the translocation site. This group of animals will include adequate samples of adults and young of both sexes as available. The type of transmitter and the attachment method will follow the description of methods in Harris and Leitner (2004).

All translocated animals fitted with transmitters will be monitored by a qualified biologist using a portable receiver and hand-held antenna. For the first month after translocation, each animal will be located daily and its coordinates established by GPS receiver. After that, all animals will be located once a week until they enter dormancy or there is evidence of mortality. An attempt will be made to capture each animal once a month to evaluate its condition and be sure that transmitters are fitting well. If the signal is lost and it seems possible that the animal has left the translocation site, an attempt will be made to locate it from a light aircraft equipped for this purpose. This will be an important component of the monitoring program, as animals may attempt to return to their original location. The locations at which animals enter dormancy will be noted and trapping will be carried out in early spring of the following year in order to confirm over-winter survivorship and remove transmitters. Reports of monitoring results will be made on a monthly basis, with a summary report submitted in the fall, and a final report prepared the following spring. These reports will provide location data for each individual with maps and an analysis of the overall effectiveness of the translocation program.

<u>Constraints and Concerns Related To MGS Translocation</u>

There has been only one previous attempt to translocate MGS from a development site. In this case, 18 animals were trapped and then immediately released several km away on conservation land. Although the translocation was apparently approved by CDFG and the animals were marked with PIT tags, there was no requirement for follow-up studies. Therefore, we have no information regarding the success or failure of this translocation project. Unlike the situation with the DT, there is no existing evidence to indicate that translocation of MGS would be beneficial.

There are a number of concerns about active translocation of MGS from the RSPP site:

1. It will be necessary to construct extensive metal fencing prior to trapping. There is no guarantee that this fencing will be effective in preventing movement of MGS into areas that have been cleared by trapping. Furthermore, the potential adverse impacts of such fencing on other desert wildlife are unknown.
2. Because of the enormous magnitude of the trapping effort, it will have to be conducted over approximately 2.5 months during the time when the species is active aboveground. Even in a reproductive year, the entire adult population is active and trappable only from February 15 through May 15, just 3 months. Adult females construct special natal burrows starting about March 15 and young are restricted to these burrows until weaned at about 5 weeks of age. The young are not trappable until early May, while adult males begin to enter dormancy in late May. Therefore, trapping and removing adult females between late March and early May could condemn the helpless young in the natal burrows to starvation and death.
3. Although potential translocation areas with apparently suitable habitat exist in the region surrounding the RSPP site, there are no data available concerning the MGS populations at any potential translocation area. The past three years have been characterized by low winter rainfall in the Ridgecrest area, so it is reasonable to assume that habitat carrying capacity has been substantially reduced. Adding translocated animals to an area where the existing population is probably already under stress does not seem wise. The only reason to conduct a translocation project would be to salvage animals that could survive to reproduce in their new location. If extra animals are moved to an area where resources are already limited, it is very likely to result in higher mortality and reduced recruitment in both the receiving population and among the translocated animals.

It may be beneficial to actively translocate DT, since they can be easily detected and captured and since they may live and reproduce for many years after translocation. Furthermore, there is some experience with this practice that suggests it may be beneficial to the species. However, to apply this method to a small rodent which is difficult to capture, is trappable for a very limited period each year, and has a short lifespan is very questionable.

DR-BIO-60

Information Required:

If during consultation with CDFG it is determined that an additional delineation is needed, please revise the delineation of ephemeral drainages as directed by the CDFG. Please provide all information requested to CDFG.

Response:

The CDFG (represented by Environmental Scientist Dave Hacker) conducted a site visit with AECOM (represented by Ecologist Joshua Zinn) on December 2, 2009 to verify the field findings of the RSPP Jurisdictional Delineation Report (JDR). Based upon this field visit and in consultation with the CDFG's Lake and Streambed Alteration Program, the CDFG has concluded that:

1. The streambed of El Paso Wash comprises all points within the highest point of confinement. The natural dike features, which define the floodplain, define the streambed. In this case, this is close to the already-mapped FEMA floodplain, except that the CDFG jurisdiction would go to the top of the bank or "highest point of confinement". Mapping the extent of these should be based on the presence of a channel that moves water and sediment and extended to the highest point of confinement of those waters at their highest flow.

2. The features that had previously been characterized as swales are also state jurisdictional streambeds and therefore potentially subject to Streambed Alteration Agreements. The swale features will be considered as ephemeral streams (as the CDFG considers that these swale features demonstrate evidence of sediment transport, channel form, and natural levee formation from high flows). Whether the CDFG would require Streambed Alteration Agreements for all of these features is discretionary (if the CDFG determines that the alteration is not substantial, the CDFG would not require a Streambed Alteration Agreement for these features).

Although the CDFG does not provide Streambed Alteration Agreements for CEC projects, they do make recommendations to the CEC. Based upon the CDFG's guidance and recommendations concerning potential jurisdictional waters of the state, the RSPP JDR will be revised in accordance with CDFG guidance and submitted for approval prior to March 5, 2010. The Applicant strongly disagrees that the features previously characterized as swales are jurisdictional and even though these features will be mapped in the revised JDR in order to be responsive to this request, this remapping should not be deemed as acceptance that the swales are jurisdictional streambeds, which would require a Streambed Alternation Agreement.

DR-BIO-61

Information Required:

Please provide a copy of written communication from the USACE that states there are no jurisdictional waters of the United States that will be disturbed for the RSPP project.

Response:

The RSPP JDR has been assembled as a Jurisdictional Determination (JD) package for review by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) in support of issuing a JD that concludes that all formally delineated aquatic features occurring within the proposed footprint of the Project are nonjurisdictional (i.e., are not waters of the United States under the regulatory administration of the USACE). The Approved JD Form is included as Attachment 2 to the RSPP JDR.

The RSPP JDR was initially submitted to Mark Durham (South Coast Branch Chief) of the USACE Los Angeles District on October 23, 2009 for review for the purpose of issuance of a jurisdictional determination. A copy of the RSPP JDR was submitted to the CEC on October 23, 2009. Personal Communication with Mr. Durham concerning the status of the RSPP JDR was made on January 4, 2010. Mr. Durham responded that the JD is currently under review by the USEPA. As of this date, no JD concerning federally regulated aquatic resources has been made by USACE/USEPA for the RSPP. Once the JD is received, it will be immediately docketed with the CEC. However, for purposes of the Staff analysis, we believe the JDR provides strong evidence that the project will not affect US jurisdictional waters.

DR-BIO-62

Information Required:

Please provide a detailed discussion, with supporting analysis, for the implementation of a low impact development approach to managing stormwater flows. This should include completed engineering plans with re-vegetated channels and features that enhance use of the channel as wildlife movement corridors such as vegetated terraces and wide partially vegetated channels. FEMA floodplains and other non-State Waters alluvial features should remain intact and connected to the re-routed channels to the maximum extent practicable to retain the hydrologic and ecological functions of those features. A monitoring plan should accompany the re-routed channel plan that includes re-vegetation goals and a monitoring program to reach and maintain those goals (success criteria) (see number 13 below).

Response:

A natural vegetated buffer around the El Paso Wash is being incorporated into the site plan to further contribute to a low impact development approach. Attenuation design would result in not significantly diverting natural flow, in terms of volume and occurrence, away from the El Paso Wash, so that the natural communities supported by the wash would be minimally impacted. These measures will retain the wash's hydrologic and ecological functions and allow for the continued use of the El Paso Wash as a wildlife movement corridor. Please see the response to DR-BIO-66 for more information regarding the restoration and revegetation strategy for the portions of the El Paso Wash that would be permanently and temporarily impacted by the crossings and drainage channel tie-ins described above.

Regarding stormwater management within the Project footprint, the resource management agencies have expressed a preference to move water as quickly through the Project site as possible in order to reduce water quality impacts and to avoid the collection of standing water that could attract ravens or result in other indirect adverse impacts. Therefore, the remaining smaller watercourses and the washlets and swale complexes impacted by the facility footprint will be designed as engineered channels. They will not be enhanced or revegetated and as such mitigation credit for re-creation of these aquatic features is not being requested. The absence of revegetation or other enhancement also would reduce the likelihood that the engineered channels, which require maintenance as part of facility operations, would become an attractive nuisance to wildlife species. The RSPP is currently pursuing mitigation opportunities for impacts to State jurisdictional waters. The on-site drainage improvements would seek to replicate the existing flow patterns as closely as possible and each of the proposed off-site channels are being sized to contain the peak flow of the 100-year flow rate. Impacts to the existing downstream drainage patterns and flow rates would be minimized, but would be slightly changed due to minor changes in contributing drainage areas and times of concentration. Please see the response to DR-BIO-63 for more information on downstream effects.

The original design for this site has been revised to incorporate a low-impact development approach to the stormwater flows. The proposed area of development has been pulled away from the El Paso Wash so that the flows in the Wash are not re-routed as a result of this project. The revised site plan keeps the developed area of the solar fields out of the channel and above the banks of the Wash at all locations. The vegetation and biology in the 2.5 miles of El Paso Wash that is adjacent to the site is intended to remain undisturbed except for one new pipe bridge crossing which is approximately 100-feet wide, and some localized drainage channel connections between the Project site and the El Paso Wash. The existing Arizona crossing of the Wash at Brown Road has been maintained and is not proposed to be modified. The FEMA floodplain would remain intact with all localized drainage from the pre-development site continuing to be discharged to the Wash through redirected channels as part of the drainage plan for the post-development site. Engineering plans for the re-designed project site will be provided on February 10, 2010 and a new drainage report for the re-designed site will be provided on February 24, 2010.

A monitoring plan for the re-routed channels, including re-vegetation goals and a monitoring program to reach and maintain those goals (e.g., success criteria), is provided in the Draft Channel Maintenance Plan in Attachment DR-BIO-65.

DR-BIO-63

Information Required:

> Please provide a detailed discussion, with supporting analysis, of the downstream effects of redirecting water away from the unnamed washes at the southwest side of the project, of directing those waters into the El Paso wash upstream of the existing confluence, and of re-routing the El Paso Wash. Specifically, discuss the effects to ecological functions and values and the extent of those effects downstream of the redirected flows. In other words, to what degree and how far downstream would the project affect the hydrology and sediment transport such that it impacts wildlife habitat features off of the project site.

Response:

As described in the data response introduction, the Ridgecrest site plan has been reconfigured to minimize impacts to natural stormwater flows across the El Paso Wash. The El Paso Wash will no longer be re-routed and natural flows would be maintained (see DR BIO-62). A post-Project functions and values assessment will be provided in early spring 2010 after the revised disturbance area, drainage plans, Storm Water Pollution and Prevention Plan (SWPPP), and other relevant Project plans are finalized and supporting data is available.

There is one un-named small ephemeral dry wash located near the southwest side of the site that would be slightly redirected around the southwest corner of the site prior to being returned to its original flow path. This small wash currently connects downstream to the El Paso Wash. There is no diversion into the El Paso Wash upstream of the existing confluence and no re-routing of the El Paso Wash. The site will be elevated on the south side of the development such that the flows from this small ephemeral dry wash would be allowed to flow westerly along the edge of the soil berm and then outward to find its natural drainage path in a low impact method of drainage flow management as proposed by the CEC and BLM. The re-directed drainage flow will join the west leg of the El Paso Wash in the same location as it currently does in the pre-development condition. The hydraulic flows would essentially remain the same as currently exists and there is not anticipated to be any sediment transport as a result of this minor diversion. The flow path of the drainage area is slightly longer in the post-development condition thus creating a lower slope, less velocity, and no increase of sedimentation as a result of this minor diversion. A new drainage report associated with the re-designed site plan will be provided on March 5, 2010 and will show that the drainage subareas in this southwest corner of the project are relatively undisturbed and unchanged.

The downstream xeric riparian functions and values assessment will utilize the Hydrogeomorphic Approach (HGM) to qualitatively assess the physical, chemical, and biological functions and values of Mojave Desert wash scrub and unvegetated ephemeral dry wash. A synthesis of the methodologies and definitions outlined in resource agency issued guidance documents will be employed for this analysis. The quantitative assessment for biological functions and values of Mojave Desert wash scrub and unvegetated ephemeral dry wash will utilize the latest project design in concert with hydrological calculations (including flood data). The potential for downstream scour, sedimentation, and changes in hydrologic flows, volume, and timing will be evaluated, informing the assessment of potential effects to off-site wildlife habitat features.

DR-BIO-64

Information Required:

Please provide a detailed discussion, with supporting analysis, of the potential for erosion and wildlife habitat impacts at the outlet of the proposed engineered channel on the northeast side of the project. The proposed channel would concentrate sheetflow and the flows from multiple small channels and redirect it to a single point in upland habitat.

Response:

As described previously, the site plan has been reconfigured to minimize impacts to natural stormwater flows through the El Paso Wash. Engineered drainages along the perimeters of both the north and south solar fields are being redesigned to accommodate the new solar field configuration. Due to the redesign of the Project area and subsequent redesign of proposed engineered channels throughout the Project area, the drainage configuration that is the subject of DR-BIO-64 no longer exists in the proposed plan. Post construction, drainage on the northeast side of the north solar field will be conveyed by an engineered channel that will direct water in a manner similar to the existing natural channel. The engineered channel would then feed water back into the natural channel north of the Project area. Please refer to DR-BIO-65 (Channel Maintenance Plan) for information regarding the construction and maintenance of the proposed engineered channels within the Project area. Revised plans, including a SWPPP and a Drainage, Erosion, and Sediment Control Plan, are being prepared, which will outline standard measures to minimize erosion and protect wildlife habitats during project construction and operation.

DR-BIO-65

Information Required:

Channel Maintenance Program: Please provide a draft Channel Maintenance Program for routine maintenance activities, as well as capital improvement projects and emergency repairs. The Channel Maintenance Program should include at least the following elements:

i. *Purpose and Objectives:* Include a discussion of the main goals of the Channel Maintenance Program (for example, maintenance of the diversion channel to meet its original design to provide flood protection, support mitigation, protect wildlife habitat and provide habitat connectivity, and maintain groundwater recharge).

ii. *Guidelines for Maintenance*: Define standards for acceptable conditions and action triggers for: sediment removal, vegetation management, debris collection, blockage removal, fence repairs, and access road maintenance. Discuss bank protection and grade control structure repairs that might be needed to repair eroding banks, incising toes, scoured channel beds, as well as preventative erosion protection. At a minimum the applicant would need to implement instream repairs when the problem (1) causes or could cause significant damage to the project, adjacent property, or the structural elements of the diversion channel, (2) is a public safety concern, (3) negatively affects groundwater recharge, or (4) negatively affects the mitigation vegetation, habitat, or species of concern. Include a discussion of routine channel maintenance - trash removal and associated debris to maintain channel design capacity; repair and installation of fences, gates and signs; grading and other repairs to restore the original contour of access roads and levees (if applicable); and removal of flow obstructions at RSPP storm drain outfalls. Describe how capital improvement projects and emergency repairs would be funded and implemented.

Response:

Please refer to Attachment DR-BIO-65, Draft Channel Maintenance Program, provided at the end of this section.

DR-BIO-66

Information Required:

Re-vegetation Plan for Re-Routed El Paso Wash: Please provide a draft Re-vegetation Plan for the re-routed El Paso Wash that include at least the following elements:

- *Overall Goals*: Explicitly state the overarching goal of the re-vegetation plan, which should include at least replicating the hydrological and biological functions and values of the impacted desert washes.
- *Existing Functions and Values*: Describe the existing functions and values of the drainages that are being replaced by the engineered channels. Include a discussion of the characteristic soils (biological soil crust, permeability), sediment transport and other geomorphic processes, microtopography (microcatchments for moisture, seeds), vegetation (zonation, composition, cover density, dominants in each stratum, rare or uncommon species or communities, non-native component), and wildlife habitat and values (connectivity, rare species, habitat elements).
- *Reference Reach:* Select one or several reference reach(es) of the existing channels that would provide a target for mitigation design and success criteria, and provide photos and a hard-copy and GIS [shape files & metadata] map of the reference reach(es). Provide a detailed description of the reference reach and how the features of the reach(es) relate to the success criteria for the mitigation design and goals. Include a rationale for selection for the reference reach(es).
- *Proposed Mitigation Design:* Describe the mitigation goals and target functions/values (hydrologic, geomorphic, water quality, habitat function/value) of the re-vegetation plan and a rationale for these goals and targets.
- *Success Criteria:* Provide a table of success criteria and quantitative parameters to measure successful achievement of these criteria. The criteria should address each major aspect of the project, including replication of natural hydrological and geomorphological processes and establishment of appropriate vegetation and wildlife habitat values.
- *Monitoring Methods:* Describe proposed methodology for measuring progress toward success criteria and a rationale as to why each method has been chosen to evaluate progress in relation to each success criterion. Describe sampling methods used and include size of sample units and number of samples.
- *Monitoring Schedule:* Monitoring should be tied to the appropriate spring growing season, with the “first year” of monitoring occurring one full growing season following completion of installation. Given the slow pace of revegetation in desert ecosystems, a monitoring duration of 10-years is appropriate. In addition to quantitative methods, ground and/or aerial photos can be used to illustrate year-to-year progress of the overall project.
- *Implementation Plan:* Describe equipment, procedures, access paths, and any measures used to avoid sensitive areas outside of the grading plan during re-vegetation. Of particular importance is topsoil storage and disposition. The implementation plan should include a description of how the top layer (top 1 inch) of soil will be salvaged from the existing washes, stockpiled and maintained to sustain viability, and how these soils will be applied during revegetation efforts. Indicate storage location of topsoil, area required for storage, duration of intended storage, and ultimate disposition of topsoil material in the engineered channels. Discuss how the area available for re-vegetation in the channel bottom would integrate with the channel slope protection and erosion control and any opportunities for bioengineering.

- *Weed Control:* Describe method(s) to be used to remove noxious plants from the mitigation site during the course of re-vegetation and monitoring, and specific triggers for when weed control is required.
- *Planting/Seeding:* Provide a table of species to be planted and indicate geographic source of plants (of local origin), type of propagules to be used, and season in which seeding/planting/transplanting is to be done. Include size and quantity of propagules and/or intended spacing. For transplant propagules, describe method, location of harvest site, and duration of storage, if applicable
- *Irrigation:* Most mitigation projects should become hydrologically self-sustaining. The function of irrigation in the early years of a project is to give new vegetation a head start at becoming established. Describe any proposed irrigation methods, including estimated frequency, and indicate month(s) in which it is to occur. Also indicate water source(s) for irrigation.
- *Implementation Schedule:* Provide a schedule showing intended timing (by month) of site preparation, any seed/topsoil storage, seed/topsoil application, and plantings.
- *Maintenance and Monitoring:* Describe planned maintenance activities (e.g. inspection of irrigation system, inspection of water structure(s), erosion control, weeding, etc.). Identify any pest species (plant and/or animal) that might cause problems on the site, and provide a control plan for these species if appropriate. Indicate the critical threshold of disturbance that will trigger the implementation of control methods. Provide a table showing proposed schedule of frequency of maintenance inspections over the life of the project.
- *Monitoring Reports:* Monitoring reports to the CPM are typically due January 31st of each year. Describe the overall content and purpose of the annual reports.
- *Contingency Measures:* If an annual performance goal is not met for all or any portion of the mitigation project in any year, or if the final success criteria are not met, describe how the failure will be remedied. Include a process for analysis of the cause(s) of failure and propose remedial action for CPM and agency approval. Remedial actions might include replanting, weed or herbivore control. Provide a funding mechanism to pay for planning, implementation, and monitoring of any contingency procedures that may be required and present all necessary assurances that the funds will remain available until success criteria have been achieved.
- *Long-Term Management:* Integrate long-term management (weed/vegetation management, preventing wildlife entrapment hazards) with the Channel Maintenance Program described above.

Response:

As previously described, the Ridgecrest site plan has been reconfigured to minimize impacts to the El Paso Wash, and this wash will no longer be re-routed. However, there would be some areas of temporary and permanent impacts to the Wash, due to the Project's crossings and drainage channel tie-ins along the Wash. Mitigation for these impacts, once quantified, would be addressed as part of the Project's overall mitigation strategy to be determined. After impact calculations have been revised, the Applicant will consult with the resource agencies to determine if revegetation is necessary given that it is anticipated that the impacts will be substantially reduced due to the reconfiguration.

Existing Functions and Values

A detailed qualitative functions and values assessment of the existing conditions of the previous disturbance area was provided as a component of the revised JDR submitted November 25, 2009. This revised JDR is also a component of the RSSP Notification for a Lake and Streambed Alteration Agreement. A revised detailed qualitative functions and values assessment for the final disturbance area will be provided after supplemental field delineations take place during spring of 2010.

A qualitative assessment of xeric riparian functions and values will be provided using the HGM and the methodologies and definitions outlined in:

- A Hydrogeomorphic Classification for Wetlands as a guide (Brinson et al. 1995).
- An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices (Smith et al. 1995).
- The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest (USEPA 2008).
- Wetland Values: Concepts and Methods for Wetlands Evaluation (USACE 1979).
- USEPA Watershed Academy: Wetland Functions and Values (USEPA 2009).
- United States Geological Survey (USGS) Water Supply Paper 2425: Wetland Functions, Values, and Assessment (USGS 1996).

Literature Cited

Brinson, M., R. Rheinhardy, F. Hauer, L. Lee, W. Nutter, R. Smith, and D. Whigham. 1995. A Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands. U.S. Army Corps of Engineers Waterways Experiment Station. Wetlands Research Program Technical Report WRP-DE-11. December 1995 – Operation Draft.

Smith, D. R., A. Ammann, C. Bartoldus, and M. M. Brinson. 1995 An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices. Technical Report WRP-DE-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A307 121.

U.S. Army Corps of Engineers (USACE). 1979. Wetland Values: Concepts and Methods for Wetlands Evaluation. Research report 79-R1, U.S. Army Corps of Engineers, Institute for Water Resources, Fort Belvoir, Virginia.

U.S. Environmental Protection Agency (USEPA)
2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. Office of Research and Development.
2009. Watershed Academy http://www.epa.gov/watertrain/index.htm.

U.S. Geological Survey (USGS) 1996. Water Supply Paper 2425: Wetland Functions, Values, and Assessment. Available at: http://water.usgs.gov/nwsum/WSP2425/functions.html.

DR-BIO-67

Information Required:

Please include an assessment of the feasibility of reconfiguring the project footprint to retain some or all of the project area ephemeral drainages with setbacks from the banks of the drainages to accommodate a buffer for protection of water quality and to provide wildlife habitat connectivity.

Response:

As described in the data response introduction, the Ridgecrest site plan has been reconfigured to minimize impacts to natural stormwater flows across the El Paso Wash. As a result of the proposed site realignment, the El Paso Wash will be avoided, with the exceptions of the crossing of Brown Road, the HTF pipe bridge, the new 230-kV transmission line, and 8 to 10 drainage channel tie-ins. See DR-BIO-62 for a discussion of the development setbacks and treatment of smaller watercourse and washlets that would contribute to protection of water quality and maintain wildlife habitat connectivity within the proposed site plan reconfiguration. Please see other data responses included in this submittal for a discussion of how the reconfigured Project contributes to maintaining habitat connectivity for DT (BIO-DR-53), WBO (BIO-DR-56 and 57), and MGS(BIO-DR-58). An updated JDR will be prepared to reflect the revised site plan and will incorporate CDFG's guidance and requests regarding ephemeral features (See DR-BIO-60). A revised functions and values analysis for the current and post-project conditions will be included, per DR-BIO-63 and DR-BIO-66b, after supplemental field delineations take place during spring of 2010. These documents will further evaluate the Project's effects on water quality as they relate to ecological function and wildlife habitat.

DR-BIO-68

Information Required:

Please discuss whether surveys were conducted, remote imagery analysis (of high resolution aerials) was used, or other types of review for possible creosote bush rings in the project survey area were undertaken, and if so, the results of the surveys including a map depicting the locations of creosote rings. If no such analysis was made, please provide a recent analysis and maps of creosote bush rings on the project site.

Response:

Potential creosote rings on the Ridgecrest site were identified by methodically scanning high-resolution (one-foot) aerial imagery of the region in the ESRI ArcGIS software environment (Towill 2009) and Google Earth 5.1. A creosote ring preserve in Lucerne Valley, California was used as a visual reference for identifying creosote ring features in aerial imagery. At each site, the GIS analyst scanned imagery at 1:1,200 scale (one inch equals 100 feet) for creosote ring features. This scale was determined adequate (based on the reference site) to identify ring features greater than 10 feet in diameter. After scanning the extent of the aerial photo visible onscreen, a graphic mask was applied to indicate that the area had been surveyed. This reduced the amount of time spent re-visiting surveyed areas and also ensured total coverage of the site. Point features were placed on potential ring features to be revisited for closer examination.

After scanning the entire disturbance area, features identified as potential creosote rings were re-examined in greater detail. While these features were ring-shaped and greater than 10 feet in diameter, it was determined that some involved shadow and terrain and those features were excluded. Fifty potential creosote rings greater than 10 feet in diameter were determined to be present in the project disturbance area. These features have not been ground-truthed. However, the aerial imagery used is considered sufficient for this analysis. A map of the location of the potential creosote rings is seen in Figure DR-BIO-68 included in Attachment DR-BIO-68, provided at the end of this section.

DR-BIO-69

Information Required:

Please prepare a Weed Management Plan that includes at least the following elements:

a) Plan Goals and Objectives: Define the goals of the Weed Management Plan. At a minimum, the Weed Management Plan should include a goal that the plan will protect the biological resources surrounding the project from the harmful effects of weeds and potential unintended harm from weed management techniques, and will be consistent with all applicable LORS. Identify specific weed management objectives (eradication, suppression, or containment) for each non-native plant species that could potentially threaten the areas affected by the project.

b) Noxious Weed Inventory/Baseline Conditions: Please describe the baseline conditions (weeds found, vectors, population densities, etc.) and provide an approximate distribution map showing concentrations of the noxious weeds and other invasive non-native plants in the project buffer. The complete project site will be denuded so this information is not needed for the site.

c) Define and Map the Weed Management Area: Identify the areas that will be included as part of the Weed Management Area (WMA), which should include at least project facilities, linear facilities and a buffer area 100 feet out from the boundary of these features; access roads and a buffer 25 feet out from both sides of the roads. A GIS-based map of the project area should be included to clearly define these buffer zones and facilities as part of the Weed Management Area.

d) Weed Risk Assessment: Consistent with BLM guidelines for weed management, conduct a weed risk assessment for each component of the Project construction, operation, and closure that involves soil disturbing activities or altering vegetation; the stepwise risk assessment is available online at: http://www.blm.gov/ca/st/en/prog/weeds/9015.html.

e) Monitoring and Survey Methods: Describe survey and monitoring methods that will be used during construction and operation to ensure timely detection and prompt eradication of weed infestations. Describe how locations of noxious weed occurrences and other data (detection date, growth stage, infestation extent, treatments implemented, results of treatment, and current status) will be mapped and maintained during the construction and operation phases.

f) Weed Management: Describe measures that will be employed during construction, operations and site closure to prevent the establishment of new weed species, eliminate small, rapidly-growing infestations, prevent large infestations from expanding, and reduce or eliminate large infestations. Include implementation schedules, monitoring reporting requirements, budgets, and responsible parties. Include the following elements: Prevention & Exclusion; Early Detection & Rapid Response; Eradication & Management; Restoration (of treated sites); Employee Education & Training; Funding & Resources; Enforcement & Compliance. Please refer to BLMs Weed Prevention and Management Guidelines online: http://www.blm.gov/ca/st/en/prog/weeds/weedprevent.html

g) Reporting Requirements: Describe the proposed content of construction-phase monitoring reports and longer term weed control progress reports. Reporting during construction should include monthly summary reports describing observations and activities relevant to noxious weeds management, and a compilation and analysis of this information into quarterly reports. Upon completion of construction a report should be prepared describing the overall results of noxious weed management and current weed status at the project site. Thereafter annual monitoring reports should be produced for the duration of the monitoring period. The annual reports should include information on noxious weed surveys and management activities for the year, a discussion of whether the weed management goals for the year were met, and recommendations for weed management activities in the upcoming year.

h) h. Attachments/Other Information: If the following elements were not included in the body of the report they could be included as attachments to the Weed Management Plan: detailed maps (see map guidelines, above); herbicide use protocols and sample record forms; sample monitoring data forms; Cal-IPC and CDFG rankings and ratings and details on management strategy and control methods for each observed and potentially occurring noxious weed on the project site; species -specific goals and Objectives (measurable, with time frame); methods for evaluation of success in achieving weed control goals.

Response:

Please refer to Attachment DR-BIO-69, Draft Weed Management Plan, provided at the end of this section.

DR-BIO-70

Information Required:

Please provide a translocation plan for American badger. The plan should include a description of the protocols to be used for capture, transport, and release of American badgers and a discussion of the potential receiving site and why it is determined to be acceptable. This plan should reflect close coordination with the relevant agencies.

Response:

Please refer to Attachment DR-BIO-70, Draft American Badger Translocation Plan, provided at the end of this section.

DR-BIO-71

Information Required:

Please provide information on the location and characteristics of the lands proposed for compensatory mitigation for Species of Special Concern, the associated enhancement and endowment costs, and the long-term monitoring plan for these compensation lands. The discussion of off-site compensation habitat should reflect close coordination with the relevant agencies (Energy Commission staff, CDFG, USFWS, and BLM).

Response:

Lands proposed as compensatory mitigation for Species of Special Concern that would be affected by the RSPP have not yet been selected. Therefore, it is not possible at this time to provide detailed site-specific information on the location, characteristics, enhancement and endowment costs, or long-term monitoring of compensatory mitigation lands. However, the response to DR-BIO-72, below, describes the compensatory mitigation approach, including how suitable mitigation lands would be located and evaluated, how enhancement and endowment costs would be estimated, and information on the development of long-term management and monitoring plans. Please refer to DR-BIO-72 for a complete response to this data request.

DR-BIO-72

Information Required:

Please provide a compensatory desert tortoise habitat mitigation proposal that fully mitigates the proposed impacts of the taking, as described in California Code of Regulations §783.4.

- For compensation lands intended to satisfy California Endangered Species Act (CESA) Incidental Take Permit requirements, the project owner shall transfer fee title or a conservation easement on compensation lands to California Department of Fish and Game (CDFG) under terms approved by CDFG. Alternatively, a Compliance Project Manager-approved, in consultation with CDFG and United States Fish and Wildlife Service (USFWS), non-profit organization qualified pursuant to California Government Code section 65965 may hold fee title or a conservation easement over the compensation lands. In the event an approved non-profit holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG; in the event an approved non-profit holds a conservation easement over the compensation lands, CDFG shall be named a third party beneficiary.
- The project owner will be required to provide initial enhancement funding and a non-wasting endowment to manage the compensation lands in perpetuity.
- Coordinate with BLM in order to satisfy their requirements in the compensatory mitigation proposal.

Response:

A compensatory habitat mitigation proposal that would mitigate Project impacts to special-status species, including DT, is currently under development as an HMMP. A preliminary draft HMMP will be provided in February 12, 2010. The response provided below summarizes the approach proposed to develop and implement a comprehensive compensatory mitigation plan for impacts to DT, Mohave MGS, and other special-status species.

<u>Introduction</u>

Compensatory mitigation for the RSPP would be achieved through a combination of off-site land acquisition, off-site habitat enhancement, and funding conservation programs that benefit the special-status wildlife species that would be affected by implementation of the Project. The compensatory mitigation approach described in this data response would be further developed and refined in the HMMP to be provided once mitigation lands are selected. Development and refinement of the HMMP would be conducted in close coordination with applicable resource agencies (CDFG, USFWS, BLM and CEC). As noted above, the draft HMMP will be submitted on February 12, 2010; the Applicant will then work with the agencies to refine the draft into a final HMMP.

Land acquisition, preservation, and enhancement through management would be an important component of the overall compensatory mitigation approach. Land acquisition involves securing and preserving unprotected lands via a Conservation Easement to facilitate the conservation of the resource (i.e., wildlife, vegetation, or jurisdictional waters) in perpetuity. Land acquisition may occur through two primary mechanisms: 1) purchase of private lands or 2) payment of a fee to a third party for the purchase of lands. In either approach, the costs associated with land acquisition would be the responsibility of the permittee (i.e., Project owner) and would include not only the cost of the land parcels to be acquired, but also fees for the initial enhancement and continued long-term management and monitoring (via a non-wasting endowment) of those lands by a third party in perpetuity. Acquired land would be preserved and managed for the biological resource or species habitat values in perpetuity.

The location of lands to be acquired for compensation would be determined based on consultation with the resource agencies (CDFG, USFWS, CEC, and BLM). Priority lands for acquisition would be identified using the following criteria:

- *Species occurrences, and habitat quality.* Acquisition efforts shall focus on protecting habitat of adequate quality for special-status species impacted by the Project (see Species-specific Habitat Quality Criteria, below) that, at minimum, provides functions and values equal to that present on the Project site. Where possible, preservation of high-quality occupied habitat that satisfies the mitigation requirements for DT, MGS, and WBO will be given highest priority.

- *Location*. Priorities for acquisition would include lands in the vicinity of the Project site (i.e., within the same or adjacent watershed).

- *Landscape position*. Priorities for acquisition would include 1) lands that preserve key movement corridors, or 2) areas that contribute to the connectivity between other preserved or high-value sites for impacted species (e.g., critical habitat, known population sites, or other preserve lands).

- *Maximum size*. Acquisition parcels shall be as large as possible to maximize ecosystem functions on site, population sizes of special-status species, and protection of species from adjacent land uses and edge effects. Opportunities for augmentation of existing preserved land would be considered a high priority. Also, consideration of the future potential for consolidation of acquisitions within a larger management framework would be considered. Larger preserves allow for greater efficiency and effectiveness in implementing large-scale enhancement or restoration actions, and preserve management.

- *Land designation*. Important areas identified in Federal species recovery plans (e.g., within DT critical habitat), or species-specific conservation strategies (e.g., within or adjacent to known or core MGS populations).

- *Presence of Invasive Species.* Invasive species that are likely to jeopardize habitat functions and values must not be present at a sufficient density to impact site quality as it pertains to use of the site for compensatory mitigation.

- *Vegetation Community Composition.* Vegetation community composition on potential mitigation lands, including the presence of desert washes, should be representative of communities present on the Project site, if possible.

- *Enhancement opportunities*. Lands that are presently limited in habitat value may be considered priorities for acquisition if they can be feasibly enhanced or restored to functional, high-quality habitat, and would contribute to regional connectivity of populations or important habitats.

- *Other property constraints*. Acquisition efforts would avoid lands with lease rights or other liens that would be contradictory to the purpose of using the property for special-status species protection (e.g., mineral leases, water rights, natural gas drilling easements) or with the presence of cultural or other resources on site that would limit potential options for special-status species protection.

- *Long-term management feasibility*. Priority acquisition lands would occur under the purview of a reputable land management entity that is solvent, and with strict assurances that the property would be preserved in perpetuity (e.g., conservation easements).

- *Contribution to the goals of the Desert Renewable Energy Conservation Plan (DRECP)*. The State of California and the U.S. Department of Interior are cooperatively developing the DRECP. The DRECP will establish a science-based process for reviewing, approving, and permitting renewable energy applications in California. The DRECP will create a government-organized habitat mitigation program that consolidates habitat purchases for compensatory mitigation. Land acquisition to mitigate for impacts of the RSPP shall focus on parcels that would contribute to DRECP goal attainment, where feasible.

Additional surveys of potential mitigation sites (e.g., DT protocol-level surveys, MGS habitat assessment, etc.) would be conducted in order to evaluate conditions relative to some of the above-mentioned factors (e.g., species occurrences and abundance, habitat quality, etc). Species-specific criteria for evaluating habitat quality on potential mitigation lands are included below.

As potential compensatory lands are identified, the RSPP team would coordinate closely with CEC, CDFG, USFWS, and BLM in an attempt to obtain consensus that the targeted lands are suitable. During the mitigation site selection process, close collaboration would also occur with non-profit entities known to participate in mitigation planning within the Mojave Desert (e.g., DT Preserve Committee and Wildlands). Specific opportunities that could be considered for land acquisition in reasonable proximity to the RSPP site include: private lands that would augment the DT Natural Area preserve (located approximately 25 miles south of the RSPP site), and private lands adjacent to CDFG-owned parcels on Little Dixie Wash located just west of the RSPP site.

<u>Species-specific Habitat Quality Criteria</u>

The following section provides additional detail regarding species-specific habitat quality criteria that would be used to guide selection of off-site mitigation lands in order to satisfy compensatory requirements for the respective species. These species-specific criteria were developed using a regional perspective.

Mojave Desert Tortoise

The suitability of potential off-site mitigation lands as habitat compensation for Project impacts to DT would be based on the following criteria:

- Within current occupied range of species.
- Within same population and genetic unit as the Project site (e.g., within the Western Mojave Recovery Unit and preferably within the same or adjacent watershed).
- Similar vegetation species/community composition to the Project site, or, if the habitat at the Project site is highly disturbed (including regrowth), then shrub cover consistent with occupied habitat in the region would be preferred.
- Sufficient shrub cover to provide thermal cover and establishment of an herbaceous layer as forage for DT.

- Presence of abundant and diverse native herbaceous plant cover (as forage).
- High cover site potential, relative to both topography and soils (e.g., burrows, caliche caves, and other shelter sites).
- Friable (e.g., alluvial) soils for burrows (shelter, nests and overwintering); however, habitat quality decreases with extremely sandy soils that do not support burrow construction.
- Habitat with limited anthropogenic disturbance and sources of mortality (e.g., preference for sites where the following threats are absent or of limited influence: livestock or feral horse/burro grazing, roadways, fences or other movement barriers, OHV use, raven predation, trash dumping, chemical contamination, etc).
- Sufficiently far from development (e.g., equal or greater distance from development than proposed Project site).
- Compatible adjacent land uses. Preserved and undeveloped lands are the highest priorities for adjacent land uses, or conditions that allow for effective boundary defensibility from adjacent threats.
- Within relative proximity to critical habitat, and/or with potential for connectivity between or amongst critical habitat.
- Existing species occupancy, or likely occupancy based on habitat suitability and occupancy of adjacent lands.

Mohave Ground Squirrel

The suitability of potential off-site mitigation lands as habitat compensation for Project impacts to MGS would be based on the following criteria:

- Within current range of MGS with evidence that the site is occupied by the species.
- On flat to moderately sloping terrain.
- Within reasonable proximity to the Project site (e.g., preferably within the same or adjacent watershed)
- Presence of shrub layer that includes species known to be used as forage (e.g., winterfat [*Krascheninnikovia lanata*], spiny hopsage [*Grayia spinosa*], saltbush [*Atriplex* sp.]) and larger shrubs that provide cover and protection against temperature extremes.
- Presence of abundant and diverse native herbaceous plant cover (as forage).
- Presence of friable (e.g., alluvial) soils that are suitable for burrow construction (nesting, shelter, hibernation). Soil suitability decreases with extremely sandy soils. Additionally, MGS are not known to use desert pavement, and generally do not inhabit rocky areas; hence, such areas would be avoided.
- Habitat with limited anthropogenic disturbance and sources of mortality (e.g., preference for sites where the following threats are absent or of limited influence: livestock or feral horse/burro grazing, roadways, fences or other movement barriers, OHV use, raven predation, trash dumping, chemical contamination, etc).
- Sufficiently far from development (e.g., equal or greater distance from development than proposed Project site; therefore, greater than 5 miles from development).

- Compatible adjacent land uses. Preserved and undeveloped lands are the highest priorities for adjacent land uses.
- Landscape position/connectivity. Preferred sites would be within identified core or known occupied population areas, or in areas that connect known/core populations or other high-quality sites (see Figure DR-BIO-58c and 58d).

Western Burrowing Owl

The suitability of potential off-site mitigation lands as habitat compensation for Project impacts to WBO would be based on the following criteria:

- Within current range of species.
- On flat to moderately sloping terrain.
- Within relative proximity to the Project site (e.g., preferably within the same or adjacent watershed, or within Kern County).
- Less than 30 percent shrub and/or tree cover.
- Presence of suitable (e.g., natural or artificial) burrows for nesting.
- Existing species occupancy and abundance.

Habitat Mitigation and Monitoring Plan

The HMMP is currently under development. As mentioned above, a preliminary draft HMMP will be provided in February 12, 2010. The Plan would include specific information regarding proposed minimum compensation ratios and criteria for identifying mitigation lands, site-specific mitigation strategies (e.g., preservation versus enhancement options on mitigation lands), implementation of the mitigation approach, and long-term management (including maintenance and monitoring needs) once mitigation lands are selected. As part of the HMMP, an implementation plan would be developed for selected mitigation lands to ensure that the site-specific mitigation strategy is implemented successfully. The implementation plan shall include restoration and/or enhancement needs, associated success criteria, monitoring, adaptive management, and contingency measures.

A long-term management and monitoring plan (LTMP) will also be developed for selected mitigation lands to ensure protection of species-specific habitat values in perpetuity. It is anticipated that a draft LTMP would be provided by October 2010, assuming that mitigation lands have been selected and associated resource assessments completed by this time. The LTMP will describe habitat characteristics of the parcel(s) of land, how the parcel meets the requirements of covered species, and the long-term management (including maintenance and monitoring) needs of the parcel for these species. If the same compensation site(s) is being proposed to satisfy compensatory mitigation needs for multiple species a justification for why the site(s) is acceptable for all species would be included. The LTMP will require annual monitoring reports to be prepared addressing the effectiveness of habitat enhancement(s) and conservation of the mitigation lands acquired to compensate for impacts to covered species. The implementation plan and LTMP could be developed either as part of the HMMP or as separate documents in support of the HMMP. Development and refinement of the HMMP, including the implementation plan and LTMP, will be conducted in close coordination with applicable resource agencies (CEC, CDFG, USFWS, and BLM) to ensure that the compensatory mitigation proposal (HMMP) satisfies each agency's specific mitigation requirements. The HMMP would be subject to the approval of CDFG and USFWS.

As part of the process leading up to the acquisition of compensation lands (i.e., during development of the HMMP), a Property Analysis Record (PAR), or a PAR-like analysis, will be conducted to estimate costs associated with implementation of the mitigation strategy (land acquisition and initial property enhancements) and long-term management and monitoring. The PAR analysis is a commonly used and accepted software tool developed by the Center for Natural Lands Management (2008). The PAR models the anticipated costs associated with the acquisition of land, as well as management expenses, while accounting for escalation in costs associated with inflation. The PAR will analyze the characteristics of a target property, and the associated costs required to manage the site (e.g., fencing, habitat enhancement, monitoring, etc.). The end result of the PAR model will be an accurate estimate of the long-term endowment costs that would be required to fully implement all compensation measures.

Additionally during the HMMP development, the Project Applicant would provide assurances that the property shall be 1) preserved in perpetuity through the establishment of a conservation easement and identification of an appropriate fee title holder, 2) managed by a reputable land management entity, and 3) fully funded through a non-wasting endowment as described in detail below.

1) *Establishment of Conservation Easement and Identification of Fee Title Holder*

   A conservation easement would be established for private lands acquired for compensatory mitigation purposes such that lands would be preserved in perpetuity. Because a conservation easement would be used as the vehicle for resource protection, the fee title holder can be either the original land owner, the Project Applicant, or an approved third-party entity such as the Desert Tortoise Preserve Committee, Inc. (DTPC), Wildlands, Inc., The Nature Conservancy, CDFG, or other land conservancy. In the case of the RSPP a third-party entity would be preferred. The Project owner shall transfer fee title or a conservation easement on compensation lands either to CDFG under terms approved by CDFG, or alternatively, to a Compliance Project Manager-approved, in consultation with CDFG and USFWS, non-profit organization qualified pursuant to California Government Code section 65965 (e.g., DTPC, Inc.; Wildlands, Inc., The Nature Conservancy, etc.). In the event an approved non-profit holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG; in the event an approved non-profit holds a conservation easement over the compensation lands, CDFG shall be named a third-party beneficiary. The preferred approach is for a qualified non-profit to hold the conservation easement.

2) *Selection of Land Management Entity*

   A land management entity would be selected that will be responsible for managing compensation lands according to the terms of the conservation easement in perpetuity. Therefore, the selected land management entity will be one that is reputable, solvent, and capable of managing the property for its intended purpose (e.g., has a proven track record of land stewardship).

3) *Funding Assurances*

   The Project owner (i.e., Applicant) would be required to provide initial enhancement funding and a non-wasting endowment for the management of compensation lands in perpetuity. The endowment will be necessary to fund long-term management of the property; therefore, the endowment amount must be acceptable to both the selected land management entity tasked with managing the property and the resource agencies. As mentioned above, the amount of the permanent capital endowment would be determined through the PAR or PAR-like analysis. Interest from this amount must be available for reinvestment into the principal and for the long-term operation, management, and protection of the mitigation lands, including reasonable administrative overhead, biological monitoring, law enforcement measures, and any other action designed to protect or improve the habitat values of the mitigation lands. The endowment principal cannot be drawn upon unless such withdrawal is deemed necessary by the resource agencies, or the third-party entity approved by the agencies to ensure the continued viability of the species on the properties. The preferred approach is to have the land manager and the endowment holder be the same entity.

Fee Programs

In addition to land acquisition, described above, the proposed compensatory mitigation approach for impacts to special-status species would include the payment of a fee on a per-acre basis. The fees resulting from the remaining mitigation requirement may be paid to an existing in-lieu fee program or may be donated to a nongovernmental organization (NGO) (e.g., DTPC, Inc., Wildlands, Inc.) and would be designated for specific activities that would promote recovery and/or preservation of the impacted species in the region. Funded activities would occur in proximity to the Project site (within the same County or the same or adjacent watershed), if possible. Donating funds to a private organization will be subject to prior approval by CDFG and USFWS and shall be supported by a contract or agreement detailing the amount and specific purpose of the funds being donated. Funded activities could include, but are not limited to, the following:

- Habitat enhancement of existing preserved lands (e.g., revegetation, invasive plant control);
- Exclusion or reduction of key disturbance sources (e.g., livestock grazing, predators, OHVs);
- Reduction of mortality sinks (e.g., roadways and linear barriers);
- Research studies and monitoring;
- Captive breeding and release programs; and
- Public information and education programs.

Some potential mitigation opportunities for the RSPP identified to date are summarized below.

- Install fencing along major roadways bordering important population areas in Kern County (e.g. U.S. Highway 395).
- Collaborate with the DTPC to identify high-priority management actions for the protection of DT in Kern County.
- Construct and monitor effectiveness of wildlife crossings under Brown Road and U.S. Highway 395 in the vicinity of the Project site. Crossings would be designed to facilitate safe passage of DT and MGS across roads in the vicinity of the Project site.
- Fund a radio-telemetry MGS movement study in the Western Mojave area to evaluate the movement of MGS between key population areas, within the MGS Habitat Conservation Area (HCA), and between the MGS HCA and lands outside the HCA. This study would help to better characterize key lands for connectivity and wildlife movement and facilitate more accurate target areas for land acquisition, preservation, and management
- Designate funds to facilitate and enhance raven monitoring, management, and control through the regional raven management program in development by USFWS and supporting agencies. This fee may be directed to USFWS to be applied as part of a new in-lieu fee program being developed. BLM may also be able to use funds to support raven management at recreational areas that attract ravens and could impact surrounding mitigation lands.
- The revised draft Desert Tortoise Recovery Plan was issued in 2008 (http://ecos.fws.gov/docs/recovery_plan/080804.pdf) and identifies several “Recovery Actions” for facilitating the protection and recovery of the species. The cost of the recovery is estimated to be a couple hundred million dollars and no firm source of funding has been identified. Recovery actions outlined in the Desert Tortoise Recovery Plan include:
  - Increasing law enforcement,
  - Closing roads that provide access to DT habitat through fencing,

- Excluding and eliminating burros and horses from DT habitat,
- Funding monitoring programs (i.e., establish a grant for monitoring), and
- Funding applied research that contributes to the long-term viability and conservation of DT (e.g., setting up a grant for graduate students to do research on the species)

Funds from the fee-based portion of the proposed mitigation strategy could be used to establish or contribute to funding in perpetuity for any of the above actions. The funds would be earmarked for support of the DT and specific recovery actions, and provided to a third party (e.g., DTPC, Wildlands, Inc., or other NGO) for management as appropriate.

DR-BIO-73

Information Required:

Please provide a Mohave ground squirrel compensatory habitat mitigation proposal that fully mitigates the proposed impacts of the taking, as described in California Code of Regulations §783.4.

- For compensation lands intended to satisfy CESA Incidental Take Permit requirements, the project owner shall transfer fee title or a conservation easement on compensation lands to CDFG under terms approved by CDFG. Alternatively, a CPM-approved, in consultation with CDFG and USFWS, non-profit organization qualified pursuant to California Government Code section 65965 may hold fee title or a conservation easement over the compensation lands. In the event an approved non-profit holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG; in the event an approved non-profit holds a conservation easement over the compensation lands, CDFG shall be named a third party beneficiary.
- The project owner will be required to provide initial enhancement funding and a non-wasting endowment to manage the compensation lands in perpetuity.

Response:

Please refer to DR-BIO-72 for a complete response to this data request.

DR-BIO-74

Information Required:

Please provide a copy of completed applications for the California 2081 (Incidental Take Permit) permit and the SAA.

Response:

The Streambed Alteration Agreement application was submitted to Mr. David Hacker of the CDFG on November 25, 2009. A copy of the Streambed Alteration Agreement was provided to the CEC at this time. The California 2081 Incidental Take Permit application will be submitted to the CDFG on February 12, 2010. A copy will be provided to the CEC at the time of submission.

DR-BIO-75

Information Required:

Please provide a Biological Assessment to BLM and USFWS to facilitate completion of the Biological Opinion (Take Authorization) by the USFWS.

Response:

The Biological Assessment will be submitted to the BLM and USFWS on March 1, 2010. A copy will be provided to the CEC at the time of submission.

DR-BIO-76

Information Required:

Please provide a monitoring plan to investigate whether birds are being killed and/or injured from facility operation. The monitoring should last two years unless it can be justified to monitor a shorter or longer period. Carcass removal and searcher efficiency studies should be included as part of the overall monitoring study to identify any biases that need correction. The plan should reflect coordination with the relevant agencies.

Response:

Please refer to Attachment DR-BIO-76, Draft Avian Mortality Plan, provided at the end of this section.

DR-BIO-77

Information Required:

Please provide a relocation plan for desert kit fox. The plan should include a description of the process of closing down dens and a description and discussion of the receiving area and why it is determined to be acceptable. This plan should reflect close coordination with CDFG. The value to kit foxes of potential, known, and natal/pupping dens differ and therefore, each den type needs a different level of protection. When preparing the plan, include the following standard recommendations:

Natal/pupping dens: Natal or pupping dens which are occupied will not be destroyed until the pups and adults have vacated. Therefore, project activities at some den sites may have to be postponed.

Known Dens: Known dens occurring within the footprint of the activity must be monitored for three days with tracking medium or an infra-red beam camera to determine the current use. If no kit fox activity is observed during this period, the den should be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den should be monitored for at least five consecutive days from the time of the observation to allow any resident animal to move to another den during its normal activity. Use of the den can be discouraged during this period by partially plugging its entrances(s) with soil in such a manner that any resident animal can escape easily. Only when the den is determined to be unoccupied may the den be excavated under the direction of the designated biologist. If the animal is still present after five or more

consecutive days of plugging and monitoring, the den may have to be excavated when, in the judgment of the Designated Biologist, it is temporarily vacant, for example during the animal's normal foraging activities. Hand excavation is encouraged, but it is realized that soil conditions may necessitate the use of excavating equipment. However, extreme caution must be exercised.

Destruction of the den should be accomplished by careful excavation until it is certain that no kit foxes are inside. The den should be fully excavated, filled with dirt and compacted to ensure that kit foxes cannot re-enter or use the den during the construction period. If at any point during excavation a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den as described above should be resumed. Destruction of the den may be completed when in the judgment of the Designated Biologist the animal has escaped from the partially destroyed den.

Potential Dens: Potential dens should be monitored as if they were known dens.

Response:

Please refer to Attachment DR-BIO-77, Draft Desert Kit Fox Relocation/Translocation Plan, provided at the end of this section.

DR-BIO-78

Information Required:

Please provide a detailed enhancement plan for desert kit fox receiving area and discuss why these measures will increase the likelihood of a successful desert kit fox relocation effort.

Response:

If kit foxes are translocated, they would be moved to receiving sites with suitable habitat sufficient to support all translocated animals. Therefore, no additional habitat enhancement is proposed.

Attachment DR-BIO-53

Regional and Local DT Connectivity

Kings County
Tulare County
Inyo County
Project Location
Ridgecrest
Oildale
Kern County
Lamont
Arvin
San Luis Obispo County
Tehachapi
Rosamond
Santa Barbara County
Lancaster
Palmdale
Victorville
Santa Clarita
Ventura County
Los Angeles County
Hesperia
San Bernardino County
Twentynine Palms
Desert Hot Springs
Los Angeles
Los Angeles County
Riverside County
Orange County
Orange County
San Diego County
Oceanside
Escondido
Encinitas
Imperial County
California
Arizona

Map Location

Legend

- Project Area
- Desert Tortoise Critical Habitat (USFWS)
- WEMO DWMA

Source: ESRI; USFWS; BLM; AECOM

N
W
E
S

1 inch = 24 miles

0 24 48 Miles

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

DR-BIO-53-1
Regional and Local DT Connectivity

Solar Millennium

AECOM

Date: January 2010

Path: P:\20090908080\Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\Wildlife\DR_BIO_53_RegionalandLocalDTConnectivity.mxd, 01/14/10, SteinB

Attachment DR-BIO-54

Draft Desert Tortoise Clearance and Relocation/Translocation Plan

DRAFT
RIDGECREST SOLAR POWER PROJECT
DESERT TORTOISE CLEARANCE AND RELOCATION/TRANSLOCATION PLAN

Prepared for:

Ridgecrest Solar I, LLC
1625 Shattuck Ave, Suite 270
Berkeley, CA 94709

Prepared by:

AECOM
Contact: Leo Edson
Phone: (916) 414-5800

January 2010

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LIST OF ATTACHMENTS

DR-BIO-54-A Guidelines for Desert Tortoise Translocation (USFWS 1994)

DR-BIO-54-B Recommended Specifications for Permanent Desert Tortoise Exclusion Fence

DR-BIO-54-C Clearance Survey Protocol for the Desert Tortoise – Mojave Population

DR-BIO-54-D Guidelines for Handling Desert Tortoise During Construction Projects

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Figure DR-BIO-54-1 Regional Map

Figure DR-BIO-54-2 Vegetation Communities

Figure DR-BIO-54-3 Desert Tortoise Observations

Figure DR-BIO-54-4 Project Site Relative to the West Mojave Plan (WEMO) Desert Wildlife Management Area and Desert Tortoise Critical Habitat

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I. INTRODUCTION

Ridgecrest Solar I, LLC (or Applicant) proposes to construct, own, and operate the Ridgecrest Solar Power Project (RSPP or Project). The Project would have a nominal output of 250 megawatts (MW) and consist of a single power plant utilizing two solar fields.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, about 5 miles southwest of the City of Ridgecrest, California (Figure DR-BIO-54-1). The Project right-of-way (ROW), for which the Applicant has applied to the Bureau of Land Management (BLM), includes approximately 3,995 acres of public lands owned by the Federal government and managed by BLM. Lands within the Project ROW are primarily undeveloped open space dominated by Mojave creosote bush scrub vegetation (Figure DR-BIO-54-2). The Project facilities would occupy approximately 1,448 acres of the 3,995-acre site, and there would be a total Project disturbance area (area inside and outside the facility fence line that will be disturbed by the Project), of approximately 1,944 acres on site plus 16.3 acres resulting from construction of the water pipeline offsite.

Protocol surveys for desert tortoise (*Gopherus agassizii* [DT]), a State and federally listed threatened species, were conducted from March 7 through May 28, 2009, and on October 26, 2009. Surveys were conducted throughout the Project disturbance area and in the buffer area (i.e., along transects forming a 1,000-foot buffer around proposed Project linear features and a 0.75-mile and 1-mile buffer around remaining non-linear Project features, as required by the California Energy Commission [CEC]). A total of 40 DT were detected in the Project disturbance area and 11 were found in the buffer area. Additional DT sign (burrows, pallets, scat, tracks, carcasses, and shell remains) was also observed throughout the Project disturbance area and in portions of the buffer.

Implementation of the proposed Project has the potential to adversely affect the State and federally listed DT. Incidental take authorization of DT must be obtained prior to implementation of the Project to comply with the Federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA). Relocation or translocation of DT from the Project footprint is anticipated and is a requirement of both the ESA and CESA incidental take permits.

This Desert Tortoise Relocation Plan/Translocation (Plan) has been prepared on behalf of the Applicant and outlines the methods that would be used to protect DT within the Project disturbance area and move DT out of harm's way prior to the onset of construction activities. Moving DT would include either simply removing DT a short distance to another part of their home range (relocation), which is preferred by the Applicant, or moving DT outside their home range to suitable conservation areas away from the Project (translocation). This Plan also identifies measures that would be implemented for the maintenance, monitoring, reporting and management of the DT and the relocation/translocation land.

To reduce impacts on sensitive biological resources, the Project site plan was reconfigured to minimize impacts to the El Paso Wash, increase connectivity for the Mohave Ground Squirrel (MGS), and to reduce the impact to DT. The Project description, including acreage calculations,

presented below are based on the reconfigured site plan. However, survey results presented in this report are based on surveys conducted in 2009, prior to site redesign. Additional biological surveys will be conducted in spring 2010, after the site plan has been finalized, to ensure that all sensitive biological resources in the new Project footprint have been accurately identified and quantified. Following completion of spring 2010 surveys, impacts to sensitive biological resources will be updated and environmental compliance documents will be revised as appropriate. The Project mitigation will be developed based on the revised impact calculations.

II. BACKGROUND

A. Project Description

The proposed Project site is entirely on Federal land, including BLM ROW # CACA 49016, in Township 28 South, Range 39 East. Access to the northern portion of the Project site would be provided by a new 24-foot wide paved access road from Brown Road, approximately 1.6 miles west of the intersection of Brown Road with U.S. Highway 395. This access road runs about 450 feet from Brown Road to the location of the new office building and continues for approximately another 3000 feet to the entrance of the power block. Access to the southern portion of the Project site would also be provided by a new 24-foot wide paved access road from Brown Road, approximately 2.25 miles west of the intersection of Brown Road with U.S. Highway 395. This access road would run about 600 feet from Brown Road to the security gate for the south solar field.

The Applicant has applied for a ROW grant for approximately 3,995 acres of land owned by the Federal government and managed by BLM. The Project site is composed of undeveloped desert with naturally vegetated areas. There are no existing structures on site that would need to be demolished, but existing 115- and 230-kilovolt (kV) Southern California Edison (SCE) transmission lines that traverse the southwestern portion of the site will require relocation. Construction and operation of the RSPP would disturb a total of approximately 1,944 acres on site plus 16.3 acres offsite resulting from construction of the water pipeline. This total includes areas outside the fence line of the Project facilities themselves, primarily rerouted drainage channels that avoid Project facilities, a water line, and access roads.

The Applicant proposes to develop a 250-megawatt (MW) solar energy facility on approximately 1,448 acres (Plant Site). The Project will utilize solar parabolic trough technology to generate electricity. Arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. Heat transfer fluid (HTF) is heated to high temperatures (750 degrees Fahrenheit [°F]) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced.

The power plant will have two solar fields. The north solar field would be 1,118 acres and the south field would be 809 acres. The northern solar field would be located north of Brown Road and the southern solar field would be located south of Brown Road.

The power block would be located north of Brown Road, immediately southwest of the northern solar field. The power block would be composed of its own administration, control, warehouse, maintenance, and lab buildings; the HTF pumping and freeze protection system; solar steam generator; a propane-fired auxiliary boiler; one steam turbine generator; an air-cooled condenser; generator step-up transformer, transmission lines and related electrical system; potable and treated water tanks; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

In addition to the main power generating facility, the site would include a main office building and parking lot, a main warehouse with laydown area, on-site access roads, a tie-in switchyard, and a land treatment unit for bioremediation or land farming of any HTF-contaminated soil.

The Project would generate electric power solely via solar energy. Propane will be used to fire an auxiliary boiler overnight to support startup operations until the HTF system is up to operating temperature, at which time the generation of electricity can commence. A second fired heater will be used as needed, mostly during the winter, to prevent freezing of the HTF. A new, approximately 5-mile-long water pipeline would be installed within the Brown Road and China Lake Boulevard ROWs to connect the Project with the Indian Wells Valley Water District supply. (The diameter of the pipe would be 12" diameter or smaller depending on the Water District's determination.) A new 230- kV transmission line from the turbine generator to a new nearby switchyard will interconnect with SCE's existing 230-kV InyoKern/Kramer Junction transmission line located west of the Project site.

B. Desert Tortoise Survey Results

A total of 51 DT were observed within the Project disturbance area and buffer, combined (i.e., biological resources study area [BRSA]) during focused surveys for DT conducted March 7 through May 28, 2009, and October 26, 2009 (AECOM 2009) and incidentally during other biological surveys in 2009. Surveys completed on October 26, 2009 were conducted within the water pipeline disturbance area a subset of the Project disturbance area, and associated buffer because the water pipeline route had not yet been finalized in spring 2009 (March 7 through May 28). Forty DT detections (including 23 adults) occurred within the Project disturbance area. Of all detections within the BRSA, 30 were adult DT, 12 were juveniles, and 9 were of unknown age. Over 200 DT burrows and 33 pallets were observed throughout the BRSA and are mapped in Figure DR-BIO-54-3. Twenty-three burrows were occupied by DT; 48 burrows were noted as active (exhibiting evidence of recent use by DT). Thirty-six of the active burrows and 18 of the occupied burrows were within the Project disturbance area. In addition, the following DT sign was observed within the Project disturbance area: four active DT pallets, 23 additional DT pallets, 99 observations of scat (12 of which were fresh), eight observations of bone fragments,

and five carcasses (2 of which were adults). DT tracks were common within active DT burrows. Figure DR-BIO-54-3 shows the location of DT and DT sign observed during the surveys conducted at the Project site.

The RSPP site is not located in DT critical habitat, nor is it located within any of the four DT Desert Wildlife Management Areas (DWMAs) designated for DT conservation under the West Mojave (WEMO) Plan (Figure DR-BIO-54-4). The nearest DWMA is the Fremont-Kramer DWMA, located approximately 7 miles south of the site. A total of 844 acres of the Project disturbance area (south of Brown Road) occurs within the MGS Conservation Area, a Wildlife Habitat Management Area designated by the WEMO (BLM 2005). The site is not located within any other WEMO-designated conservation areas.

III. PLAN GOALS

The goals of these relocation/translocation efforts are to:

- Successfully relocate at-risk DT to suitable habitat located adjacent to the Project site;
- If relocation is not feasible, successfully translocate at-risk DT from the Project site to selected translocation site(s);
- Minimize impacts of relocation to resident DT outside the Project site;
- Minimize the impacts of translocation on recipient DT populations; and
- Collect monitoring data to enhance understanding of translocation as a viable conservation technique, to ensure DT safety and evaluate success of relocation/translocation efforts, and to guide adaptive management to improve effectiveness of relocation/translocation.

IV. RELOCATION/TRANSLOCATION PLAN

This relocation/translocation plan meets the requirements of the Translocation Guidelines specified in Appendix B of the Desert Tortoise Recovery Plan (USFWS 1994). This Plan has also incorporated the interim guidelines set forth by the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) for the translocation of DT (LaPre, pers. comm. 2010). New techniques and requirements are currently in development by the USFWS and will be incorporated as they are received. Once this Plan meets BLM approval, it will be submitted as part of the overall proposed action to USFWS for consideration in USFWS's issuance of a biological opinion (BO). The BLM also will seek CDFG concurrence with this Plan prior to initiating formal consultation Section 7 with the USFWS. Final guidance provided in the Project BO will be incorporated into this Plan.

Relocation/translocation of DT would be necessary prior to the start of Project construction. The USFWS defines "translocation" as when a DT must be moved more than 5 kilometers (km) to clear it from the Project site, which typically removes the DT out of their home range, while "relocation" requires a movement of less than 5 km. Relocation, the preferred option, would be

used to move as many of the DT as possible. DT that need to be relocated from the Project disturbance area would be placed outside the Project disturbance area but would be placed in suitable habitat as close to the capture location as possible. However, translocation of DT further than 5 km may be necessary because of potential DT density constraints on land adjacent to the Project site. An evaluation of carrying capacity is planned to determine the appropriate number of DT to relocate on land adjacent to the Project site.

All relocation/translocation efforts would be carefully implemented to avoid adverse health impacts to the DT and to minimize adverse impacts to DT or receiving DT populations. In order to maximize relocation/translocation success, Project construction activities must be closely coordinated with appropriate DT clearance surveys, handling procedures, environmental considerations such as ambient temperature, animal health screening, and relocation/translocation scheduling. These are discussed in detail in the following sections. If any DT mortality is suspected as a result of any relocation/translocation activities described in this Plan, CDFG will be notified immediately.

A. Site Considerations and Options for Relocation

As indicated earlier, DT that are relocated from the Project footprint would be placed outside the footprint, but within the RSPP ROW.

If practical, DT detected during pre-construction surveys would not be "translocated" in the biological sense of putting an animal in a location outside their home range. Instead, DT would simply be moved to another part of their home range (i.e., relocated). By moving a DT found near the site's border abutting native vegetation to a suitable location immediately adjacent to its capture site outside the Project disturbance area, the Project would be maintaining the DT within its home range, not translocating it. For the transmission line and fence construction, DT would be moved a short distance from the construction zone. If a DT is detected in the middle of the Project site or if moving a DT would entail more than a 5-km move, then such an individual would be considered for translocation (see Section B, Site Considerations for Translocation).

As evident from Figure DR-BIO-54-2, the majority of the BSRA outside the Project disturbance area considered for potential relocation of DT consists of Mojave creosote bush scrub habitat, a suitable habitat to relocate DT. In general, the eastern portion of the BSRA and ROW is unsuitable for relocation, particularly to the north of Brown Road, where the presence of U.S. Highway 395 and scattered residential development pose a constraint. DT found in the western portion of the Project site would be relocated to suitable areas in the western BSRA or ROW. Similarly, DT found in the southern portion of the Project site would be relocated south. No DT from north of Brown Road would be relocated south of Brown Road and vice versa. All other DT would be translocated unless other mitigation measures (e.g., fencing Brown Road and Highway 395) are able to be implemented to ensure that relocated DT would be safe. Even DT relocated within their home range are likely to travel more when their home range is restricted by the Project fence and may be killed on U.S. Highway 395 or Brown Road. In all cases, DT would be relocated to suitable areas, as close as safely possible to the capture site.

The specific selection of relocation site(s) will be determined prior to the initiation of construction activities. Once preliminary relocation areas are determined based on "desktop" analysis, these areas will be surveyed prior to implementing relocation activities to determine the distribution of resident DT. The results of these surveys will be used to determine, in consultation with Dr. Karl and the agencies, whether the area would be suitable for the relocation of DT (e.g., area below the carrying capacity for DT).

Once further site(s) suitability has been determined, the location(s) and supporting information will be coordinated with USFWS, CDFG, and BLM to obtain their concurrence. A number of factors will be taken into consideration in determining the relocation sites; one of the primary considerations will include habitat suitability. The relocation site(s) will be composed of DT habitat that resembles the habitat on the Project site or possesses the best attributes for the survival of the DT. Analysis of the habitat will also consider precipitation, soils, vegetation community, vegetation density and abundance, perennial plant cover, forage species, geomorphology, and slope. The safety of the site(s) for DT, in relation to other existing land use features, such as roadways, will also be considered. For instance, U.S. Highway 395 east of the RSPP site would pose a risk to DT disturbed by the loss of habitat at the site, in combination with relocation.

In all instances, DT would be released into the deep shade of a large shrub, a known burrow for that DT, or an unoccupied natural or artificial burrow within the identified receiving area; and subsequently monitored by the biological monitor (BM; refer to Section C, Qualifications of Authorized Handlers, for a definition) with oversight by the authorized biologist (AB; also refer to Section C for a definition). Circumstances under which each option for release is considered appropriate will be determined in collaboration with the resource agencies. In cases where DT are relocated into an unoccupied natural or artificial burrow within the identified receiving area, the receiving burrow would be of the same size and orientation as the original burrow. The final determinations on placement of relocated DT would take place as a result of pre-construction clearance surveys in the Project disturbance area.

Site Considerations for Translocation

At this time, potential translocation site(s) have not been identified. Any considered translocation site and/or required compensatory habitat selection designed to fulfill permit conditions would be based on maximizing translocated animal survivorship and long-term conservation planning pertinent to all aspects of the Project. Various planning, geographic and administrative factors and tools, such as GIS, would be considered in potential translocation site(s) selection.

The USFWS has issued translocation guidelines for the Ivanpah Solar Energy Project, and based on these guidelines, is now preparing to issue new guidelines that would apply to all utility-scale solar projects (LaPre, pers. comm., 2010). These guidelines are being prepared by the Desert Tortoise Recovery Office in Reno. The RSPP team will contact the Desert Tortoise Recovery Office to obtain a copy of these new guidelines when they are available and incorporate the guidelines into the Project translocation planning and efforts.

B. Qualifications of Authorized Handlers

The USFWS (http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/dt) assigns a single designation for biologists who can be approved to handle DT - AB. Such biologists have demonstrated to USFWS that they possess sufficient DT knowledge and experience to handle and move DT appropriately. The AB is permitted to then approve specific monitors to handle DT, at their discretion. The CDFG must also approve such biologists, potentially including individual approvals for monitors approved by the AB. Although the CEC only has designations for "Designated Biologist" and BM, only the biologists (AB or other appointed monitors) authorized by USFWS and CDFG can handle DT.

An AB would be the responsible for directing the overall RSPP translocation/relocation program, including the clearance surveys, monitoring and reporting. The BM would assist the AB in other aspects of relocation/translocation program, as necessary. The primary responsibility of the BM would be monitoring construction activities, such as fence installation.

C. Consistency with Plans and Permits

At the time of the development of this Plan, application packages to procure incidental take permits pursuant to CESA and ESA, respectively, are being prepared and submitted to the regulatory agencies. All relocation/translocation techniques to be used per this Plan would adhere to terms and conditions specified in the State (Section 2081) and Federal (BO) incidental take permits, as well as the applicable finalized CEC Conditions of Certification, once they are obtained.

A number of guidelines and sources of information have provided primary direction for all relocation/translocation plan elements described in this document. Handling of DT and other DT protection measures would be conducted in accordance with the USFWS-approved protocols (DTC 1994; USFWS 2009). The techniques and translocation site options recommended herein are intended to be consistent with all pertinent regulatory plans developed for long-term conservation of the DT and specific permits issued for this Project. In addition, all actions discussed are based upon ecological considerations and information gleaned from previous DT translocations and translocation plans. This Plan has also been developed under the technical guidance of Dr. Alice Karl, who also shared documents that were incorporated into this Plan. Off-site translocation procedures identified in this document are based on established Translocation Guidelines prescribed in the Desert Tortoise Recovery Plan (USFWS 1994, Attachment DR-BIO-54-A) and will be modified as necessary; based on project-specific USFWS recommendations, including a new DT field manual currently in preparation.

D. Site Fencing

To facilitate DT relocation/translocation and exclusion, permanent DT exclusion fencing would be installed around the perimeter of the solar fields, power block and adjacent support structures prior to initiating DT relocation/translocation. External linear facilities and El Paso Wash would not be fenced. Site fencing would ensure that other DT do not enter the active construction areas. DT that utilize habitats proximal to the Project's linear utility features would also be excluded from

potential impact and/or removed from harm's way should they approach an active construction zone. Temporary fencing would be installed prior to clearance surveys around any initial construction startup/primary staging areas, in portions of linear utilities, and in any other areas where ground disturbance would occur outside permanent DT-proof fencing as a result of the Project to exclude DT from this area.

Prior to translocation/relocation activities, the boundary of the unit being developed would be permanently fenced with an 8-foot-high chain link fence for security purposes. Permanent DT exclusionary fencing would either be attached to the base of the security fence or installed just outside of this security fence. Both permanent and temporary fences involve the installation of 3-foot wide, 1-by-2 inch mesh hardware cloth, situated at 24 inches above ground, with 12 inches of material buried. Specifications for DT-proof fencing are provided in Attachment DR-BIO-54-B and can be found at the following website: http://www.fws.gov/ventura/sppinfo/protocols/DT Exclusion-Fence 2005.pdf. For temporary exclusion fences, rebar would be used to secure hardware cloth material every 4 to 5 feet. All fencing would be constructed with durable materials (i.e., 11 gauge or heavier) suitable to resist desert environments, alkaline and acidic soils, wind, and erosion.

All DT-exclusion fence installation activities (permanent and temporary) would be overseen and monitored by qualified BMs. The AB would be available at all times to move any DT that are within the path of the fence line work. After installation, all fencing would be monitored by the BM at least monthly as well as during storms and after high-wind events. Temporary fencing would be monitored at least weekly. Sand and debris would be removed as necessary. Repairs would be made immediately.

E. Clearance Surveys

A clearance survey for any DT that may be on the Project site will be conducted throughout the Project disturbance area. The timing of the clearance survey will coincide with heightened DT activity, from April through May or September through October. This will maximize the probability of finding all DT.

All clearance surveys will be performed per USFWS protocol guidelines (USFWS 2009). A copy of the guidelines is provided in Attachment DR-BIO-54-C. The AB would be primarily responsible for the clearance surveys and would be assisted by the BM and other qualified biologists with experience in conducting clearance surveys. Transect spacing between monitors would be appropriate for the vegetation present in the clearance area, but no greater than 5 meters apart. All DT sign encountered during clearance surveys would be recorded on standard forms (USFWS 1992) and studied for its possible indication of DT presence.

Within 24 hours prior to the initiation of construction of the DT-exclusion fence (permanent or temporary), a clearance survey would be conducted using techniques providing 100-percent coverage of the construction area and an additional transect along both sides of the fence line to provide coverage of an area approximately 90-feet wide centered on the fence alignment. Transects

would be no greater than 30 feet apart. A minimum of two clearance passes of complete coverage would be conducted. Any DT or potential DT burrow along and inside the fence line would be mapped for monitoring during fence construction, and the current use (e.g., occupied or unoccupied) would be identified.

After the area to be cleared is fully enclosed with DT-exclusion fencing, a DT clearance survey would be performed. A minimum of two clearance passes with complete coverage would be conducted as described above. Each separate survey would be walked in a perpendicular direction or offset transects to allow different angles of observation. If no DT are observed during the second survey, a third survey would not be conducted. If a DT is located on the second survey, a third survey would be conducted.

Once the area inside DT-exclusion fencing is deemed free of DT after at least two consecutive clearance surveys then heavy equipment would be allowed to enter the construction site to perform earth work such as clearing or cutting vegetation, grubbing, leveling, and trenching. The BM would monitor initial clearing and grading activities to find and relocate any DT missed during the initial DT clearance survey. Should a DT be discovered, then the AB would be responsible for relocating it outside the fence or arranging translocation.

F. Desert Tortoise Handling

All DT handling and removal, and burrow excavations, including nests, would be conducted under the supervision of the AB, in accordance with the USFWS approved protocols contained in the Desert Tortoise Council's "Guidelines for Handling Desert Tortoises during Construction Projects" (DTC 1994, rev. 1999) that incorporate the most recent, pertinent research data (Brown 2003). A copy of these Guidelines is provided in Attachment DR-BIO-54-D of this document. Any burrow that could potentially host a DT will be excavated with hand tools per the method prescribed under these Guidelines. In general, it is recommended that DT not be handled when the air temperature exceeds 90°F at 1.5 meters above the ground or if the ground temperature exceeds 95°F (DTC 1994, rev. 1999).

For relocation/translocation, each DT will be transported via an individual, sterilized tub with a taped, sterilized lid. Containers may be reused only after being disinfected with a 10-percent bleach solution and dried. Every effort will be made while handling DT to release each animal within 30 minutes of its capture. Except during brief (e.g., one-minute) periods when plastron measurements, weighing and photographs are taken, animals will be kept in an upright position.

When live DT are transported by vehicle, a means of cushioning the DT will be used to minimize jarring, bumping, and sliding. DT will not be placed in automobile trunks, on floorboards in an unconfined manner, in the bed of a truck over the exhaust system, or left unattended in vehicles. Transport by vehicle will involve only designated open routes, with speeds limited to 25 miles per hour on dirt or gravel roads.

DT observed on Project site utility corridors (e.g., water pipeline or transmission line) during Project operations and maintenance activities would not be disturbed or handled and would be allowed to move away of their own accord. Any maintenance that required surface disturbance or heavy equipment would require the same protection measures as for construction.

G. Data Gathering

The AB, with assistance from qualified biologists, would maintain a record of all DT encountered and relocated/translocated during Project surveys and monitoring. This information would include for each individual DT: the location (narrative, vegetation type, and maps) and dates of observations; burrow data; animal gender, carapace length, mass, and clinical signs of disease (discussed further in Subsection I); whether the animal voided its bladder; any apparent injuries and state of healing; and diagnostic markings (i.e., identification numbers). All DT handled would be photographed. Processing of DT found during the clearance surveys would be done the day of capture in an appropriate facility to provide shade, should temperatures require. Other options for a processing facility may be the use of temporary shade structures (e.g., E-Z Ups) or a temperature-controlled facility (e.g., a recreational vehicle).

H. Animal Health Considerations

Several diseases have been documented in wild DT populations. These include an upper respiratory tract disease (URTD) commonly associated with *Mycoplasma agassizii* (Rostal and Lance 2003); a similar disease complex connected to *Mycoplasma testudinium* and proliferative pneumonia (Jacobson and Berry 2004); a cutaneous dyskeratosis shell disease (Christopher et al. 2003); and a herpes virus (Origgi et al. 2002).

URTD and similar complexes are likely exacerbated by stress, which can be imposed on DT by drought, habitat degradation, poor nutrition and/or animal density (Saethre et al. 2003). It is also likely that certain levels of stress predispose DT to acquiring one or more of these diseases.

It is conceivable that the stress of translocation may either exacerbate existing disease or immunocompromise such that an animal contracts disease more easily. Other diseased animals must, however, be in the translocation area for healthy translocated DT to become infected.

M. agassizii transmission involves direct contact with an infected DT (Brown et al. 2003). DT are believed to be contagious during periods of acute phases, when they have clinical signs (Brown et al. 2003). Such signs include a mucous nasal discharge, wheezing, conjunctivitis, and lethargy.

All DT handled as part of this Plan will be examined for clinical signs of URTD symptoms, visible signs of herpes lesions and cutaneous dyskeratosis (Berry and Christopher 2001), with data recorded for each animal. Verified ill DT would not be placed in situations where contagion can spread to healthy DT. The AB will remove and quarantine any DT that requires translocation and shows clinical signs of disease. The AB will subsequently contact the USFWS within 24 hours to determine appropriate actions for these individuals. DT that are relocated would not require additional health assessments prior to relocation.

V. ANIMAL MONITORING AND REPORTING

All DT moved, whether during initial fence construction, from the Project site, during construction for linear facilities, or later, will be monitored sufficiently to ensure their safety and to evaluate the effectiveness of relocation/translocation efforts. Closely monitoring DT condition and movements after relocation/translocation could also facilitate the identification of potential problems at the selected receiving site and would inform an adaptive management approach for ensuring relocation/translocation success. Monitoring would also enhance the understanding of relocation/translocation as a viable conservation technique for this species. Specific monitoring, adaptive management, and reporting requirements for relocation and translocation will be developed in close coordination with resource agencies and would address, at a minimum, the following elements:

- success criteria for effective relocation/translocation,
- monitoring metrics and approach,
- thresholds for adaptive management action (e.g., management triggers),
- appropriate adaptive management actions, and
- reporting frequency

VI. PROGRAM CONTACTS

The following is a list of agency staff that will be contacted as applicable, on various aspects of relocation/translocation site selection, and long-term management of the translocation site(s):

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VII. LITERATURE CITED

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Ridgecrest Solar Power Project Responses to 12/22/09 Data Requests

Figure DR-BIO-54-1 Regional Map

Source: ESRI; AECOM 2009

Solar Millennium

AECOM

Date: January 2010

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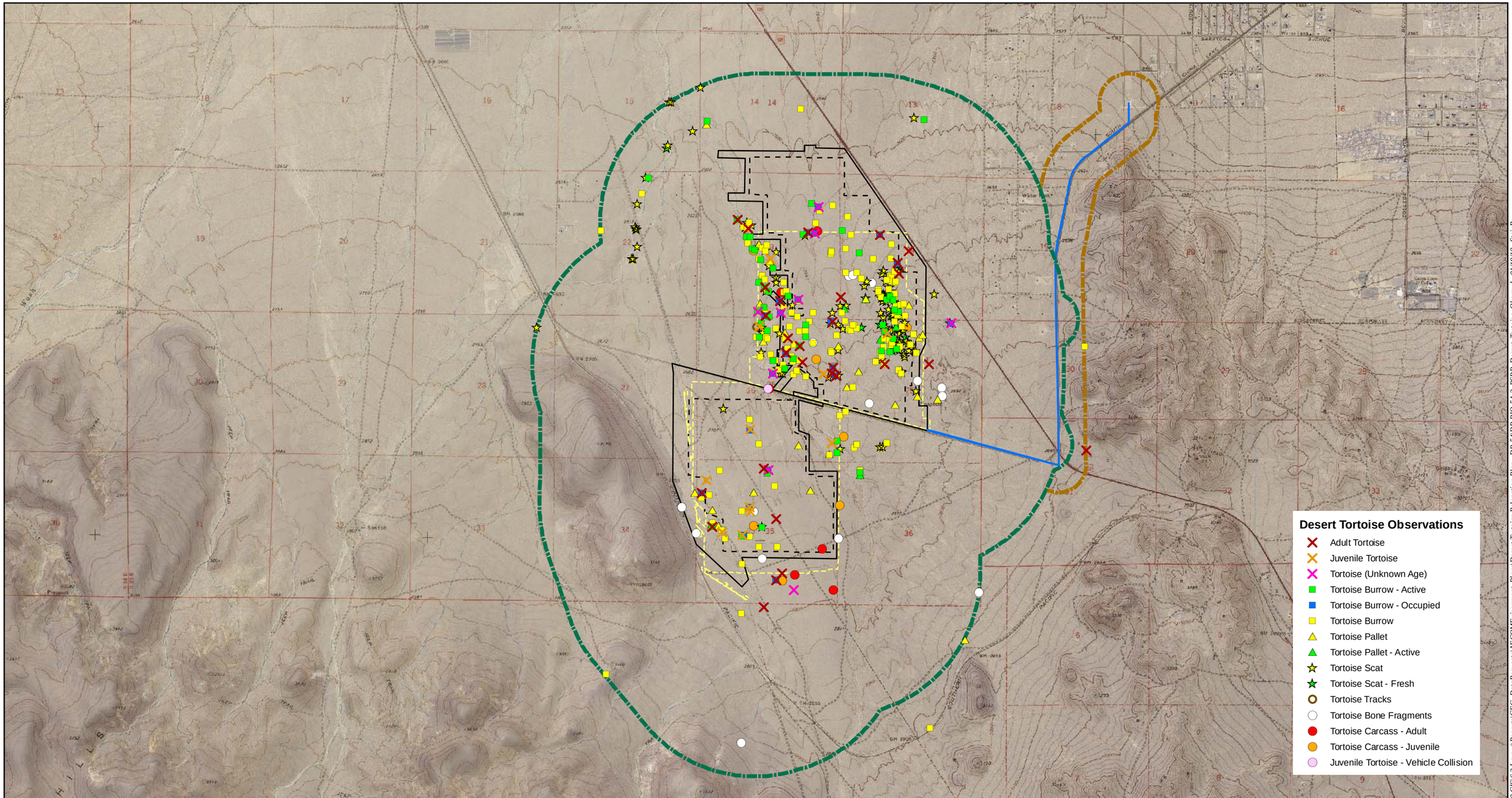

Map Location

Legend

Biological Resources Survey Area (BRSA)

- Spring 2009 Survey
- Fall 2009 Survey
- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Source: NAIP 2005; AECOM 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-54-3
Desert Tortoise Observations

Solar Millennium

AECOM

Date: January 2010

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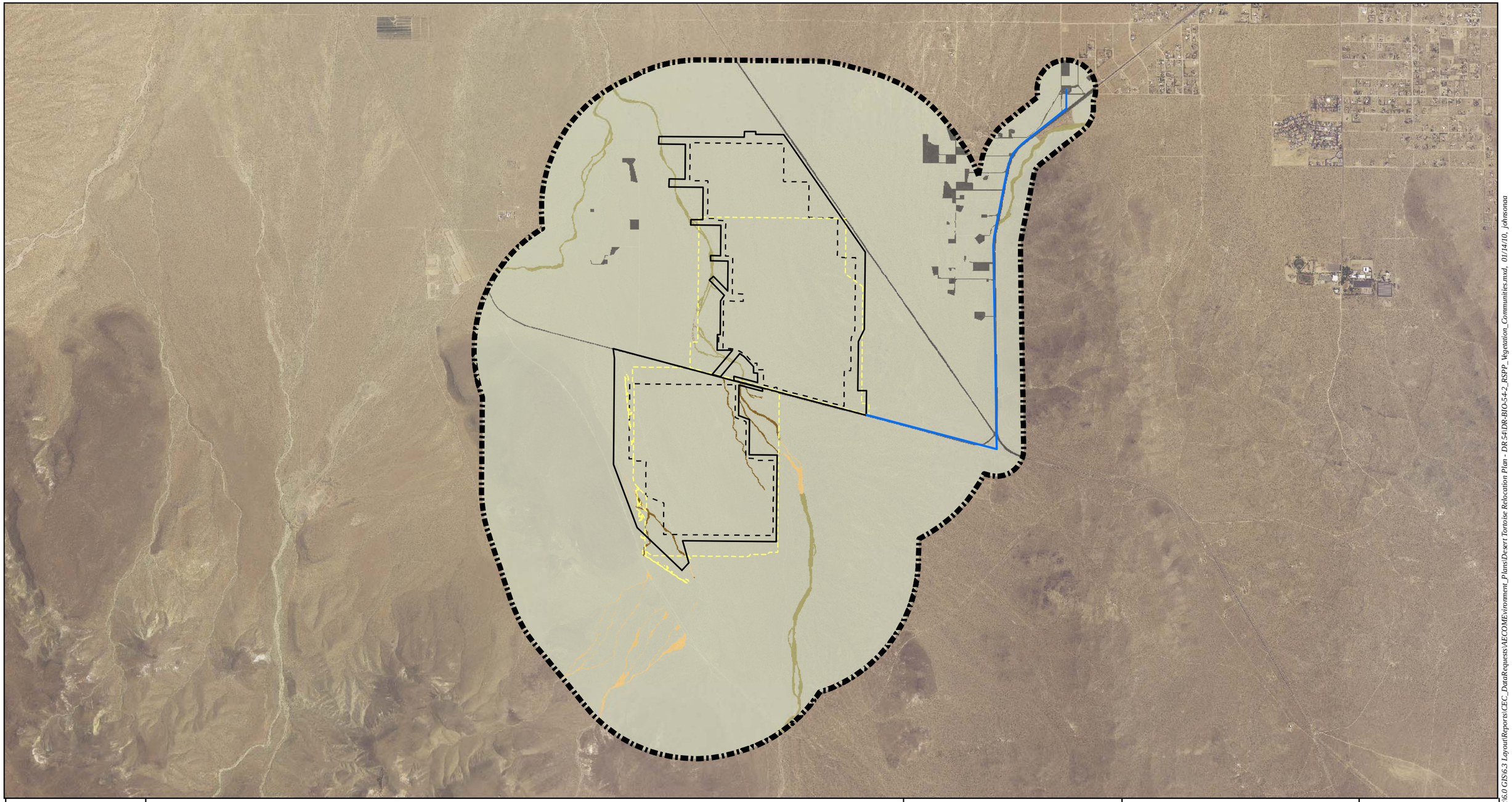

Map Location

Legend

- Surveyed Biological Resources Survey Area (BRSA)
- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Vegetation Communities

Riparian

- Mojave Desert Wash Scrub
- Unvegetated Ephemeral Dry Wash
- Unvegetated Ephemeral Dry Wash (Presumed) [1]

Upland

- Mojave Creosote Bush Scrub

Other

- Developed

[1] NOTE: Due to minimum mapping unit within buffer (1.0 mile), these areas are presumed to be unvegetated

Source: NAIP 2005; CNDDB 2009; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-54-2
Vegetation Communities

Solar Millennium

AECOM

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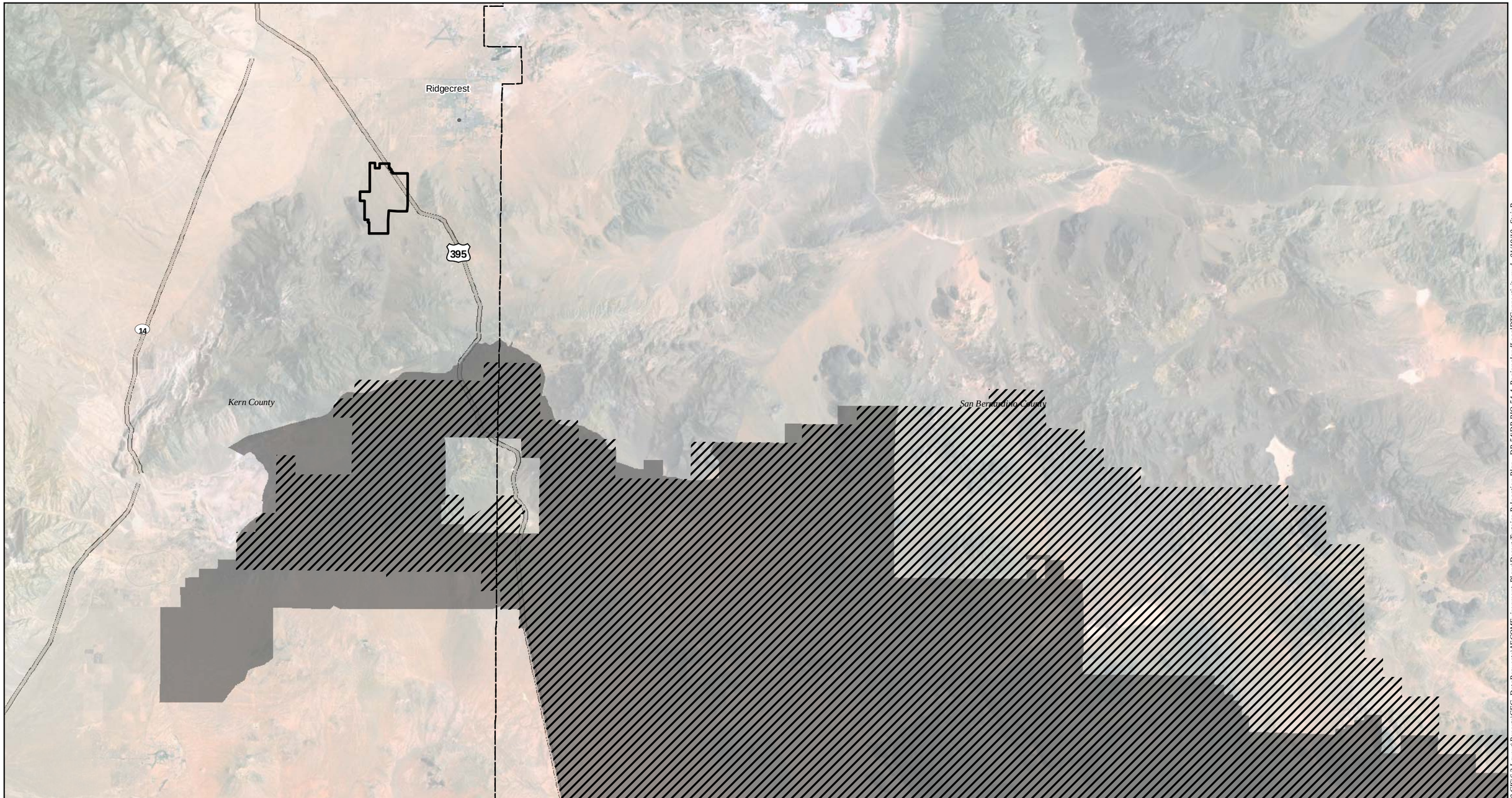

Map Location

Legend

- Project Area
- Desert Tortoise Critical Habitat (USFWS)
- WEMO DWMA

Source: ESRI; USFWS; BLM; AECOM

N
W E
S

1 inch = 5 miles

0 5 10 Miles

Ridgecrest Solar Power Project
Responses to 12/22/09 Data Request

DR-BIO-54-4
Project Site Relative to the
West Mojave Plan (WEMO)
Desert Wildlife Management Area
and Desert Tortoise Critical Habitat

Solar Millennium

AECOM

Date: January 2010

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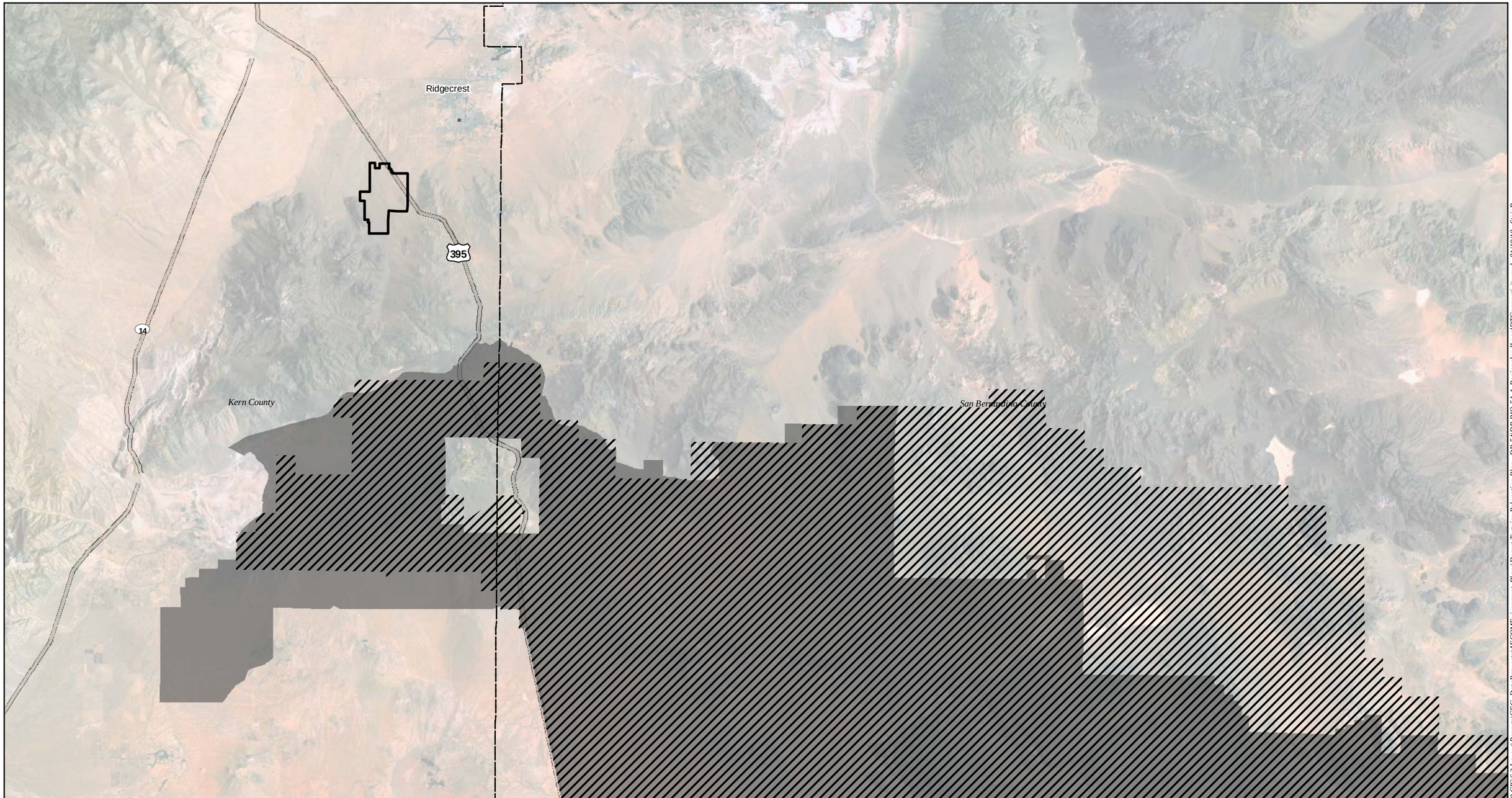
FIGURE DR-BIO-54-4

PROJECT SITE RELATIVE TO THE WEST MOJAVE PLAN (WEMO) DESERT WILDLIFE MANAGEMENT AREA AND DESERT TORTOISE CRITICAL HABITAT



Map Location

Legend

- Project Area
- Desert Tortoise Critical Habitat (USFWS)
- WEMO DWMA

Source: ESRI; USFWS; BLM; AECOM

N
W E
S

1 inch = 5 miles

0 5 10 Miles

Ridgecrest Solar Power Project
Responses to 12/22/09 Data Request

DR-BIO-54-4
Project Site Relative to the
West Mojave Plan (WEMO)
Desert Wildlife Management Area
and Desert Tortoise Critical Habitat

Solar Millennium

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ATTACHMENT DR-BIO-54-A

GUIDELINES FOR DESERT TORTOISE TRANSLOCATION (USFWS 1994)

Appendix B: Guidelines for Translocation of Desert Tortoises

(1) Experimental translocations should be done outside experimental management zones. No desert tortoises should be introduced into DWMAs—at least until relocation is much better understood.

(2) All translocations should occur in good habitat where the desert tortoise population is known to be substantially depleted from its former level of abundance. Translocation of reproductively competent adults into depopulated areas can have beneficial effects on population growth. Before population growth can occur, however, individuals must establish home ranges and enter into any existing social structure. Desert tortoises should be periodically evaluated against a defined health profile (proportional weight/size, fecal scans, and blood panels).

(3) Areas into which desert tortoises are to be relocated should be surrounded by a desert tortoise-proof fence or similar barrier. The fence will contain the desert tortoises while they are establishing home ranges and a social structure. If the area is not fenced, past experience suggests that most animals will simply wander away from the introduction site and eventually die. (Fencing is not cheap; estimates range from $2.50 to $5.00 per linear foot). Once animals are established some or all of the fencing can be removed and probably reused.

(4) The best translocations into empty habitat involve desert tortoises in all age classes, in the proportions in which they occur in a stable population. Such translocations may not always be possible, since young desert tortoises are chronically underrepresented in samples, often due to observer sampling error, and may now actually be underrepresented in most populations due to poor recruitment and juvenile survivorship during the last several years. Desert tortoises smaller than the 7-year age-size class are particularly vulnerable to predation and may be a poor investment for translocation, unless predator exclusion (fencing, for example) is incorporated into such endeavors. Mature females would probably be the best sex/age class to introduce into below carrying capacity extant populations because of their high reproductive value (low potential mortality, high potential fecundity for many years).

(5) The number of desert tortoises introduced should not exceed the pre-decline density (if known). If the pre-decline density is not known, introductions should not exceed 100 adults or 200 animals of all age classes per square mile in category 1 habitat (Bureau of Land Management designation for management of desert tortoise habitat) unless there is good reason to believe that the habitat is capable of supporting higher densities. Post-introduction mortalities

might be compensated by subsequent introductions if ecological circumstances warrant this action.

(6) All potential translocatees should be medically evaluated in terms of general health and indications of disease, using the latest available technology, before they are moved. All translocatees should be genotyped unless the desert tortoises are to be moved only very short distances or between populations that are clearly genetically homogeneous. All translocated animals should be permanently marked, and most should be fitted with radio transmitters so that their subsequent movements can be closely tracked.

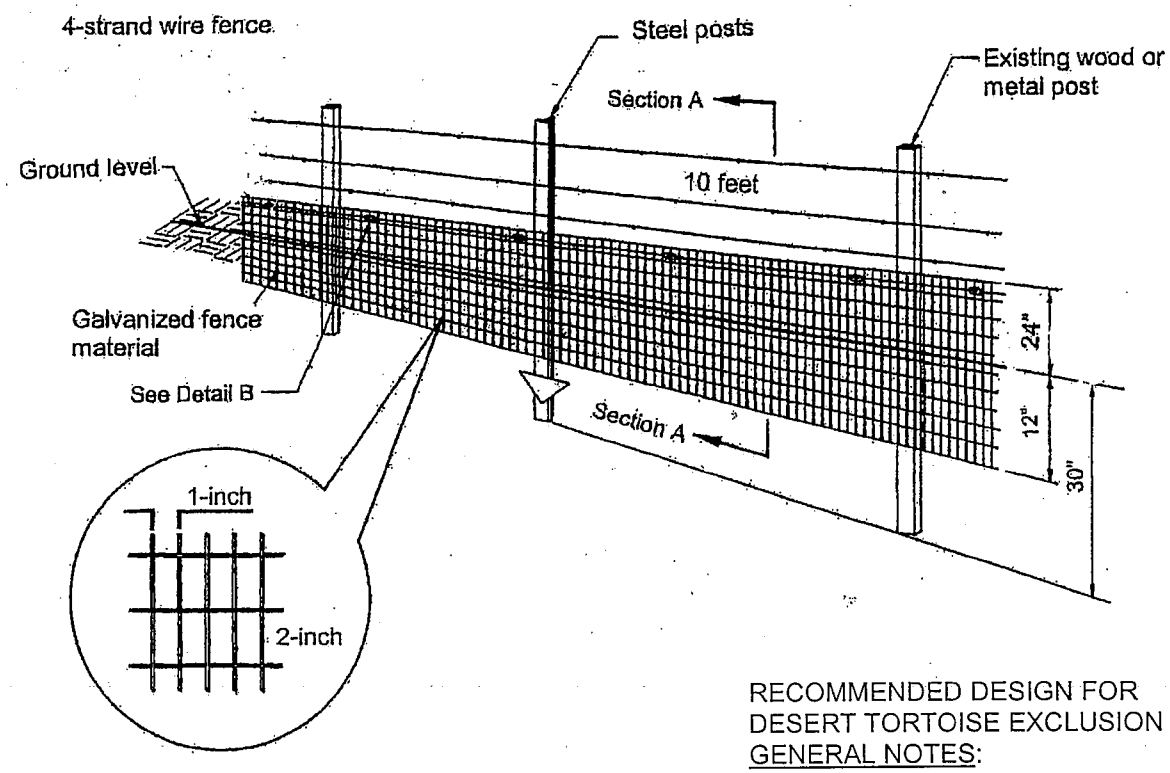
(7) If desert tortoises are to be moved into an area that already supports a population--even one that is well below carrying capacity--the recipient population should be monitored for at least 2 years prior to the introduction. Necessary data include the density and age structure of the recipient population, home ranges of resident desert tortoises, and general ecological conditions of the habitat.

Areas along paved highways can serve as good translocation sites, if properly fenced. Many such areas support good habitats, but vehicle-caused mortalities and/or collecting have substantially reduced or totally extirpated adjacent desert tortoise populations. Any translocation sites should be isolated by a desert tortoise barrier fence or similar barrier next to the highway or road. The purpose of fencing the highway is obvious--to keep translocated animals from being crushed by vehicles on the road. However, fencing the other sides of the translocation area is critical for establishment. If a fenced area or strip of habitat approximately 0.125 to 0.25 mile wide is established along highways, some translocatees should establish home ranges and a social structure within this strip. When the inside fence is removed, the translocated desert tortoises and those from the extant population farther away from the road will eventually expand their home ranges into the remaining low-density areas. A second reason for inside fencing is to prevent any diseased, but asymptomatic, desert tortoises from infecting nearby, healthy populations. In the event that disease is an issue and a resident population is present nearby, double inside fencing should be considered.

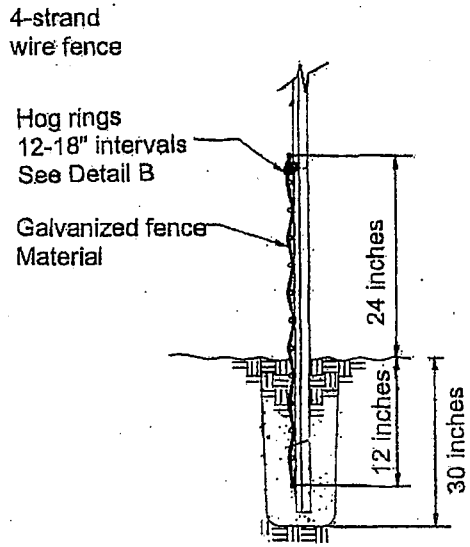
ATTACHMENT DR-BIO-54-B

RECOMMENDED SPECIFICATIONS FOR PERMANENT DESERT TORTOISE EXCLUSION FENCE

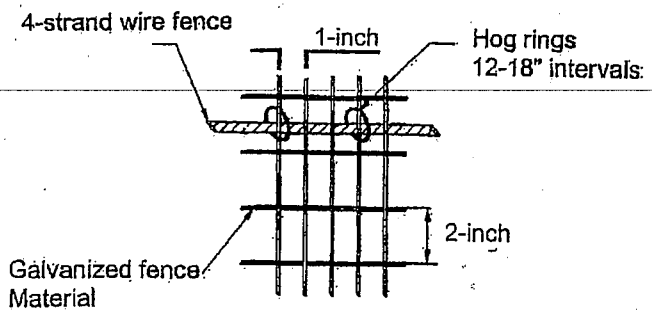
DESERT TORTOISE EXCLUSION FENCE (2005)



DETAIL A



SECTION A



DETAIL B

RECOMMENDED DESIGN FOR
DESERT TORTOISE EXCLUSION FENCE
GENERAL NOTES:

1. Ensure that fence posts and materials conform to the standards approved by the U.S. Fish and Wildlife Service.
2. Ensure that the height above ground level is no less than 18 inches and no higher than 24 inches.
3. Ensure that the depth of fence material below ground level is about 12 inches but no less than 6 inches. (See SECTION A above)
4. Install additional steel posts when span between existing fence posts exceed 10 feet.
5. Attach fence material to existing fence or wire using hog rings at 12-inch intervals.
6. Fasten fence material to posts with 3 tie wires with a wire near the top, bottom, and center of the fence material.
7. Backfill trenches with excavated material and compact the material.
8. Attach fence material to all gates. Ensure that clearance at base of gate achieves zero ground clearance.
9. Substitute smooth wire for barbed wire if additional support wires are necessary.
10. The number and placement of support wires may be modified to allow sheep and deer to pass safely.
11. Erosion at the edge of the fence material where the fence crosses washes may occur and requires appropriate and timely monitoring and repair.
12. Tie the fence into existing culverts and cattleguards when determined necessary to allow desert tortoise passage underneath roadways.

FOR BEDROCK OR CALICHE SUBSTRATE

1. Use this fence design (see below) only for that portion of the fence where fence material cannot be placed 6 inches below existing ground level due to presence of bedrock, large rocks or caliche substrate.

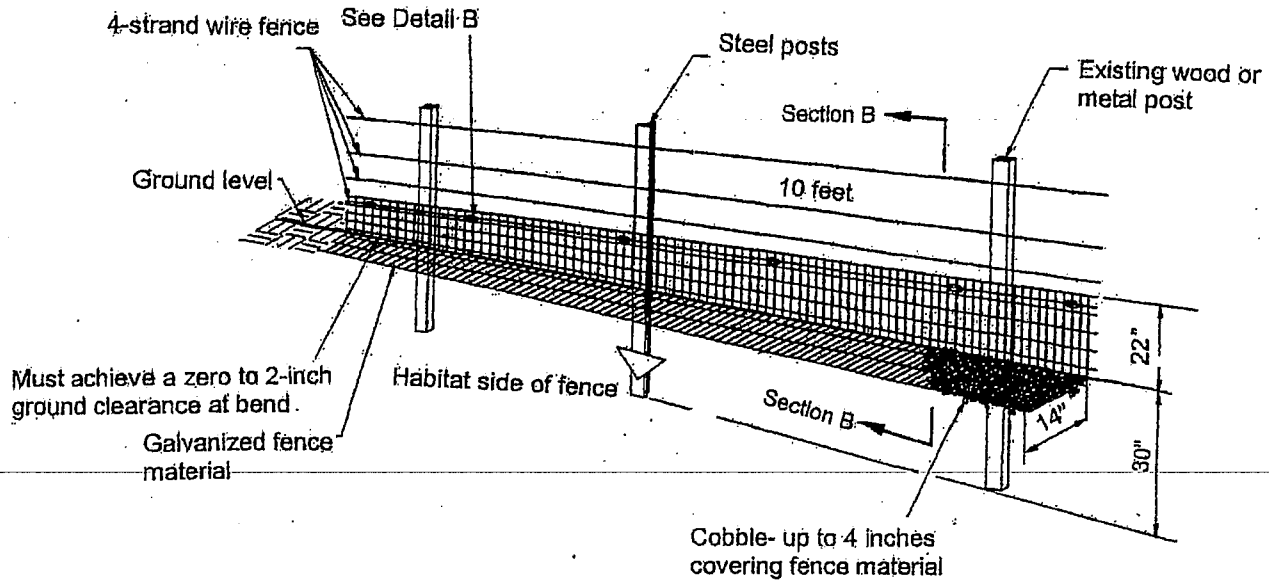
2. Ensure that the fence height above ground level is no less than 22 inches.

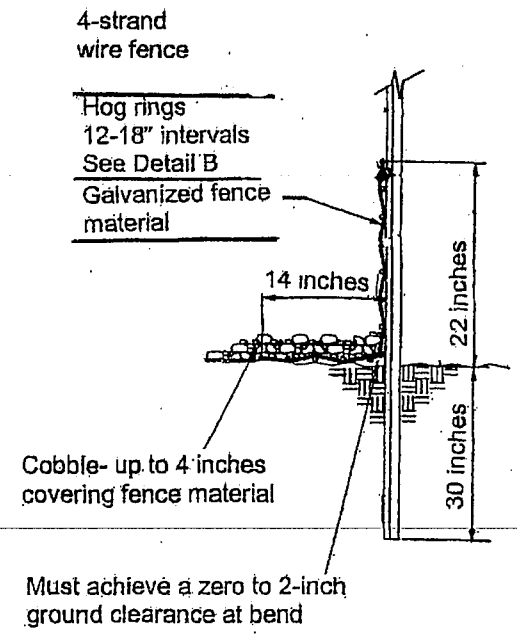
3. Ensure that there is a zero to 2-inch ground clearance at the bend.

4. Ensure that the bent portion of the fence is lying on the ground and pointed in the direction of desert tortoise habitat.

5. Cover the portion of the fence that is flush with the ground with cobble (rocks placed on top of the fence material to a vertical thickness up to 4 inches).

6. When substrate no longer is composed of bedrock or caliche, install fence using design shown above.





SECTION B

ATTACHMENT DR-BIO-54-C

CLEARANCE SURVEY PROTOCOL FOR THE DESERT TORTOISE – MOJAVE POPULATION

CHAPTER 6. CLEARANCE SURVEY PROTOCOL FOR THE DESERT TORTOISE - MOJAVE POPULATION

6.1. Objectives

- Locate as many desert tortoises as possible within the project site.
- Remove all desert tortoises encountered from the project site.
- Safely excavate, collect, and rebury desert tortoise eggs.

6.2. Applicability of Clearance Surveys

For projects located in occupied desert tortoise habitat, especially those projects with a permanent or linear disturbance (e.g., pipelines, roads, transmission lines), a clearance survey may be required as part of the Terms and Conditions of a biological opinion or incidental take permit. This survey is intended to reduce the likelihood that desert tortoises are killed or injured as a result of the proposed action. Clearance survey methods may include temporarily penning desert tortoises within the area surrounding its burrow, relocating desert tortoises from the impact area, or translocating desert tortoises to a designated area outside its home range in accordance with a USFWS-approved translocation plan (Section 7.10).

6.3. Methodology

- Clearance surveys require 100 percent coverage of the project area, with a focus on locating all desert tortoises above and below ground within the project area. This survey would be conducted immediately prior to surface disturbance at each site within the project area or following construction of a desert tortoise-proof fence or similar barrier encompassing the project area to ensure that tortoises cannot enter the project area.
- Clearance surveys at the project site must consist of at least 2 consecutive surveys of the site. Surveys shall involve walking transects less than or equal to 15-feet (5-meter) wide under typical conditions. In areas of dense vegetation or when conditions limit the ability of the surveyor's to locate desert tortoises, transects should be reduced in width accordingly. Clearance surveys should be conducted when desert tortoises are most active (April through May or September through October). If desert tortoises are found during the second pass, the USFWS and appropriate State wildlife agency may require a third survey. If any desert tortoises need to be translocated follow the USFWS-approved translocation plan for that project.
- After the desert tortoise exclusion fence has been installed, the fencing should be checked several times a day to ensure a tortoise has not been trapped within the fence and may be exposed to lethal temperatures. Desert tortoises often pace along new fences attempting to gain access to the other side or return to areas from which they were removed.
- All methods used for handling desert tortoises during the clearance surveys must be in accordance with this Manual. Anyone that handles desert tortoises during clearance activities must have the appropriate authorizations from USFWS and the State.
- During the clearance surveys, desert tortoises in burrows may be removed through tapping (Section 6.4) or careful excavation. Multiple visits may be necessary if desert tortoises are inaccessible in deep caves or burrows.

- During all handling procedures, desert tortoises shall be treated in a manner to ensure that they do not overheat or exhibit signs of overheating (e.g., gaping, foaming at the mouth, etc.), or are placed in a situation where they cannot maintain surface and core temperatures necessary to their well-being. Desert tortoises shall be kept shaded at all times until it is safe to release them. Ambient air temperature shall be measured in the shade, protected from wind, at a height of 2 inches (5 centimeters) above the ground surface. All clearance activities (capture, transport, release, etc.) shall occur when ambient temperatures are below 95 degrees F (35 degrees C) and not anticipated to rise above 95 degrees F (35 degrees C) before handling and processing desert tortoises are completed. Refer to section 7.4 for handling desert tortoises during hot temperatures.
- If a desert tortoise is encountered aboveground and outside the temperature limits refer to Section 7.4 or 7.5.
- The area cleared and number of desert tortoises found within that area must be reported to the local USFWS and the appropriate State wildlife agency. The report should be made in writing, either by mail or email. Notification should be received within one week.
- If a desert tortoise is encountered after clearance surveys have been completed, process the tortoise according to the methods described above.

6.4. Extracting Desert Tortoises from Burrows

Before touching a desert tortoise or using any instrument that comes into contact with a desert tortoise, implement procedures described in Section 7.6. Examine the burrow for other occupants (e.g., snakes, spiders, scorpions, wasps, Gila monsters, etc.). Firmly pound the soil at the side of the "apron" or soil mound at the entrance of the burrow 5 to 6 times with an open hand then listen for desert tortoise movement; wait 30 seconds and repeat several times if needed. Avoid disturbing or pounding the center of the apron or entrance of the burrow where desert tortoises typically dig nests and lay their eggs. If the desert tortoise is visible deep in its burrow, the observer can gently tap the carapace 3 to 4 times with a stick (Medica et al. 1986). The observer should then remove the stick and move away from the burrow entrance. If tapping is successful, the desert tortoise will emerge, usually to the burrow entrance. If desert tortoise movements are not heard within a few minutes, discontinue tapping.

If the desert tortoise is within arm's reach, firmly grasp the gular, plastron, or posterior edge of the carapace and gently pull the tortoise towards the burrow entrance. If the desert tortoise resists to the point where moderate pulling effort is unsuccessful, stop pulling while maintaining a grip on the tortoise; resume when the tortoise relaxes. **Never use a hook or other instrument to remove a desert tortoise from a burrow or otherwise compromise the integrity of a burrow if the desert tortoise will remain in the project area.**

If the area is to be cleared of all desert tortoises, excavate the burrow as described in Section 6.5. If the tortoise is in a deep caliche cave which cannot be excavated without potentially harming the desert tortoise, record the location and contact the USFWS for instruction.

6.5. Excavating Burrows

According to most agency documents, desert tortoise burrows are excavated only if they occur within a proposed disturbance area. If excavating a burrow to relocate a desert tortoise, and an artificial burrow is required, it should be constructed before beginning the excavation (Section 6.7.). Biological opinions and permits typically require that such areas be flagged and that project activities be confined to those areas. As an alternative to excavation in certain circumstances, the immediate area surrounding a burrow occupied by a desert tortoise may be temporarily penned, if authorized by the USFWS and the appropriate State wildlife agency (Section 6.9.).

When required, take measurements of the burrow before excavating it. Before excavation, feel for desert tortoise eggs by gently probing the soil in front of the burrow opening (i.e., the mound) with a blunt instrument (e.g., knitting needle) or similar instrument, and along the floor of the burrow as you excavate the burrow. The purpose of probing is to locate areas of excavated soil which are less compacted and may indicate a nest. Eggs have been found up to 6 feet (1.9 meters) in front of burrow openings and up to 6 feet (1.9 meters) within the entrance of a burrow; they may also occur in the mound at the burrow opening. To avoid crushing eggs, do not scrape the shovel across the bottom of the burrow, but continue to probe the area with your fingers as you proceed. Removal of the top 10 inches (25 centimeters) of soil (or until a hard layer of soil is encountered) will typically ensure that you find any desert tortoise eggs. Be particularly careful from late April to mid-October when eggs are most likely present. If found, follow the USFWS's egg handling protocol (Section 6.6.).

Excavators should wear leather or cloth gloves during burrow excavation to avoid being bitten or stung by venomous animals. Use blunt-nosed shovels or garden trowels. The preferred method involves two individuals, each with a shovel, to excavate a burrow. Place a shovel in the burrow entrance, or garden trowel for small burrows, and slice away the ceiling with the second shovel or trowel. Remove the soil with the first shovel or trowel as excavation proceeds and repeat. Excavate the burrow slowly and carefully and stop often to see if a desert tortoise is within reach. Do not collapse the burrow ahead of the shovel or trowel inside the burrow. You should feel the shovel contact the other shovel with each stroke to avoid striking a desert tortoise. It may take several minutes or several hours to excavate a desert tortoise burrow, depending on its length and other characteristics.

Always excavate the burrow to its absolute end(s), and then excavate an additional foot-or-so (0.3 meter) of harder soil beyond the suspected end to ensure that a desert tortoise is not behind a dirt plug or mound. Search all side tunnels within the burrow for desert tortoises, especially in kit fox dens. If a desert tortoise is found, do not assume that it is alone. After removing the first desert tortoise encountered, return to the burrow and continue to excavate it looking for additional desert tortoises. After excavating the burrow, leave it collapsed so that no desert tortoise may reuse it easily.

When excavating a burrow, stop digging when a desert tortoise is encountered. If during the desert tortoise less-active period (i.e., during July - August, and November - February; in Arizona the less-active period may begin in late May or June), relocate the desert tortoise to an artificial burrow. If it is during the most-active period (i.e., when desert tortoises are most likely

above ground; March - June, and September - October), place the desert tortoise in the shade of a shrub, or depending on conditions, in an artificial burrow (Section 6.7.).

6.6. Nest and Egg Handling Protocol

Desert tortoises may lay eggs during the months of May through July and usually hatch July through October. Some eggs may not hatch, or hatchlings may not emerge until the following spring. Because desert tortoise eggs are also protected by the ESA, the Authorized Biologist shall search for nests and encouraged to search prior to clearance surveys. Desert tortoise eggs shall be moved to artificial nests either in the wild or at a USFWS-approved facility. If you encounter unemerged hatchlings, contact the USFWS and appropriate State wildlife agency for instructions. Authorized Biologists must receive special training in the procedures outlined below. If you discover a nest and have not been trained, the nest shall be carefully covered with soil so as not to move the eggs then contact the USFWS and appropriate State wildlife agency for instructions.

Any nest that is found shall be carefully excavated by hand at a time of day when the air temperature 6 inches (15 centimeters) above the ground is approximately equal to the soil temperature at egg level. Immediately upon finding a nest, discontinue using large tools. The Authorized Biologist shall excavate the nest using his or her hands. Disposable rubber or latex gloves must be worn when marking and handling eggs. Before disturbance of nest contents, each egg shall be gently marked with a small dot on the top using a felt-tipped pen to establish the egg's orientation in the nest. In handling nest contents, eggs must be maintained in this orientation at all times. Because egg shells become extremely fragile in the last few weeks before hatching, special care shall be taken with eggs found from August to mid-October. Because the egg is very fragile, it may break during handling; this will be lethal to the developing tortoise inside. Broken eggs shall be buried nearby and left in the field, or the contents preserved and made available for research projects. Report broken eggs to the USFWS and appropriate State wildlife agency as required for tortoise mortalities.

The Authorized Biologist shall measure and record the depth of the nest below the soil surface, the cardinal location of the nest in relation to any adjacent shrub (i.e., north, south, east, or west side of the shrub), the species of shrub and its approximate foliage volume, and the soil type. Place approximately 1 inch (2.5 centimeters) of soil from the nest area in a bucket and carefully transfer the eggs to the bucket, maintaining egg orientation. Gently cover the eggs with soil that is free of cobbles and pebbles, to a depth equivalent to that of the original nest.

If good desert tortoise habitat is available in the general area, the eggs shall be relocated between 150 to 1,000 feet (45.7 to 305 meters) from outer boundary of the project site, unless directed differently by USFWS. Eggs and tortoises shall only be placed on lands administered by a Federal agency or on lands when a written authorization to bury the eggs or relocate the tortoises has been obtained. A nest shall be prepared with the same depth, orientation, location in relation to a specific shrub species, and in the same soil type as the original nest. The eggs shall be transferred to the new nest, maintaining their original orientation. The eggs shall be replaced so that they touch one another. Gently cover with soil from which cobbles and pebbles have been removed so that all the air spaces around the eggs are filled. Relocated nests in the wild shall be monitored by an Authorized Biologist. The monitoring program shall be developed in

consultation with the USFWS and appropriate State wildlife agency. Care must be taken to remove any scent of tortoise eggs or human activity at the nest site to minimize nest predation.

If a suitable site for a nest is not available in the wild, the eggs shall be prepared for incubation in a suitable holding facility. A small amount of soil shall be placed in a bucket and the eggs transferred to the bucket using the technique specified above, making sure that the eggs are touching one another. The bucket shall be carefully filled to the depth of the original nest, but leave the top of the soil layer 3 inches (7.6 centimeters) below the rim of the bucket so that future hatchlings cannot escape. The bucket shall be buried in soil in a safe location at a holding facility approved by the USFWS and appropriate State wildlife agency.

The Authorized Biologist shall record in detail all the procedures used in moving eggs. Personnel caring for incubating eggs at a facility shall maintain a record of where the eggs were found, method of incubation, length of time and conditions under which the eggs were incubated, observations of eggs during the incubation period, information about hatchling health and behavior, and disposition of the hatchlings.

6.7. Constructing Artificial Burrows

Constructing an artificial burrow will take from 30 minutes to several hours, depending on the substrate. An artificial burrow is intended to provide replacement shelter and protection to a desert tortoise when removed from its natural burrow. The USFWS requires experience and training in burrow construction prior to being authorized to construct an artificial burrow. The information provided below including Figures 6.1 and 6.2 is a general description of the methods for constructing artificial burrows taken from Tortoise Group's adoption and care pamphlet (www.tortoisegroup.org).

Create an artificial burrow that is the same orientation and size as the burrow from which the desert tortoise was taken. The burrow for a juvenile desert tortoise should be 3 to 4 feet (0.9 to 1.2 meters) long and an adult tortoise burrow should be 5 to 6 feet (1.5 to 1.8 meters) long. Burrow construction involves digging a three-sided shelf upon which plywood will be placed to serve as the roof of the burrow. A channel is dug below the level of the shelf which approximates the width of the tortoise and functions as the actual burrow (Figure 6.1).

Determine the width and length to dig the shelf, place the plywood on the ground. Use corner stakes and twine to delineate the perimeter. Dig the burrow in a downward slant of 15 to 20 degrees below the horizontal line of the ground (Figure 6.2). Place the plywood onto the shelf. Fit the plywood snugly and then remove it. Next, dig the channel and loosen the soil along the floor of the channel to a depth of 6 inches (15.2 centimeters) to allow a tortoise to dig its way out should the plywood sag and possibly trap or pin it in the burrow. Replace the plywood and shovel dirt on top. Place rocks along the eave of the burrow roof, above the opening (Figure 6.2). Mound the dirt so that rain water will not puddle on top of the finished burrow.

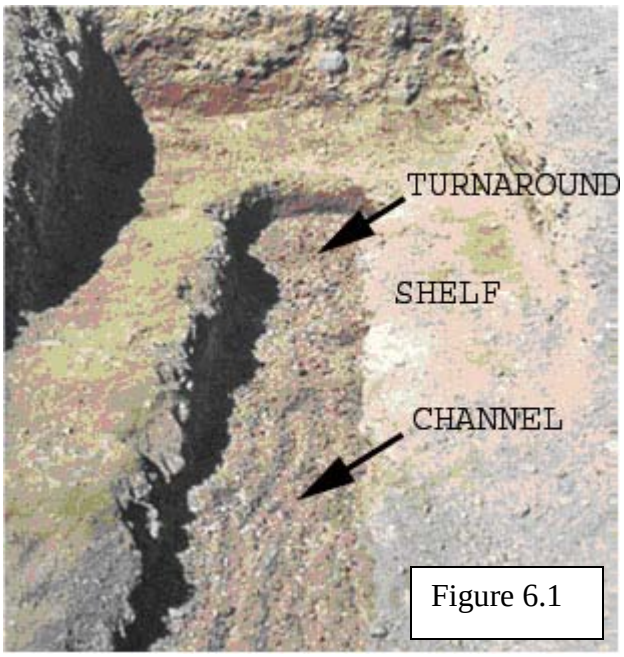


Figure 6.1

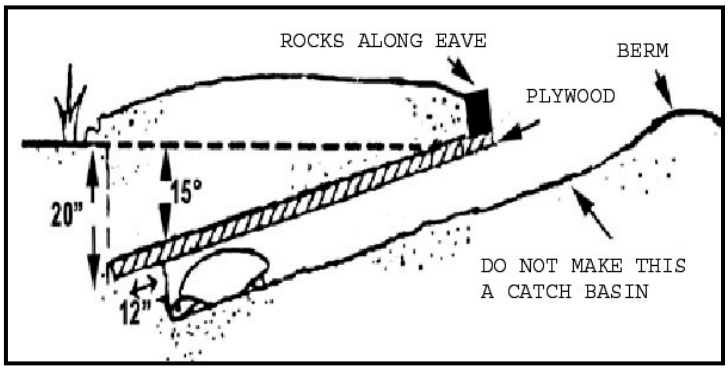


Figure 6.2

We recommend that you cover the opening of the artificial burrow with rocks or wood for 2 or 3 days to ensure that the tortoise remains within the burrow and out of harm's way, or that it resumes hibernation or aestivation. Alternatively, the tortoise and its burrow may be temporarily penned (Section 6.9). Providing an artificial burrow is particularly important if most of the burrows have been lost to disturbance and a desert tortoise would be unable to find an existing burrow in a reasonable amount of time. After several days, when project activities have ceased in the area (i.e., as on a pipeline or transmission line), or when you are reasonably sure that the tortoise is safely hibernating or aestivating, **it is absolutely essential that you remove the rocks from the opening of the blocked burrow or remove the pens around the tortoise and its burrow.**

6.8. Mapping and Finding Blocked Burrows

If you block a desert tortoise inside a burrow or temporarily pen the tortoise and its burrow according to instructions from the USFWS, you must return to that burrow and unblock it or remove the enclosure as soon as possible. Tortoises shall not be blocked in burrows during extreme high temperatures and construction activity shall be carefully monitored in the area around the blocked or penned tortoise. Accurately map the burrow with GPS so that you can find it again. Additionally, we recommend that you mark the area as a backup in case of GPS failure. For example, mark burrows with lath or ribbon placed a minimum of 100 feet (30.5 meters) from burrow. The marker should provide a cryptic message sufficient to locate the burrow (e.g., B23-2100FTS, to indicate that Burrow #23 on Reach 2 is 100 feet (30.5 meters) south of the lath (LaRue 1993)). The area must be discretely marked to avoid attracting people or ravens to the burrow.

6.9. Temporarily Confining Desert Tortoises

Desert tortoises found in the project area sheltering in a burrow during a period of reduced activity (e.g., winter), may be temporarily penned according to instructions from the USFWS. Tortoises shall not be penned in burrows during extreme high temperatures and construction activity shall be carefully monitored in the area around the penned tortoise. The methodology for penning desert tortoises (U.S. Department of Defense 2005) is adapted from a methodology developed by Gilbert Goodlett (EnviroPlus Consulting, Ridgecrest, California). Generally,

desert tortoises should not be penned in areas of moderate or heavy public use. Penning shall be accomplished by installing a circular fence, approximately 20 feet (6 meters) in diameter to enclose the tortoise/burrow. The pen should be constructed with durable materials (i.e., 16 gauge or heavier) suitable to resist desert environments. Fence material should consist of ½-inch hardware cloth or 1-inch horizontal by 2-inch (2.5 by 5.0 centimeters) vertical, galvanized welded wire. Pen material should be 24 inches (50 centimeters) in width. Steel T-posts or rebar (2 to 3 feet or 0.6 to 0.9 meter) should be placed every 5 to 6 feet (1.5 to 1.8 meters) to support the pen material. The pen material should extend 18 inches (45.7 centimeters) aboveground. The bottom of the enclosure shall be buried 6 to 12 inches (15 to 30 centimeters) or bent inward (towards the burrow), soil mounded along the base, and implement other measures to ensure zero ground clearance. Care shall be taken to minimize visibility of the pen by the public. An Authorized Biologist or Desert Tortoise Monitor shall check the pen at least daily and ensure that the desert tortoise is in the burrow or pen, the desert tortoise is okay, and the pen is intact. All instances of penning or issues associated with penning shall be reported to the USFWS within 3 days.

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ATTACHMENT DR-BIO-54-D

GUIDELINES FOR HANDLING DESERT TORTOISE DURING CONSTRUCTION PROJECTS

GUIDELINES FOR HANDLING DESERT TORTOISES

DURING CONSTRUCTION PROJECTS

July 1994
(Revised July 1999)

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California Department of Fish and Game
Nevada Department of Wildlife
Arizona Game and Fish Department
Utah Division of Wildlife Resources

Warning: These Guidelines do not authorize individuals to handle tortoises. Such authorization should come from Federal and State wildlife resource agencies, including, at least, those listed above.

Cite as: Desert Tortoise Council. 1994 (Revised 1999). *Guidelines for Handling Desert Tortoises During Construction Projects*. Edward L. LaRue, Jr., editor. Wrightwood, California.

GUIDELINES FOR HANDLING DESERT TORTOISES DURING CONSTRUCTION PROJECTS

Developed by the Desert Tortoise Council

Handling of desert tortoises and other forms of "take" (includes to harass, harm, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct) are prohibited by section 9 of the Endangered Species Act of 1973, as amended. Desert tortoise handling can only be authorized through an incidental take statement in a biological opinion, an incidental take permit (section 10(a)(1)(B) permit), or a scientific collecting permit (section 10(a)(1)(A) permit). The regulatory document(s) or permit(s) authorizing handling are the ultimate guides to how desert tortoises should be handled. We expect that these documents will often authorize handling in accordance with the following handling guidelines.

The following Guidelines have been reviewed and are based on information provided to the Desert Tortoise Council (DTC) by the U.S. Fish and Wildlife Service (Reno and Las Vegas, NV; Ventura and Carlsbad, CA; Phoenix, AZ; Salt Lake City, UT), California Department of Fish and Game (Chino and Long Beach, CA), Utah Division of Wildlife Resources (Cedar City, UT), Nevada Department of Wildlife (Las Vegas, NV), Arizona Game and Fish Department (Phoenix, AZ), U.S. Bureau of Land Management (Saint George, UT; Riverside, CA; Phoenix, AZ), several private consultants, and other individuals. Individuals contacted to develop and/or review these Guidelines are listed in Attachment 1.

The Guidelines are intended for use during construction projects monitored by authorized biologists (tortoise monitors) who are working on behalf of a project proponent in the absence of special regulatory requirements, such as a 10(a)(1)(A) scientific collecting permit. The Guidelines will be helpful to tortoise monitors performing clearance surveys and construction monitoring where tortoises need to be moved out of harm's way. They are intended to be used in coordination with U.S. Fish and Wildlife Service (USFWS) Biological Opinions issued to federal action agencies (e.g., U.S. Bureau of Land Management (BLM), U.S. Army Corps of Engineers, etc.), and state agency documents for state-authorized actions. Although useful information is provided, the Guidelines are **not** intended to replace scientific research project methodologies for handling and processing tortoises.

These Guidelines do not authorize tortoise handling. Depending on the project, responsible federal and state agencies review a person's résumé and authorize him/her to handle tortoises. These Guidelines are provided for tortoise monitors already authorized, or who hope to be authorized, by federal and state agencies. The DTC assumes that such monitors are qualified to handle and process tortoises. These Guidelines include methods and alternatives that are effectively used by professional tortoise researchers to safely handle tortoises in the field. The DTC believes that tortoise handling should be an evolving process, continually updated to include the latest, most effective and efficient methods for safe handling. A wealth of information is already available, and these Guidelines provide that information to construction monitors.

A sequential checklist for use in the field is included (section **F.**). When necessary, the checklist should be cross-referenced with the Guidelines for more detailed information. The inexperienced monitor should use the checklist as a reminder of steps to be taken when handling and processing tortoises, and should be completely familiar with the Guidelines **before** handling tortoises. The experienced monitor may also gain useful information from these Guidelines.

You are encouraged to submit comments on these Guidelines to the USFWS and the DTC. In subsequent years, the DTC will work with the USFWS, using your input, to ensure that the Guidelines are revised to incorporate new information and techniques.

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GUIDELINES FOR HANDLING DESERT TORTOISES

A. PRELIMINARY STEPS

A.1. Federal and state authorizations

Once you are selected by a project proponent to monitor construction, your résumé is typically submitted to the nearest field office of the USFWS at least 15 days prior to construction. You may also need to submit your résumé to the federal action agency (i.e., the federal agency with whom the USFWS has consulted under Section 7 of the Act) and state wildlife agencies. Within the State of Utah, any individual (including any qualified biologist) must obtain a section 10(a)(1)(A) permit from the USFWS to be authorized to handle desert tortoises. Within the States of Arizona, California, Nevada, and Utah, individuals must obtain the appropriate permits from the respective State wildlife agency to be authorized to handle tortoises. If your résumé has not been previously accepted by the responsible agency(s), you should not assume that you are approved until you have written or verbal confirmation from them. After you are authorized, you must read and comply with any federal and state regulatory documents for the project.

A.2. Specific requirements for monitors

The USFWS requires that you observe field demonstrations for egg handling or artificial burrow construction before performing either of these activities. Since 1993, the DTC has arranged for USFWS-authorized biologists to demonstrate these procedures at its annual workshop. Those observing the demonstrations were given certificates. Such demonstrations may be available at future DTC workshops, depending on demand.

The USFWS distinguishes between desert tortoise biologists and environmental monitors as follows: Biologists should (a) possess a bachelor's or graduate degree in biology, ecology, wildlife biology, herpetology, or related fields; (b) demonstrate a minimum of 60 days prior field experience using accepted resource agency techniques to survey for desert tortoises; and (c) have the ability to recognize and to accurately identify and record all types of desert tortoise sign. Generally, only qualified biologists, and not environmental monitors, may handle tortoises. Environmental monitors may handle tortoises in emergency situations, but only if they have explicit authorization to do so by the appropriate office of the USFWS.

A.3. Sequential numbering scheme

Prior to beginning the project, you should contact the USFWS and/or other regulatory agency to determine if tortoises are to be marked for your project. In California, the BLM and United States Geological Survey - Biological Resources Division (USGS - BRD) assign tortoise numbers that are used by scientists to mark tortoises on study plots located throughout the Mojave and Colorado Deserts. If your project is near one of these plots, it is important that you contact the appropriate offices of the BLM and USGS - BRD before marking tortoises to ensure that your numbers will not be confused with those used by the federal agencies.

A.4. Examples of numbering schemes

If tortoises are to be marked, they should be identified by project initials and numbers. Examples include: (a) initials of the project followed by a sequential number; (e.g., "MB1" for the first tortoise marked on the Morongo Basin Pipeline project, "MB2" for the second, etc.); (b) initials of the monitoring organization followed by a sequential number; (e.g., "DTC1" for the first tortoise marked by the Desert Tortoise Council on a project, "DTC2" for the second, etc.).

A.5. Getting organized

The materials that you are likely to need for handling tortoises are listed in Attachment 2. Many researchers organize their materials so that they have a "tortoise handling kit for the field," "tortoise handling kit for the truck," "burrow excavation kit," "tortoise marking kit," etc. In any case, it is important that you have all the materials that you need to safely and quickly handle tortoises. It is equally important that you be organized and ready to handle tortoises expeditiously when they are found.

B. IN THE FIELD

While monitoring construction, you will observe tortoises either aboveground or in burrows. When aboveground, tortoises should only be moved if in harm's way. If not, do not handle them, but monitor them to ensure that they are not adversely affected by construction. Depending on the circumstances, tortoises that are beneath machinery, in trenches or pipes, under pallets, or anywhere within the right-of-way may be in danger and need to be moved. If they must be moved, use the appropriate recommendations in these Guidelines to ensure safe handling.

You will also find tortoises in burrows in areas where they will be harmed if not moved. The following sections advise you on how to handle such tortoises.

B.1. Prior to excavating burrows

B.1.a. Determining if burrows should be excavated - According to most agency documents, tortoise burrows are excavated only if they occur within a construction right-of-way, in an area to be cleared of vegetation, or in areas that will not be cleared, but will be negatively impacted by heavy equipment, such as staging areas and turnarounds. The agency document typically requires that such areas be flagged and that construction activities be confined to those areas.

If a tortoise burrow is inside the designated construction area and will be damaged or destroyed, excavate it. Spider webs, litter, and other debris may accumulate in burrow openings overnight, and openings may collapse during winter rains. Do not assume that a burrow is inactive if it looks unused or collapsed. Tortoises may use canid or mustelid digs, and may be found in burrows of other animals, particularly kit foxes. Burrowing owls may use tortoise burrows, but do not assume that burrows occupied by owls are not also occupied by tortoises. Juvenile tortoise burrows may resemble rodent burrows, or juveniles may be inside such burrows. Therefore, excavate **all** burrows that will be lost to construction. If a burrow opening is outside the construction area, but a tortoise at the end of the burrow may be within the area, excavate it. Remember that a burrow may extend 30 feet beyond the opening.

B.1.b. Describing burrows - When possible, we recommend that you take measurements of the burrow before excavating it. The information should be recorded in your field notebook, and, if a tortoise is present, would be transferred to the data sheet (section **E.**). Measure the width and height just inside the opening of the burrow, the length (in many cases you cannot measure the length until you are finished excavating the burrow), determine burrow orientation using a compass, and record its condition using the categories given below. We recommend that you use permanent black ink and high rag content, acid-free paper for recording data. The following categories may be used to describe the conditions of burrows (U.S. Fish and Wildlife Service 1992):

Class:
1. currently active, with tortoise or recent tortoise sign
2. good condition, definitely tortoise; no evidence of recent use
3. deteriorated condition; definitely tortoise (please describe)
4. good condition; possibly tortoise (please describe)
5. deteriorated condition; possibly tortoise (please describe)

B.1.c. Other considerations - Depending on the time of year and other conditions (*B.5.c.ii.*) you may need to construct a burrow **before** you remove a tortoise from its natural burrow. Recommended techniques for burrow construction are discussed in section *B.5.f.*

B.2. Mapping burrows

If a burrow is to be excavated, there are several important reasons for mapping it: (a) resource agencies can determine how many tortoises were encountered on the project compared with the number of burrows excavated; (b) the information will be available for future projects in the same area; (c) burrow locations may be important for organizing monitors and determining tortoise "hot spots" versus areas where few, if any, tortoises are found; and (d) the number and location of burrows found during initial tortoise surveys can be compared with the number and location of burrows found during monitoring; (i.e., the data may provide information to determine appropriate take limits based on the findings of initial surveys). Typically, the USFWS requires that the number of tortoises observed during construction be reported. Mapping the information will show the location of the tortoises. Some monitoring supervisors require that all tortoise sign be mapped. If an artificial burrow is used, we recommend that it be accurately mapped. If the burrow is blocked (section *B.5.f.i.*), it is essential that you map it and mark it in the field so you can find and unblock it later.

B.3. Map types

When you map burrows, we recommend that they be numbered and shown on maps of appropriate scale. If monitoring a linear right-of-way, it often helps to number burrows sequentially within a given section of the alignment (e.g., "B-23-2," for burrow #23 on reach 2). Mapping is important if many monitors are locating, numbering, and mapping burrows simultaneously. United States Geological Survey (USGS) 7.5' topographical maps (scale 1" = 2,000'), or enlargements of them, are useful. Project maps at a scale of 1" = 100' or 1" = 200' are particularly useful when burrows are common and better resolution is necessary. The assigned numbers may be cross-referenced with data sheets, field notes, and photographs.

B.4. Excavating burrows

B.4.a. Looking for eggs - Feel for tortoise eggs by gently probing the soil in front of the burrow opening (i.e., the mound) and along the floor as you excavate the burrow. Eggs have been found up to six feet in front of burrow openings and up to six feet within the entrance of a burrow; they may occur in the mound at the burrow opening. To avoid crushing eggs, do not scrape the shovel across the bottom of the burrow, but continue to probe the area with your fingers as you proceed. Removal of the top ten inches of soil (or until a hard layer of soil is encountered) will typically ensure that you find any tortoise eggs. Be particularly careful between late April and mid-October when eggs are most likely present. If found, follow the USFWS's egg handling protocol (Attachment 3). Although not included in the protocol, we strongly recommend that you wear disposable latex gloves when handling eggs.

B.4.b. Excavating burrows - We recommend that monitors wear leather or cloth gloves during burrow excavation to avoid being bitten or stung by venomous animals. Blunt-nosed shovels or garden trowels are useful. If available, two monitors, each with a shovel, may excavate a burrow. One person may place his/her shovel in the burrow entrance and the other person, using a similar shovel or spade, would slice away the ceiling. Excavate the burrow slowly and carefully and stop often to see if a tortoise is within reach. It may take several minutes or several hours to excavate a tortoise burrow, depending on its length and other characteristics.

If you are the only monitor present, we recommend the following. Depending on the size and depth of the burrow, carefully slide an appropriate-sized plank six inches to two feet into the opening. You could use a 1" x 2" plank for smaller burrows and a 2" x 4" plank for larger burrows. Gradually collapse the burrow onto the plank, and remove the soil from the burrow tunnel as you go. Do not collapse the burrow ahead of the plank. You should feel the shovel contact the plank with each stroke. In this way, you will avoid striking a tortoise with the shovel. Alternatively, you may use a second shovel instead of the plank, which will facilitate removing soil from the burrow as you collapse it.

B.4.c. Finding and removing all tortoises - Regardless of the excavation method, you should always excavate the burrow to its absolute end(s), then excavate an additional foot-or-so of harder soil beyond the suspected end to ensure that a tortoise is not behind a dirt "plug" or mound. Search all side tunnels within the burrow for tortoises, especially in kit fox dens. If a tortoise is found, do not assume that it is alone. After removing the first tortoise encountered, you should return to the burrow and continue to excavate it looking for additional tortoises. After excavating the burrow, leave it collapsed so that no tortoise may reuse it easily.

B.5. Finding tortoises in burrows

B.5.a. Taking temperature readings - When a tortoise is encountered during burrow excavation, we recommend that you stop digging and check and record the air temperature [thermometer shaded at 1.5 m (4.9 ft) above the ground] and ground temperature [thermometer shaded at 1.0 cm (0.4 in) above the ground].

B.5.b. Deciding if tortoises should be processed - Data collected in a consistent manner during construction projects will be useful to resource agencies developing mitigation measures for future projects. However, the health of a tortoise is your number one priority. Only process a tortoise (i.e., weigh, measure, sex, and photograph it; section **B.7.**) if the situation allows you to do so without harming it or neglecting additional tortoises that may enter the construction site. If you are unable to do more than move a tortoise out of harm's way and monitor it to ensure its safety, you have done your job. Skip section **B.7.** if the situation is not right for processing a tortoise. The following sections discuss situations where you should or should not process tortoises.

B.5.c. Specific considerations before processing tortoises

B.5.c.i. Tortoise temperature preferences - The preferred daytime body temperature of desert tortoises is 69 °F to 101 °F (McGinnis and Voigt 1971). The critical maximum body temperature is between 103 °F and 112 °F (Brattstrom 1965, Naegle 1976). Berry and Turner (1984) found that juvenile tortoises preferred air temperatures of 63 °F to 66 °F during March, and 77 °F to 83 °F during June. Consequently, more juvenile tortoises were located in the morning (76.1%) than in the afternoon (23.9%). USFWS (1991) requires that measures be taken to ensure a tortoise does not overheat if it is processed when air temperature exceeds 90 °F at 1.5 m above the ground or if ground temperature exceeds 95 °F. Unless detailed processing (i.e., weighing, measuring, and photographing tortoises) is specifically required by federal or state agencies, we recommend that tortoises **not** be completely processed when air temperature exceeds 90 °F or ground temperature exceeds 95 °F. Under such conditions, the tortoise should be only inspected (section *B.7.d., B.7.e.,B.7.f.*), marked (section *B.7.g.*), and released (section *B.8.*).

B.5.c.ii. Other considerations - Based on the time of year and other conditions, we make the following recommendations to help you decide if tortoises should be processed. In this section, we assume that (1) you are authorized to handle tortoises during the authorized construction project, and (2) the tortoise must be moved out of harm's way regardless of extreme weather conditions or other potentially threatening situations.

B.5.c.ii.(a). During hot temperatures - When air temperature is greater than 90 °F or if the ground temperature is greater than 95 °F at the time you find a tortoise in a burrow that must be excavated, we recommend that you only inspect, mark, and release the tortoise (section *B.5.c.i*); construction of an artificial burrow may be necessary (*B.5.f.*). If possible, only excavate burrows and remove tortoises when temperatures do not exceed these limits. If a tortoise is found aboveground when these upper temperatures are exceeded, and the tortoise must be moved from harm's way, place it in the shade of a shrub, ideally in the vicinity of a nearby burrow of similar size (*B.8.a.*).

B.5.c.ii.(b). During cold temperatures - When tortoises are likely inactive (section *B.5.e.*), prior to removing them from their burrows, construct an artificial burrow and place the tortoise inside after it has been processed. The USFWS requires that you receive written permission from the private land owner if a tortoise is to be placed on private property.

B.5.c.ii.(c). At or near sunset - If a tortoise with a midline carapace length (MCL) (section *B.7.h.*) less than or equal to 180 mm is rescued from the construction site at or near sunset, we recommend that it be held overnight in a clean, unused cardboard box and released the next morning near the capture site. A larger tortoise (i.e., MCL greater than 180 mm), which may be less prone to predation than a juvenile tortoise, does not need to be held overnight, but should be released under a shrub (section **B.8.** for more information on releasing tortoises). We recommend that the tortoise be monitored until it resumes normal behavior, "settles in" for the night, or until you are no longer able to watch it due to darkness. In such a situation, we recommend that you be at the release site at or before sunrise the next morning to look for and continue to monitor the tortoise.

B.5.c.ii.(d). If tortoises are seriously ill - If a tortoise has prevalent signs of Upper Respiratory Tract Disease (section *B.7.d.iv.*) or hyperthermia (section *B.6.a.i.*), or otherwise appears to be seriously ill, we recommend that you construct a burrow, place the tortoise inside, block its entrance (section *B.5.f.i.*), and call the USFWS or the action agency to inform them of the situation. If you are unable to reach the appropriate agency for further instruction, check the tortoise on the next day(s), continue to record observations on its health, and contact the agency as soon as possible.

B.5.c.ii.(e). Other situations - There will be times when you will be required to exercise judgment on the appropriate disposition of a tortoise. For example, if you are the only monitor on a pipeline project in an area of high tortoise density, you would not likely process tortoises because other tortoises may wander, unseen, into harm's way while you were doing so. You may put an "excavated" tortoise in an artificial, plugged burrow until pipe installation has moved out of the area. Use your common sense, and always keep the welfare of the tortoise in mind.

B.5.d. Transporting tortoises

B.5.d.i. Use a box - There are a few situations where a tortoise may be taken from the field, held overnight, and then released the next morning. We recommend that during transport each tortoise remain in a clean, unused cardboard box that is covered or closed. Newspaper placed in the bottom will absorb any urine that is voided. The box should be ventilated in such a way that a tortoise's leg or head will not get stuck. Never put more than one tortoise in a box. Do not allow tortoises to roam freely in the vehicle, nor should they be transported in shopping bags or other containers less sturdy than a new cardboard box. Mark the box or discard it immediately after use to be sure that it is not used for another tortoise.

B.5.d.ii. Precautions - Never place tortoises over the catalytic converter or other area that becomes hot with vehicle operation. Truck beds or floorboards should be padded and travel should be at speeds that minimize vibrations or shifting of the box. A tortoise should never be left unattended in a vehicle. During summer months, desert tortoises may be transported in an air conditioned vehicle as long as they are in a covered cardboard box and the vehicle interior temperature is maintained between approximately 75 °F and 80 °F. If a tortoise is taken during the winter inactivity period, it should be maintained at approximately 55 °F, which will be less stressful to it than much warmer temperatures, and may allow it to remain in a physiological state of hibernation.

B.5.e. Preliminary steps to handling tortoises - When a tortoise is encountered, stop digging. If it is during the tortoise inactivity period (i.e., typically during July and August, and between November and February, when tortoises are less likely found aboveground; in Arizona the inactivity period may begin in late May or June), we recommend that you or another monitor construct an artificial burrow into which the tortoise will be placed after processing. If it is during the activity period (i.e., when tortoises are typically found aboveground between March and June and again between September and October), we recommend that you place the tortoise in the shade of a shrub, or depending on conditions (section *B.5.c.ii*), in an artificial burrow.

In previous federal Biological Opinions, the USFWS has recommended that a tortoise removed from its burrow be placed in a similar-sized burrow found in the area. We do not recommend this for the following two reasons: (a) there is the possibility of exposing a clinically healthy tortoise to URTD or another pathogen in the similar-sized burrow; and, (b) burrows are often too deep to tell if a resident tortoise is already in the burrow, and placing the "excavated" tortoise into an occupied burrow would result in stressing both tortoises. Therefore, if conditions are appropriate (section *5.c.ii.*), we recommend that the tortoise be placed *beside* a burrow of similar size or be placed in an artificial burrow as described below.

B.5.f. Constructing burrows - A reasonable amount of time to create an artificial burrow is from 30 minutes to several hours depending on the substrate. A suitable burrow may be created in several minutes using a gas-powered auger.

B.5.f.i. The "traditional method" - An artificial burrow is intended to provide immediate shelter and protection to a tortoise that was hibernating or aestivating when you removed it from its natural burrow. The following are guidelines to assist artificial burrow construction (after Tortoise Group 1994). The USFWS requires that you observe a field demonstration before constructing a burrow.

Dig a burrow that is (a) roughly the same orientation and size as the burrow from which the tortoise was taken, (b) six feet long, and (c) slanted downward about 15 to 20° below the horizontal line of the ground. Next, slide the plywood top onto the shelf. Avoid knocking dirt into the tortoise crawl space by inserting the plywood onto the three-sided shelf from the front end of the burrow. Do not drop the plywood onto the burrow from above. Once you are sure the plywood fits snugly, remove the plywood, smooth out the bottom of the burrow, and be sure that it will accommodate the tortoise. Loosen the soil along the floor of the crawl space to a depth of six inches to allow a tortoise to dig its way out should the plywood sag and possibly trap or pin it in the burrow. Replace the plywood and shovel dirt on top. Mound the dirt so that rain water will not puddle on top of the finished burrow.

We recommend that you cover the opening of the artificial burrow with rocks or wood for two or three days to ensure that the tortoise remains within the burrow and out of harm's way, or that it resumes hibernation or aestivation. This is particularly important if most of a tortoise's burrows have been lost to construction and it would be unable to find an existing burrow in a reasonable amount of time. After several days, when construction activities have left the area (i.e., as on a pipeline or transmission line), or when you are reasonably sure that the tortoise is safely hibernating or aestivating, **it is absolutely essential that you remove the rocks from the opening of the blocked burrow.**

B.5.f.ii. Another method - EnviroPlus (Goodlett 1992) has found that a safe burrow can be created quickly using a gas-powered auger. They have observed wild tortoises voluntarily enter these burrows shortly after they are made. Different-sized augers are available to create burrows for juvenile or large adult tortoises. With an extension, the burrow can be dug to a depth of about five feet. Using an auger, you can make a burrow that meets the criteria suggested above for a traditional burrow.

B.5.f.iii. Mapping and finding blocked burrows - If you block a tortoise inside a burrow, you must find that burrow in a few days to unblock it. Accurately map the burrow so that you can find it again. Additionally, we recommend that you mark the area. For example, Tierra Madre Consultants (LaRue 1993) marks burrows with lath or ribbon placed a standard distance and direction from each burrow. A cryptic message is written on the lath to show burrow location: "B23-2100FTS," to indicate that "Burrow #23 on Reach 2 is 100 feet south of the lath." The area must be discreetly marked to avoid attracting people or ravens to the burrow.

B.6. Handling tortoises

B.6.a. Precautions while handling tortoises

B.6.a.i. Avoiding hyperthermia - Do not expose a tortoise to direct sunlight. Keep it in the shade of your body, a shrub, a truck, etc. Remember that ground temperatures are much hotter than air temperatures. You should not place a tortoise on the hot ground, but may remove the top several inches of hot sand to expose a cooler layer below. Indications of hyperthermia may include aggressive struggling by the tortoise, a tortoise hot to the touch, frothing at the mouth (i.e., excessive salivation), or voiding of the bladder. The critical maximum body temperature for desert tortoises is between 103 °F and 112 °F (Brattstrom 1965, Naegle 1976).

If an animal begins frothing at the mouth (i.e., salivating excessively) it is probably nearing a lethal body temperature and immediate action is required: (a) if already constructed, place the tortoise in the artificial burrow, or create a pallet burrow in the shade of a bush and place the tortoise inside; (b) pour water on the ground beneath a shrub and place the tortoise in the shade on the water; (c) pour tepid (approximately 68-95 °F) water over the shell and/or wipe the skin and shell with a wet cloth; and, (d) if an air conditioned vehicle is available, place the tortoise into a box and take it into the cool vehicle (section *B.5.d.ii.*). Heat-stressed tortoises should not be released until they resume normal behavior. They should be monitored after release.

B.6.a.ii. Avoiding transmission of Upper Respiratory Tract Disease - At all times, you should handle a tortoise as if it has URTD, and in such a way that you will not transmit the disease from one tortoise to another. Much of the following information was developed by Dr. Kristin Berry (Berry 1993, 1988).

B.6.a.ii.(a). Treating clothing - Do not allow a tortoise to contact your clothing. If it does, change your clothes before handling another tortoise. Contaminated clothes should be washed before you wear them again while handling tortoises. It is advisable to have a change of clothes on-hand. Change your clothes, including your shoes, before leaving the site for another geographical region; (e.g., another valley or mountain range would be considered a separate region). Dipping the bottoms of your shoes into a sterilizing solution [section *B.6.a.ii.(d).*] or wiping them with a rag dipped in the solution may be sufficient for the shoes to be worn at another location. When visiting multiple sites on a single trip, always visit sites with known occurrence of URTD last. This will minimize the probability of spreading disease.

B.6.a.ii.(b). Treating vehicles - The USFWS recommends that you wash vehicle undercarriages and tires prior to traveling from a site where URTD is known or expected to occur to a site where URTD has not been reported. With appropriate planning, you should be able to accomplish this task.

B.6.a.ii.(c). Treating processing implements - The tips of calipers, which contact tortoises during shell measurements (section *B.7.h.*), may be covered with material to avoid direct contact with a tortoise and therefore contamination of the calipers. However, as with all other implements not directly contacting a tortoise, handling a tortoise, then handling the calipers results in contamination, and we believe that the instrument should be sterilized even if the tips are "protected." Alice Karl, who has handled tortoises for many years, only touches a tortoise with one hand, leaving the other one free and uncontaminated to handle the implements and record the data (personal communication, 6 August 1993). In such a case, the covered caliper tips are sufficiently protected. A metal or plastic rule may be used to measure the plastron (section *B.7.h*), but do not use wooden rules, which are too porous and cannot be properly sterilized. Although using a file to notch tortoises is not used for construction monitoring, if a researcher uses this technique (only with prior approval from the USFWS), the file should also be sterilized before use on another tortoise.

B.6.a.ii.(d). Sterilizing solutions - The USFWS requires that you sterilize all materials that contact a tortoise in one of the following solutions: (a) 95% isopropyl alcohol, (b) 95% ethyl alcohol, or (c) 25% solution of chlorine bleach and water. However, given that the organism is now known to be a mycoplasma, Berry (personal communication, 1 March 1994), citing discussions with Dr. Elliot Jacobson, indicated that of these three solutions, only bleach would be effective against the organism. All implements should be soaked in the solution for at least 20 minutes prior to using them on a different tortoise.

B.7. Processing tortoises

Processing a tortoise (i.e., weighing, measuring, sexing, and photographing it) should only be done by experienced monitors. If you have never handled or processed a tortoise, we recommend that you obtain experience before doing so in the field. Careful practice on pet tortoises, or observing more experienced biologists handling tortoises in the field, are recommended. Experts say that with practice you should be able to process a tortoise in 15 - 20 minutes. We do not recommend that you process a tortoise if the temperature is too hot, or if there is a chance that a second tortoise may be endangered while you are processing the first one. If processing a tortoise will endanger it or other tortoises, or if you have little or no experience in processing tortoises, skip this section and continue with section **B.8.**

B.7.a. Maintaining sterile conditions - Before touching a tortoise, the USFWS requires that you put on clean latex disposable gloves, and that you have them on during the entire process. Even if you do not process the tortoise, but only move it out of harm's way, you should wear gloves. We recommend that if a glove is torn while handling the tortoise, which is likely when its toenails scrape the glove, you should put a new glove on over the torn one. Once used, disposable materials such as latex gloves, t-shirt bags, or surveyor's tape (section *B.7.b.*) must be disposed of promptly. We recommend that each monitor have a garbage bag on hand, and that disposable materials be placed in the bag immediately after use. For non-disposable materials, the USFWS requires that each item be sterilized before it is used on a separate tortoise [section *B.6.a.ii.(c).*]. Additional recommendations and USFWS requirements are given in subsections of section *B.6.a.ii.*

B.7.b. Weighing tortoises - If the situation allows, you may weigh a tortoise. Experts recommend weighing a tortoise immediately after it is removed from the burrow. This way you have a true weight should the tortoise void its bladder, and can weigh it afterwards to determine how much fluid has been lost. One reason for weighing a tortoise is to determine if it is underweight, which may be one sign that it has URTD or another disease.

B.7.b.i. Using spring scales - If you are using a spring scale, a plastic grocery bag, cotton string, or surveyor's tape may be used to suspend the tortoise from the scale. If you use string or surveyor's tape as a sling, be sure that the material is strong enough to support the tortoise. The tape may be doubled for use with very heavy tortoises. Smaller tortoises may be placed inside a grocery bag or ziplock bag and weighed. Larger tortoises can be weighed by making a sling with one loop of the bag placed posterior to its forelimbs and the other loop placed anterior to its hindlimbs. Never suspend a tortoise far from the ground; suspend the tortoise over sand rather than large rocks; keep weighing time to a minimum; and take every precaution to prevent the tortoise from falling.

The following scale sizes are recommended: (a) 0 to 100 g scale with a 1.0 g precision for small tortoises, (b) 1 kg scale with a 10 g precision for moderate-sized tortoises, and (c) 5 kg scale with a 50 g precision for large tortoises. *Pesola* brand spring scales have been recommended. It is best to use the smallest scale that will accommodate the weight of a tortoise. Occasionally a tortoise will weigh more than 5 kg; mark that information on the data sheet. Keep scales clean. When weighing a tortoise, hold the ring at the top of the scale to ensure that the scale is suspended vertically and the correct weight is being taken. Record the information on the data sheet. Note: Some researchers use electronic *Mettler* scales or *Chantillon* balances for more accurate weights.

B.7.c. Immobilizing tortoises

B.7.c.i. Using coffee cans - A desert tortoise may be placed on the top of a coffee can or other large can to facilitate observations and measurements as described in the following sections. The can should be large enough to support the tortoise and small enough to prevent any waving appendages from touching the can. (Note that coffee cans come in several sizes and can be "nested" in one another for ease of transport and for handling different-sized tortoises). Freedom to move its appendages may encourage a tortoise to extend its head, which allows you to observe the eyes, nares, chin glands, and beak where most signs of URTD are observed. The can must be sterilized before using it with another tortoise, or you may place waterproof plastic, such as a baggy, on top of the can, the tortoise on top of the plastic, and discard the plastic afterwards.

B.7.c.ii. Using towels - A tortoise may be held on a clean cloth between your knees as you kneel. Use your body to shade the tortoise during processing. You may scrape away the hot, upper surface of the soil down to a cooler level onto which you can place the towel and the tortoise. While holding the tortoise firmly between your knees, carefully press down on its back to immobilize it. The cloth prevents direct tortoise contact with your clothing, but may not prevent urine or nasal exudate from soaking through the towel and contaminating your clothes. If this happens, you should change your clothes before processing another tortoise. In either case, the cloth must be soaked in a disinfecting solution and laundered before it can be used on another tortoise. Disposable baby changing sheets have been suggested in place of cloth towels.

B.7.d. Observing tortoises - If the situation allows, we recommend that you observe a tortoise and record ectoparasites, shell lesions, signs of osteoporosis or osteomalacia, injuries, and evidence of URTD. Much of this information is taken from Berry (1993, 1988).

B.7.d.i. Ectoparasites - Potentially encountered parasites of tortoises include adobe tick (*Ornithodorus turicata*), mites (*Trombicula* sp.), and bot fly larvae (Family: Cuterebridae). In some areas, ticks are the most common parasite observed on wild tortoises. They generally adhere to the growth areas between scutes, particularly on rear marginal scutes. If present, mites will be found on the skin. Bot fly larvae would appear as a large swelling or bulge (1.0 - 1.5 cm long) on the neck, leg, or tail. There will be a small hole through which you may observe the larva. Experts recommend that you do not try to remove parasites. Such unnecessary handling would likely injure and/or stress the tortoise. We recommend that the numbers and locations of each parasite be recorded on the data sheet.

B.7.d.ii. Shell lesions - There are many types of lesions, ranging from injuries caused by predators to diseases of scute and bone. The field worker should look for and record any observations on scute and bone irregularities, discoloration, apparent damage (healed or healing), open wounds, holes, pits, etc. Since we do not know much about shell diseases in the desert tortoise at this time, photographs and written descriptions will be very useful. See section **B.7.h.** for taking photographs of plastrons.

B.7.d.iii. Osteoporosis and Osteomalacia - These diseases can manifest themselves to the observer by depressed scutes and/or thinning scutes with exposed bone beneath. Some scute depression and thinning is part of the normal aging process of the shell, or may result from nutritional deficiencies or pathologies. It is recommended that the field worker photograph such conditions and record the information on the data sheet.

B.7.d.iv. Upper Respiratory Tract Disease - Tortoises may have this disease and not show any obvious sign of it. Therefore, **treat every tortoise as if it has URTD to avoid spreading the disease to healthy tortoises**. Observe all tortoises for the following signs of URTD: (a) wheezy, rattling breath; (b) clear to green mucous coming from the nostrils or dirt caked around the nostrils; (c) dirt caked on forelimbs due to mucous being rubbed there; (d) puffy eyes or eyes sunken and dull; (e) swollen, oozing chin glands; (f) lethargic, with legs or head listlessly distended from shell; etc. Very low body weight, lack of skin luster, or a dry mummified appearance may be evidence of URTD or another disease (Kristin Berry, personal communication, 2 February 1994). We recommend that these signs or abnormal behavior be recorded on the data sheet. Photo-documentation of signs of URTD is strongly recommended.

B.7.e. Recording distinctive features - If the situation allows, we recommend that you record on the data sheet diagram any marks or anomalies (e.g., unique morphological features, damaged limbs, damaged shell, manmade marks on the shell, etc.). Captive tortoises may be marked with paint, have initials carved in their carapaces, have holes drilled in their marginal scutes, or have raised centers on their carapace scutes due to abnormally high growth rates. Some anomalies may include irregular gulars, extra vertebral scutes (normal is five), paired or malformed costal scutes (normal is four on each side), extra marginal scutes (normal is 11 on each side), or missing scutes. There may be too many or too few toes, or malformed toe nails. We recommend that you describe a tortoise in enough detail that another monitor would recognize it from your description. This information may be important to distinguish "problem" tortoises that persistently enter construction sites.

B.7.f. Sexing tortoises - If the situation allows, we recommend determining the sex of a tortoise if its midline carapace length (MCL) is greater than or equal to 180 mm (section *B.7.h.*); the sex of smaller tortoises is not easily, if at all, determinable. If the MCL is less than 180 mm, mark "sex unknown" on the data sheet. Generally, the following **male** characteristics may help differentiate them from females: (a) concave plastron; (b) longer, more curved gulars; (c) larger size; (d) longer, broader, more conical tail; (e) shorter, thicker toenails; and (f) larger, well-developed chin glands. For less experienced monitors, pay particular attention to the gular projection and the shape of the plastron, which are the two best characters for differentiating the sexes. For very large tortoises, you can feel the concave (male) or flattened (female) plastron or see it by holding the tortoise at eye level without turning the tortoise over on its back. When in doubt, record all other information and mark "sex unknown" on the data sheet.

B.7.g. Marking tortoises - If the situation allows and if you are required to mark a tortoise by painting an identification number on a scute, we recommend the following. Use a clean, sterile toothbrush to remove dirt from the left fourth costal scute, where the tortoise will be marked. If this scute is damaged, use the right fourth costal scute. The number is likely to last longer if placed on a rough, off-centered surface where shell-wear is less common, which is one reason only the fourth costal scutes are used for marking. Next, place a small dot (i.e., no larger than 1/4 inch diameter) of "white-out" or acrylic paint on the scute. Once the spot is dry, write the pre-arranged number on the spot using a waterproof, permanent black ink pen. Some biologists recommend using a capillary type technical pen with a point diameter of about 0.25 mm.

Allow the number to dry before applying epoxy. Devcon brand, five-minute epoxy has been recommended by some field-workers. It is advisable to mix the epoxy on a file card or piece of paper, then transfer the mixed epoxy to the number on the shell with something such as a toothpick, wooden coffee stirrer, or tongue depressor. Wait several seconds until the epoxy starts to thicken but is still liquid enough to spread over the numbered spot with ease. Cover the paint spot overlapping its edges just enough to seal the paint. **Never allow the epoxy to spill over onto the growth area, which occurs at the border between two scutes.** Anticipate this when applying the paint so there will be space for the epoxy to overlap the paint without entering the seams. It may be helpful to cover the margins of the scute with 1/2" wide masking tape before applying the epoxy, to ensure that the epoxy does not touch the growth area, especially on smaller tortoises. Record the assigned number on the data sheet.

B.7.h. Measuring tortoises - If the situation allows, while the epoxy is drying (be careful to avoid smearing the epoxy), we recommend that you measure the tortoise and record the following information on the data sheet: (a) carapace length at the midline (MCL), (b) plastron length from the gular notch to the anal notch (PLN), (c) width at the junction of the seventh and eighth marginal scutes (Width M7/M8), and (d) maximum height from the intersection of the abdominal and femoral scutes (i.e., at the junction of the two largest scutes on the plastron and the two immediately posterior) to the corresponding position on the carapace (Max height). The USFWS requires that all measurements be in millimeters. Use calipers for the most accurate measurements, or a plastic/metal rule as an alternative.

While taking measurements, tortoises are to be handled carefully. Do not turn the tortoise over to measure its plastron. This measurement can be made with the tortoise in an upright position. Mishandling may result in pulmonary edema, psychogenic shock, or intestinal torsion. If eggs inside a female are broken while you are handling her, she may die from egg yolk peritonitis.

B.7.i. Photographing tortoises - If the agency requires that you photograph processed tortoises, we recommend that you take the following color, **slide** photographs: (a) dorsal view of the carapace, (b) ventral view of the plastron, (c) the numbered scute, and (d) frontal view of the tortoise's face and forelegs. If the tortoise is too large for you to hold while taking a photograph of the plastron from the underside, do not take this photo. If present, have another monitor hold the tortoise while you take the plastral photograph. It is important that each object fill 80 - 90% of the frame and that the object be clearly focused. Kodachrome film has been suggested because the slides last longer with less discoloration than Ektachrome, for example. We recommend that the following information appear in the photograph: date, biologist's name, project name, and tortoise number. Two types of labels have been recommended:

(a) hold a small card adjacent to the tortoise so that the above information is clearly visible on the photograph without blocking the part of the tortoise being photographed; or,

(b) attach a 1/2" x 1/2", adhesive "Avery label" to the tortoise to allow for closer, more detailed photographs of the subject.

It is suggested that you keep a log of the photographs in your field notes (e.g., "Roll 1, Slide 23, carapace of Tortoise 4.") If you are inexperienced with photography, we recommend that you not photograph tortoises. If you are only somewhat experienced, we recommend that you shoot several test rolls of film prior to photographing tortoises in the field. Use only camera settings that produce the clearest slides. If available, we recommend that a second monitor take the photograph while you, the processor, hold the tortoise. We recommend that processed slides be labeled with the following information: date, biologist's name, project name, tortoise number, township, range, section, county, and state.

B.8. Releasing tortoises

B.8.a. Translocating tortoises - Once a tortoise has been processed, or moved out of harm's way, do not move the tortoise more than 1,000 feet from the collection site unless otherwise directed by the USFWS. You should carefully consider the situation before you release tortoises (section *B.5.c.ii.*). The minimum distance from the edge of the construction zone that a tortoise can be translocated will be determined by its age and sex (different home range sizes), the presence or absence of tortoise-proof fencing around the perimeter of the construction zone, and the duration of the construction activity. The USFWS has required that tortoises removed from construction sites be placed in the shade of a shrub, in a natural unoccupied burrow, or in an artificial burrow (section *B.5.*). We do not recommend that tortoises found aboveground be placed inside an artificial burrow, but rather released as described elsewhere (section *B.8.b.*). Further, the DTC recommends that tortoises **not** be put into existing burrows for reasons given in section *B.5.e.* A tortoise should not be placed on private land without the written permission of the landowner.

B.8.b. Releasing tortoises

B.8.b.i. Temperature considerations - The USFWS requires that tortoises be released at a temperature that is suitable for activity, with reasonable expectation that the temperature will remain within the tortoise's thermal preference long enough for it to adjust to its surroundings. McGinnis and Voigt (1971) found the preferred daytime body temperature of tortoises to be 80.6 °F to 100.4 °F during July, and somewhat lower during May (section *B.5.c.*). Some situations and recommended procedures are given in section *B.5.c.ii.*

B.8.b.ii. Discouraging urination - Many experts state that tortoises are most likely to urinate while being carried, and that the longer you handle them, the more likely they are to urinate. A tortoise may be more prone to void its bladder during drought conditions, which is also when water availability is at its lowest. You may discourage bladder voiding by pressing the tortoise's tail against its vent while you are carrying it. Also, press the tail against its vent if it starts to urinate. If it

does, record on the data sheet the quantity, color, and viscosity of the urine. If the tortoise has already been weighed, weigh it again to estimate the amount of lost fluid.

B.8.b.iii. Monitoring released tortoises - Upon releasing a tortoise, the USFWS requires: (a) that each tortoise be accompanied by an authorized monitor, (b) that each tortoise be monitored at the release site until it is exhibiting normal behavior, and (c) that there be no mass releases of animals.

C. FOLLOW-UP SUGGESTIONS

C.1. Caring for field supplies

Some of the materials you may use are very sensitive to desert conditions. Spring scales will register incorrect weights if they become clogged or rusty; surveyor's tape may become brittle and not support the weight of a tortoise; masking tape will dry up and be useless. It is best if you have well-maintained materials for handling tortoises. Non-disposable materials should be cleaned and sterilized between uses on different tortoises, and may need to be cleaned before using them at the beginning of a project if they have not been used in a long time. Care for field materials is equivalent to the care you can offer a desert tortoise.

C.2. Information sharing

The USFWS typically requires a follow-up report to construction projects authorized by their Biological Opinions. We recommend that each project be considered an opportunity to provide information to the resource agencies on the best ways to accomplish tortoise monitoring. We feel that a consistent approach to handling and processing tortoises and recording the data will ultimately benefit the conservation effort for the species. The DTC is very appreciative of the many individuals, representing many organizations, who have already shared information to develop these Guidelines. Their names are listed in Attachment 1, and they are to be commended for their invaluable input.

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DATA SHEET FOR HANDLING DESERT TORTOISES

Complete both sides of this data sheet when either a tortoise is moved out of harm's way, or a burrow is excavated and a tortoise found.

Project Identification

Date:_____ Project Name:_____ Monitor's Name(s)_____

Location: State:_____ County:_____

USGS quadrangle:_____ T:_____ R:_____ 1/4 of_____ 1/4_____

Comments:_____

Project Description

Slope:_____ Aspect:_____ Elevation:_____

Topography	Soil Type	Vegetation	Location found
_____ Flat	_____ Sandy loam	_____ Creosote bush	_____ Burrow
_____ Small hills	_____ Blow sand	_____ Saltbush scrub	_____ Pallet burrow
_____ Large hills	_____ Gravel	_____ Blackbrush	_____ Other
_____ Small wash	_____ Cobble	_____ Desert wash	_____ Under shrub
_____ Large wash	_____ Caliche	_____ Joshua tree	_____ In open
_____ Bajada	_____ Rocky	_____ Thorn scrub	_____ Caliche cave
_____ Dune	_____ Pavement	_____ Grassland	_____ Rock shelter

Describe:_____

_____

_____

_____

Tortoise Burrow Data

Time of excavation: Start:_____ End:_____ Burrow #: _____

Temperature during excavation (1.5m/1.0cm): Start:_____ End:_____

Burrow: Width:_____ Height:_____ Length:_____

Orientation:_____ Condition:_____

Burrow description/contents:_____

_____

_____

_____

TORTOISE MEASUREMENTS AND OBSERVATIONS

Tortoise #:_____ Numbered Scute:_____ Tortoise Weight (g):_____ Sex:_____

Measurements (mm): MCL:_____ PLN:_____ Width M7/M8:_____ Max Height:_____

Photos Taken: Carapace:_____ Plastron:_____ Frontal:_____ Numbered Scute:_____

Comments:_____

_____

Tortoise Health Profile (indicate the best description with an "x" in the appropriate space).

Nasal Description	**Breathing**	**URTD Determination**
_____ Nostrils dry	_____ Clear	_____ Sufficient sign present
_____ Nostrils damp	_____ Wheezing	_____ Insufficient sign present
_____ Nostrils wet	_____ Rasping	_____
_____ Nasal exudate present	_____ Bubbly	_____
_____ Bubbles from nostrils	_____ Normal	_____

Describe:_____

_____

Posture and Behavior	**Shell Disease***	**Trauma***
_____ Alert, responsive	_____ Lesions present	_____ Head
_____ Lethargic	_____ Sunken scutes	_____ Forelimbs
_____ Appendages limp	_____ Thinning scutes	_____ Hindlimbs
_____ Head hanging	_____ None observed	_____ Shell, gular horn

Describe:_____

_____

* Sketch all features mentioned above, including the epoxied number, gular horn, anomalies, and other identifying features.

F. CHECKLIST FOR HANDLING DESERT TORTOISES

The following sequence is recommended for handling and processing tortoises. If this differs from an established sequence that you, as an experienced monitor, have developed, the DTC does not require that you abandon your approach, but that you consider the information. For the inexperienced monitor, we **do** recommend that you follow this sequence. Each step is cross-referenced with sections in the Guidelines. See the Table of Contents for page numbers. The bold word, "**data**," follows a given instruction where we recommend information be recorded on your data sheet, maps, or personal journal.

Before going to the field, be authorized (A.1.) and trained (A.2.), determine if tortoises are to be marked (A.3.), if so, develop a numbering scheme (A.4.), and have your materials organized (A.5.).

Upon finding a burrow, determine if it will be excavated (B.1.a.). If so, describe it beforehand (B.1.b. **data**) and decide if an artificial burrow is needed (B.1.c.). Map (B.2. **data**) and number (B.3. **data**) excavated and artificial burrows.

Before excavating a burrow, check for eggs (B.4.a.) and, if found, follow USFWS protocol for handling them (Attachment 3). Then, excavate the burrow (B.4.b.) and be absolutely sure that it is empty or that you have removed all tortoises (B.4.c.).

When you find a tortoise in a burrow, take the temperature (B.5.a. **data**) and decide if the tortoise should be processed (B.5.b. and B.5.c.).

Before you handle a tortoise, determine if it will be processed and how it will be disposed during hot temperatures [B.5.c.ii.(a).], during cold temperatures [B.5.c.ii.(b).], at or near sunset [B.5.c.ii.(c).], if the tortoise is seriously ill [B.5.c.ii.(d).], or during other situations [5.c.ii.(e).]. If the tortoise must be transported in a vehicle, use a new cardboard box (B.5.d.i.) and take precautions (B.5.d.ii.).

If an artificial burrow needs to be constructed (B.5.e.), use either the traditional method (B.5.f.i.) or another acceptable method (B.5.f.ii.). Take every precaution to ensure that the tortoise, if blocked in its burrow, is unblocked after several days (B.5.f.iii.).

When removing a tortoise from its burrow, avoid hyperthermia (B.6.a.i.), and take precautions to prevent the transmission of URTD (B.6.a.ii.) with proper treatment of clothing [B.6.a.ii.(a).], vehicles [B.6.a.ii.(b).], and processing implements [B.6.a.ii.(c).], using appropriate sterilizing materials [B.6.a.ii.(d).].

If the tortoise is to be processed, put on disposable gloves and maintain sterile conditions (B.7.a.), weigh the tortoise (B.7.b.i. **data**), immobilize it using a can (B.7.c.i.) or a towel (B.7.c.ii.), observe it for ectoparasites (B.7.d.i. **data**), shell lesions (B.7.d.ii. **data**), osteoporosis and osteomalacia (B.7.d.iii. **data**), and URTD (B.7.d.iv. **data**). Record distinctive features (B.7.e. **data**), sex the tortoise (B.7.f. **data**), mark it (B.7.g. **data**), measure it (B.7.f. **data**), and photograph it (B.7.i. **data**).

After the tortoise has been processed, release it into the adjacent area or place it in the artificial burrow (B.8.a.). Be careful of temperature extremes (B.8.b.i.), discourage tortoise urination (B.8.b.ii.), and monitor the tortoise (B.8.b.iii.).

After you leave the field, maintain your field materials in good working order (C.1.), and share your experiences with the USFWS (C.2.).

ATTACHMENT 1: PERSONS CONTACTED

Edward L. LaRue, Jr. assembled the information and drafted the Guidelines in 1994, and, with input from USFWS field offices in California, Arizona, Nevada, and Utah, revised them in April 1996 and again in July 1999. The following individuals were contacted to develop and/or review preliminary drafts. Not all of them responded to the initial or subsequent requests for information. For those who did, thank you very much for your invaluable assistance. When known, contributors' July 1999 affiliations are given rather than their 1994 affiliations. Tierra Madre Consultants, Inc. is given special thanks for its commitment to this project, and for much of the funding to complete it.

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ATTACHMENT 2: HANDLING SUPPLIES

Burrow excavation and construction
Thermometer (to measure air and ground temperatures)
Watch or clock (to record start and finish processing times)
Measuring tape (for burrow dimensions)
Compass (for burrow orientation)
Hand held mirror (for viewing inside burrow)
Leather or cloth gloves (to avoid animal stings and/or bites)
Blunt-nosed shovel(s) (for excavating burrow)
Garden trowel (for excavating burrow)
1" x 2" plank (to insert in small burrows)
2" x 4" plank (to insert in larger burrows)
4' x 8' x 1/4" thick plywood (for artificial burrow construction)
Hand saw (to cut plywood into appropriate size and shape)
Surveyor's tape (for marking a burrow or making a weighing harness/sling)

Tortoise handling and marking
Disposable latex gloves (for handling tortoise)
Different sizes of coffee cans/sterilized towel (for immobilizing tortoise)
Toothbrush, sterilized (for cleaning dirt from scute to be numbered)
Acrylic paint or typewriter correction fluid (for making dot to number tortoise)
Waterproof, capillary pen (for numbering the tortoise and keeping notes)
1/2" masking tape (to cover growth areas prior to applying epoxy)
Epoxy, toothpicks, wooden coffee stirrer, tongue depressors (to cover the number on the scute and to apply the epoxy)
Plastic, ziplock bags (for holding used latex gloves and weighing juvenile tortoises)
Hand lens (for observing parasites)
95% ethyl or isopropyl alcohol, or 25% chlorine solution (for sterilizing equipment)
Rubber/plastic container and lid (for soaking instruments)
New, disposable cardboard boxes (for holding and/or transporting tortoises)
Garbage bags (for disposing of used gloves, t-shirt bags, etc.)

Tortoise measurements and photography
Grocery, t-shirt bags, surveyor's tape, cotton string (to weigh the tortoise)
Calipers (for measuring carapace length, width, and height)
Metal or plastic rule (to measure plastron length)
100 g, 1.0 kg, and 5.0 kg tubular spring scale (to weigh small and large tortoises)
3" x 5" file cards (for mixing epoxy and identifying photographic slides)
Avery labels or other stickers (to attach to tortoise to identify photograph)
35 mm camera (for taking photographs)
Slide film (for taking photographs)

Egg handling
Felt-tipped pen (for marking eggs)
Bucket (for transporting eggs)

Miscellaneous
Agency document(s) regulating the specific project (e.g., USFWS Biological Opinion, State Memorandum of Understanding, BLM Stipulations, etc.)
Handling Guidelines and checklist
Agency approved, sequential numbering scheme for marking tortoises
Project maps for mapping tortoise burrows
Clipboard
Data sheets
Pads or blanket for truck bed to cushion transported tortoise and reduce heat
Phone number and contact person of local USFWS field office, State fish and game departments, BLM field office, etc.
Phone number of nearest qualified veterinarian to treat injured tortoise
Extra change of clothing, including extra shoes

(Much of this list is taken from McCullough et al. 1993)

ATTACHMENT 3: EGG HANDLING PROTOCOL

This Egg Handling Protocol is taken verbatim from U.S. Fish and Wildlife Service File No. 1-5-93-TA-390. Wording concerning placing eggs on private lands was added to be consistent with USFWS recommendations for the Tortoise Handling Guidelines.

Tortoise eggs shall be moved to artificial nests either in the wild or at an approved facility. Biologists must receive special training in the procedures outlined below, but such training can be obtained after a nest is actually found. If this is done, the nest shall be carefully covered with soil so as not to move the eggs and protected until on-site training is provided. The responsible federal agency shall ensure that this training is made available.

Any nest that is found shall be carefully excavated by hand at a time of day when the air temperature six inches above the ground is approximately equal to the soil temperature at egg level. Immediately upon finding a nest, large tool use shall be discontinued and the nest excavated by the biologist using his or her hands. [DTC recommends that the monitor put on disposable latex gloves before marking and handling eggs]. Before disturbance of nest contents, each egg shall be gently marked with a small dot on the top using a felt-tipped pen to establish the egg's orientation in the nest. In handling nest contents, eggs must be maintained in this orientation at all times. Because egg shells become extremely fragile in the last few weeks before hatching, special care shall be taken with eggs found from August to mid-October. Because these eggs are very fragile, some may break during handling. This will be lethal to egg contents. Such an accident can be expected to occur until techniques are developed to avoid this type of incident. Broken eggs shall be buried nearby and left in the field, or the contents preserved and provided to qualified researchers.

The biologist shall measure and record the depth of the nest below the soil surface, the location of the nest in relation to any adjacent shrub (i.e, whether on the north, south, east, or west side of the shrub), the species of shrub and its approximate foliage volume, and the soil type. Place approximately 1 inch of soil from the nest area in a bucket and carefully transfer the eggs to the bucket, maintaining egg orientation. Cover the eggs with soil that is free of cobbles and pebbles, to a depth equivalent to that of the original nest.

If good tortoise habitat is available in the general area, the eggs shall be relocated between 150 to 1,000 feet from outer boundary of the project site, unless directed differently by USFWS. [Eggs should only be placed on lands administered by a federal agency, or on private lands when a written authorization to bury the eggs there has been obtained]. Prepare a nest with the same depth, orientation, location in relation to a specific shrub species, and in the same soil type as the original nest. Carefully transfer the eggs, maintaining their original orientation, to the new nest. The eggs shall be replaced so that they touch one another. Gently cover with soil from which cobbles and pebbles have been removed so that all the air spaces around the eggs are filled. Relocated nests in the wild shall be monitored by a qualified biologist. The monitoring program shall be developed in consultation with the Fish and Wildlife Service.

If a suitable site for a nest is not available in the wild, the eggs shall be prepared for incubation in a suitable holding facility. Place a small amount of soil in a bucket and transfer the eggs to the bucket using the technique specified above, making sure that the eggs are touching one another. Carefully fill the bucket to the depth of the original nest, but leave the top of the soil layer three inches below the rim of the bucket so that future hatchlings cannot escape. Bury the bucket in soil in a safe location at an approved holding facility.

The biologist shall record in detail all the procedures used in moving eggs. Personnel caring for incubating eggs at a facility shall maintain a record of where the eggs were found, method of incubation, length of time and conditions under which the eggs were incubated, observations of eggs during the incubation period, information about hatchling health and behavior, and disposition of the hatchlings.

Attachment DR-BIO-55

Common Raven Monitoring, Management and Control Plan

RIDGECREST SOLAR POWER PROJECT
DRAFT
COMMON RAVEN MONITORING, MANAGEMENT AND CONTROL PLAN
RIVERSIDE COUNTY, CALIFORNIA

Docket 09-AFC-09

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Figure DR-BIO-55 Site Location and Raven Monitoring Areas

1.0 INTRODUCTION

This section introduces the project background, purpose, objectives, and conditions of concern related to raven monitoring, management, and control in the vicinity of the proposed Ridgecrest Solar Power Project (RSPP or Project).

1.1 Background

Ridgecrest Solar I, LLC (hereafter referred to as the Applicant), proposes to construct, own, and operate the RSPP. The Project would have a nominal output of 250 megawatts (MW) and consist of a single power plant utilizing two solar fields.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, California, about five miles southwest of the City of Ridgecrest, California (Figure DR-BIO-55). The Project right-of-way (ROW), for which the Applicant has applied to the Bureau of Land Management (BLM), includes approximately 3,995 acres of public lands owned by the Federal government. The total disturbance area is estimated at 1,944 acres plus an additional 16.3 acres resulting from construction of the water pipeline off site.

The Project would include two solar fields. The north solar field would be 894 acres and the south field would be 554 acres. The solar fields would be composed of piping loops arranged in parallel groups connected to supply and return header piping. The power block would be located north of Brown Road, just southwest of the northern solar field. The power block would be composed of its own administration, control, warehouse, maintenance, and lab buildings; a heat transfer fluid pumping and freeze protection system; steam generator; propane-fired auxiliary boiler; one steam turbine generator; an air-cooled condenser; generator step-up transformer, transmission lines, and related electrical system; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

A water pipeline, approximately 5 miles long, would be installed within the Brown Road and China Lake Boulevard ROWs to connect the Project with the Indian Wells Valley Water District supply. (The diameter of the pipe could be 12 inches diameter or smaller depending on the Water District's determination). A new 230-kilovolt (kV) transmission line from the turbine generator to a new nearby switchyard would interconnect with Southern California Edison's existing 230-kV Inyokern/Kramer Junction transmission line passing west of the Project site. The transmission line would be approximately 0.75 mile long and located entirely within the facility footprint.

In addition to the solar fields and a main power generating facility (power block), the site would include a main office building and parking lot, a main warehouse with lay down area, on-site access roads, a tie-in switchyard, an underground water pipeline, and a bioremediation area. The Project site plus the linear facilities (water pipeline, transmission line and switchyard) are hereinafter collectively referred to as the Project Area.

Without the implementation of monitoring, mitigation, and control measures, the Project has the potential to indirectly impact populations of the desert tortoise (*Gopherus agassizii* [DT]), listed as threatened under the federal Endangered Species Act (ESA) and California ESA, by increasing the attraction of common ravens (*Corvus corax*) into the area and thereby increasing potential DT depredation by raven. The majority of the proposed disturbance area is sutiable DT habitat, though none of this habitat is in a DT conservation area or is designated DT critical habitat (BLM 1999). The movement of ravens throughout the area and over DT habitat adjacent to and in the vicinity of the disturbance area could increase the chances of a raven encountering and depredating a DT.

1.2 Purpose and Objectives

The purpose of this Common Raven Monitoring, Management, and Control Plan (Plan) is to ensure that the construction, operation, maintenance, and decommissioning of the RSPP does not attract ravens to the Project Area by creating food or water subsidies, perch sites, roost sites, or nest sites, and to identify the conditions of concern specific to the RSPP that may attract ravens to the Project Area. The Plan includes monitoring, management, and control measures that will 1) monitor raven activity and 2) specify management and control measures that will avoid, minimize, or mitigate impacts. The monitoring effort is intended to provide qualitative data that can be interpreted by the Designated Biologist (DB) (see Section 3.2) to determine if Project Design Features (PDFs) are effective or if additional management and control measures are needed to meet the objective.

Specific plan objectives include:

1. Clearly identify how the Project would utilize PDFs and other measures to manage the conditions of concern specific to the RSPP that may attract ravens to the area.
2. Document the effectiveness of PDFs and other measures in addition to raven management and control measures implemented at the RSPP.
3. Specify how, when, and what other measures would be selected and implemented if the monitoring suggests the need for additional controls.
4. Define triggers for modification of management and control measures using adaptive management principles.

1.3 Conditions of Concern

The conditions of concern are those Project features or activities that, when not properly designed or managed, provide new subsidies that may result in changes in raven population or behavior that could potentially adversely affect the DT population in the Project Area. Four basic conditions of concern have been identified for the RSPP and have been considered in developing this Plan:

1. Potential creation of new perching/roosting/nesting sites for ravens;

2. Water ponding potential from dust suppression;
3. Raven food sources from soil disturbance (e.g., rodents, insects, etc.); and,
4. Human food and waste management.

The study design for raven monitoring, as well as measures for raven management and control, is dependent upon the accuracy of defining these conditions. Each of these conditions of concern is defined in more detail below.

Raven Perching, Roosting, and Nesting Sites

The majority of raven predation on DT is thought to take place during the spring, most likely by breeding birds that have been shown to spend most of their time foraging within 1,300 feet of their nests (Kristan and Boarman 2003). Therefore, structures that facilitate nesting in areas ravens could not otherwise nest in may pose a danger to nearby DT populations. Project components, such as tower structures, transmission poles and lines, and support structures provide new elevated perching sites that have the potential to increase raven use of the Project Area.

Ponding Water

During construction, water will be applied to graded areas, construction ROWs, dirt roads, trenches, spoil piles, and other areas of ground disturbance to minimize dust emissions and topsoil erosion. If water resulting from these dust suppression activities were to form ponds, those ponds would have the potential to attract ravens and increase DT predation by ravens. During operations, deionized water will be used to wash mirrors; however, the amount of water used will be minimal and is not anticipated to result in ponded water on site.

Raven Food Sources from Soil Disturbance

During construction, decommissioning, and restoration, disturbance of the soil would occur from heavy equipment operation. This disturbance would result in the "unearthing" and exposure of natural food sources for ravens such as rodents and insects. Ravens would be attracted to the soil disturbance areas to prey on unearthed, injured, and dead animals.

Human Food and Waste Management

Ravens are considered scavengers that obtain a high percentage of their diet from human subsidies such as food sources brought on site by employees, landfills, dumpsters behind restaurants and grocery stores, open garbage drums and plastic bags placed on the curb for garbage pickup, and roadkill. In addition, construction waste piles also attract small mammals (e.g., rodents) that become an additional food source for ravens. The construction, operation, decommissioning, and restoration phases of the RSPP would result in increased food and waste generation in the Project Area; improper waste management could attract ravens.

2.0 REGION-WIDE RAVEN MANAGEMENT AND MONITORING PROGRAM

The Applicant will participate in a regional raven management and monitoring program. As specified by the California Energy Commission (CEC) for other ongoing solar power projects in the region, this program will include agreements with State and local governments and the Applicant (Beacon 2008). Pursuant to this program, the Applicant will contribute to the region-wide effort in an amount related to the anticipated level of the Project's adverse impacts to DT from predation by ravens. It is anticipated that the funds contributed by the Applicant would be held by the National Fish and Wildlife Foundation as part of a Desert Conservation Fund until needed to implement the region-wide program. The Applicant will contribute funds necessary to avoid, minimize, and mitigate potential impacts to DT resulting from increased raven predation associated with the RSPP.

3.0 ROLES AND RESPONSIBILITIES

3.1 Environmental Compliance Manager

The Applicant shall assign an Environmental Compliance Manager (ECM) to the Project. The ECM is responsible for facilitating implementation of the environmental conditions of the Project. Typical ECM duties involve managing, supervising, and/or providing advice on work affecting air quality, water/streambed permits, and biological resources environmental compliance programs. The contact information for any ECM named to oversee the Project will be incorporated into the Final Biological Resources Mitigation, Implementation, and Monitoring Plan.

The ECM must have experience in the implementation of general environmental compliance measures and must have specific training by the DB to conduct biological monitoring activities specified in this Plan.

3.2 Designated Biologist

The Applicant shall assign a DB to the Project. The Applicant shall submit the resume of the proposed DB, with at least three references and contact information, to the CEC Compliance Project Manager (CPM) for approval in consultation with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS).

The DB will have the following background and training:

- Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field, and three years of experience in field biology or current certification of a nationally recognized biological society, such as the Ecological Society of America or the Wildlife Society; and
- At least one year of field experience with biological resources found in or near the Project Area.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM, in consultation with the CDFG and USFWS, that the proposed DB has the appropriate training and background to effectively implement the Plan. The Applicant shall ensure that the DB performs the activities specified in the Plan.

The Applicant shall also designate an alternate biologist with the same qualifications as the DB, outlined above.

4.0 MANAGEMENT PRACTICES

This section specifies management practices or PDFs that the Applicant proposes to implement to accomplish the purpose of this Plan as identified in Section 1.2. The PDFs are designed to avoid creation of new subsidies and thus prevent the increased use of the Project Area by ravens. The four basic conditions of concern identified in Section 1.3 have been grouped into construction and operation phase conditions, as appropriate for the Project. Construction-phase conditions are considered temporary and are anticipated to be avoided or minimized mainly by the implementation of management measures as defined in Section 4.1 below. Operation conditions will include management measures to minimize potential impacts and may require additional control measures based on the results of the monitoring program (Section 4.2). If these PDFS or management practices are not effective in accomplishing the goal of this Plan, modifications to these practices and/or additional measures will be implemented and monitored under adaptive management to ensure the Plan's purpose is satisfied.

4.1 Construction

Construction-phase impacts are considered more temporary in nature than operational impacts and therefore require temporary management practices to avoid or minimize the potential to attract ravens to the Project Area. Construction-phase impacts will also occur during the decommissioning and restoration phases of the RSPP.

4.2 Raven Perching, Roosting, and Nesting Sites

Construction activities may create temporary perch, roost, or nest sites for ravens by introducing equipment or materials to the landscape that provide height for ravens.

Weekly monitoring will evaluate the presence of ravens during construction. If ravens are identified perching, roosting, or nesting on building materials, equipment, waste piles, or other construction debris, hazing (described in Section 6.4) will be employed to discourage use.

4.3 Ponding Water

To minimize the occurrence of ponding water, the application rates of water for dust suppression activities will be predetermined to minimize excessive application. The application rate will consider soil infiltration and evaporation rates. The ECM will patrol areas to ensure water does not puddle for long periods (more than 1 hour) and make recommendations for reduced water

application rates where necessary as discussed in Section 6.0 (Adaptive Management). The fill station will be designed to adequately drain water to prevent ponding.

4.4 Raven Food Sources from Soil Disturbance

During construction activities, specifically grading, there is a potential for animals to be unearthed, providing a food subsidy for scavengers and thereby resulting in increased attraction of ravens to the Project disturbance area. Daily observations of the construction site and of access roads will expedite proper disposal of food subsidies to the extent feasible.

4.5 Human Food and Waste Management

A trash abatement program will be established during the construction phase of the RSPP. Trash and food items will be contained in closed, secured containers on the Project site and removed daily to reduce the attractiveness to opportunistic predators such as ravens. Daily observations of the construction site as well as access roads will expedite proper disposal of roadkill. In addition, the Worker Environmental Awareness Program will assist in ensuring that no trash or roadkill is available that might attract DT predators.

4.6 Operations

Operational impacts are considered ongoing and require PDFs and ongoing management practices to avoid or minimize the potential to attract ravens to the RSPP. No soil disturbance is anticipated during operations or maintenance that will result in raven food sources from soil; therefore this condition of concern is not addressed.

4.7 Raven Perching, Roosting, and Nesting Sites

PDFs will be implemented to avoid introducing new subsidies by minimizing the attractiveness of Project components. Potential PDFs that will be considered to reduce impacts from these Project components primarily include the use of physical bird deterrents such as, but not limited to, bird spikes, Bird-B-Gones, and WhirlyBirds. In addition, nest removal will occur in conjunction with monitoring, as discussed below in Section 5.3.

4.8 Ponding Water

To minimize the occurrence of ponding water, the application rates of water for dust suppression activities will be predetermined to minimize excessive application. The application rate will consider soil infiltration and evaporation rates. The ECM will patrol areas to ensure water does not puddle for long periods and make recommendations for reduced water application rates where necessary. During operations, deionized water will be used to wash mirrors; however, the amount of water used will be minimal and is not anticipated to result in ponded water on site. If water should be found to be a concern, changes will be made through adaptive management.

4.9 Human Food and Waste Management

The trash abatement program developed for the construction phase will also include operational measures to be implemented for the life of the Project. Trash and food items will be contained in

closed, secured containers and removed daily to reduce the attractiveness to opportunistic predators such as ravens. The ECM will continue to ensure that these practices are enforced and make recommendations for improvements where applicable as discussed in Section 6.0.

5.0 MONITORING PRACTICES

Semi quantitative and qualitative monitoring will be implemented to assess the efficacy of PDFs and management measures, and to determine the need for implementing additional control measures. These monitoring practices are intended to evaluate the potential impacts that construction and operation may have on raven activity and populations, which could result in potential impacts to DT. Raven monitoring will be implemented in the construction and operation phases of the RSPP. The monitoring program is designed as an observational reconnaissance level study aimed at monitoring the effectiveness of the PDFs and management measures implemented with the goal of avoiding new subsidies for ravens in the Project Area and evaluating the overall effects of the Project and specific Project components (i.e., solar array) on raven activities (e.g., presence or type of activity).

5.1 Construction Phase

To identify potential increases in raven activity, the ECM will conduct at least weekly reconnaissance level surveys in the Project Area. Surveys will focus on all potential subsidies including waste disposal areas, erected structures, staging areas where large equipment or material may be stored, and any area where water is applied to control dust and erosion or there are recent surface disturbances.

Data will be recorded for each raven observed, including activity, categorized as flying, perched, or on the ground (likely scavenging); type of perch (if applicable); and the general location of the bird within the Project Area. In addition, any nesting locations will be recorded and unoccupied nests will be removed (see Section 5.5 for a discussion on nest removal). Data sheets will be developed and submitted to the agencies prior to implementation of this Plan, after final Project design is complete.

5.2 Operation Phase

To identify potential increases in raven activity during operation and maintenance of the RSPP, the ECM, in coordination with the DB as appropriate, will conduct biweekly (i.e., every other week) reconnaissance-level monitoring at the Project site for the life of the Project in addition to annual breeding season raven monitoring at the Project site and all associated aboveground linear components (Figure DR-BIO-55) as discussed below.

5.3 Ongoing Biweekly Raven Monitoring

The ECM, following training by the DB, will conduct biweekly surveys (every two weeks) for raven activity at pre-designated locations throughout the Project Area for the first five years of Project operation, commencing when the Project becomes operational. After the first five years

of Project operation, surveys will be conducted biweekly for one year every five years, unless results indicate more frequent or less frequent monitoring is necessary following completion of the first five years of Project operation. The ECM will be accompanied by the DB during the first four surveys to facilitate appropriate data collection. Survey locations will focus on Project components that may influence raven abundance, activity, and behavior by potentially allowing perching, roosting, and nesting opportunities or by providing supplemental resources such as food and water. These Project components include tower structures, transmission poles and lines, and support structures, as well as waste disposal facilities.

Surveying will occur every other week. Up to five permanent sampling locations in addition to a stationary sampling point will be identified by the DB based on areas that have the greatest likelihood of attracting ravens (e.g., tower structures, transmission poles and lines, and waste facilities).

A five-minute sampling session observing and listening for ravens will occur at each survey location. The surveyor will record raven detections and will document the behavior of the raven (e.g., perched, flying, on the ground, nesting), perch type (if applicable), and distance and direction from the survey location. Additional data collected will include the survey start/stop time, and weather (including temperature, average wind speed, and percent cloud cover). In addition, the location of any nests detected during a survey will be noted and Universal Transverse Mercator (UTM) coordinates recorded immediately following the conclusion of the survey session. To aid the ECM and ensure consistency throughout the duration of the Project's life, a data sheet will be prepared in advance outlining the required data to be collected. Surveys will be conducted unless wind or rain interferes with audible or visual detection of ravens.

5.4 Breeding Season Raven Surveys

Breeding season surveys will conducted by the ECM biweekly (every two weeks) starting at the beginning of the typical breeding season (mid-February) and continue to the end of June to identify nests and evidence of DT predation at nests (Boarman 2002, 2003). These surveys will be conducted by the ECM, following training by the DB, for the life of the Project on RSPP-controlled lands and along the new transmission line and switchyard. Each survey will consist of systematically searching a Survey Area, which will include the Project site and the aboveground linear features associated with the Project (Figure DR-BIO-55). Because the 5-mile water pipeline is an underground linear component of the RSPP and will not act as a potential raven attractant, it will not be surveyed.

Surveys will be conducted by vehicle when possible and on foot when necessary. All native trees, landscape trees, utility poles, transmission towers, and other structures within the Survey Area will be searched for nests. If nests are identified, the DB will be contacted to verify the nest conditions. UTM coordinates, as well as nesting substrate and current breeding status (if detectable), will be recorded for each nest located. Once data have been collected, the DB will determine if the nest is unoccupied (i.e., no eggs in the nest or nestlings have fledged), in which case the nest will be removed by the DB or the ECM (see description of nest removal in Section

5.5). The DB will search a 30-meter radius surrounding each nest or perch site for evidence of DT predation. All DTs depredated will be photographed, a UTM coordinate collected, and the length measured (or estimated). In addition, each DT will be marked to avoid duplication of data recording on subsequent surveys. If occupied nests are detected during surveys, the Applicant will notify the Raven Management Workgroup for assistance with control measures.

Descriptions of nesting behavior and DT predation will be semi-quantitative and qualitative and will produce data that is valuable for assessing raven behavior and documenting potential problem individuals for management actions. In addition, an increase in the number of raven nests in the Project Area may suggest the potential need for revisions to PDFs or additional control measures (as described in Section 6.0).

5.5 Nest Removal

The majority of raven predation on DT most likely occurs in the spring, from April to May, when DT are most active and ravens are feeding young (Boarman and Heinrich 1999). The removal of unoccupied raven nests will be utilized to control DT predation. Nests will be removed by the DB only from within the Applicant-controlled lands and the transmission line and switchyard ROW. If nests are observed on adjacent lands, the resource agencies will be notified. The removal of unoccupied nests will occur simultaneously with the breeding season raven surveys that will take place from mid-February to the end of June. Removing raven nests outside of the breeding season may have a smaller effect on the raven population since they may readily rebuild the following season. However, evidence suggests that birds with no nests in their territory at the beginning of the breeding season are less likely to commence nesting than those who already have intact nests (Kristan and Boarman 2003). If an unoccupied raven nest is detected outside of the breeding window during biweekly surveys, it will also be removed by the DB.

5.6 Decommissioning and Restoration Phase

To identify potential increases in raven activity, the ECM will conduct at least weekly reconnaissance level surveys in the Project Area during ground disturbance activities associated with decommissioning and grading associated with restoration, if any. Surveys will focus on all potential subsidies including waste disposal areas, erected structures, staging areas where large equipment or material may be stored, and any area where water is applied to control dust and erosion or areas where there are recent surface disturbances.

Data will be recorded for each raven observed, including activity, categorized as flying, perched, or on the ground (likely scavenging); type of perch (if applicable); and the general location of the bird within the Project Area. In addition, any nesting locations will be recorded and unoccupied nests will be removed (see Section 5.5 for a discussion on nest removal). Data sheets will be developed and submitted to the agencies prior to implementation of this Plan, after final Project design is complete.

6.0 ADAPTIVE MANAGEMENT

This section defines how adaptive management principles will be applied to this Plan, specifically in reference to PDF and control/mitigation measure implementation. This section defines potential changes to the mitigation and conditions that may trigger them.

6.1 Definition

Adaptive management is typically used in environmental management efforts to facilitate more effective management of resources to achieve desired objectives. Adaptive management can be defined as an iterative and structured optimal decision-making process intended to reduce uncertainty through system monitoring. The decision-making process simultaneously maximizes one or more resource objectives and accrues information needed to improve future management, either actively or passively. Using current knowledge, passive adaptive management involves the use of conceptual modeling to guide management actions. The model is adjusted as new knowledge is obtained and management decisions are subsequently modified. Active adaptive management involves testing alternative hypotheses through system manipulation employing management strategies. Thus, passive adaptive management is based on information gained from observational studies, whereas active adaptive management is based on information gained from experimental manipulation (Holling 1978). This Plan will focus on passive adaptive management but may ultimately apply both passive and active adaptive management.

6.2 Adaptive Management Triggers

To facilitate meeting Plan objectives, it may be necessary to make changes to the PDFs or initiate the implementation of additional control measures. Implementation of adaptive management measures (described in Section 6.3) would occur if both of the following conditions are met:

a. The results of annual breeding season raven monitoring and/or Project Area monitoring during the operational phase suggest that current PDFs provide evidence that the number of raven occurrences in the Project Area is increasing, thereby increasing the potential for DT predation.

b. The Applicant has made every attempt to adjust PDFs to control raven occurrences and avoid the need for additional control measures, and has contacted and worked with the DB and the resource agencies to identify other sources of ravens and/or management measures, but increased raven occurrences continue.

6.3 Adaptive Management Measures

Adaptive management measures will be identified during implementation of the monitoring program and will be discussed by the Applicant, CEC, USFWS, BLM and the CDFG before any decisions are made. Adaptive management measures may include modifications to PDFs, monitoring strategies, or implementation of additional control measures. Key examples would

be 1) modifications to the monitoring program survey frequency, including increase or reduction of the monitoring frequency and survey points, should results of surveys deem it to be warranted; 2) eliminating or refining a PDF or management measure if it is not working; or 3) incorporating a defined control measure, if impacts are observed, that would not otherwise be implemented (triggered). Potential control measures are discussed in more detail below.

6.4 Control Practices

If the results of the monitoring efforts suggest that there is a substantial and sustained (e.g., consecutive years) increase in raven activity that may result in DT predation, even with the implementation of PDFs as defined in Section 4.0, then the Applicant may need to implement additional measures to further control ravens in the Project Area. This section defines the types of control practices that may be implemented if additional measures are determined to be necessary based on the adaptive management triggers described above.

As stated above, prior to the implementation of any control measure, the DB and the Applicant would coordinate the discussion and approval of control measures with the CEC, USFWS, BLM and the CDFG and control measures proposed to be implemented must be agreed to by these resource agency representatives and the Applicant. If no identified control measures accomplish appropriate raven management objectives, additional control measures will be reassessed for potential implementation.

<u>Roadkill Removal</u>

Ravens are well known for eating animals that have been killed along roads and highways, which are often abundant in the desert region (Boarman and Heinrich 1999). Roadkill provides a food source for ravens, which facilitates increased raven nesting near roads and highways in areas that might otherwise offer little food (Kristan et al. 2004). Due to the unlikely presence of roadkill in the Project Area, roadkill removal is considered unlikely; however, the ECM will document the occurrence of roadkill during the biweekly raven monitoring events. Operations staff will also report roadkill on a daily basis if found. Monitoring of roadkill will focus on the Project Site, with associated paved and dirt roads, and the staging area, but also including any other Project Area facilities that may support vehicular traffic, including construction equipment. If roadkill occurs frequently in the Project Area, and if ravens are commonly noted feeding on roadkill, it may be appropriate for the Applicant to implement a roadkill removal program. Details of a roadkill removal program would be designed by the ECM in coordination with the DB and CEC.

<u>Hazing</u>

Hazing may use any number of visual and/or auditory devices designed to scare birds, including air or gas cannons, human flushing, bioaccoustic deterrents, and/or flags and streamers to create an integrated system of negative stimuli. Because many birds will become accustomed to methods quickly, many of these techniques are used in combination. If deemed appropriate, a hazing program would be designed by the DB in coordination with the ECM and CEC. Permission may also be required from the local police or municipality, as there may be local ordinances that prohibit the creation of loud noises.

Methyl Anthranilate

Methyl anthranilate (MA) is a naturally occurring GRAS- (generally recognized as safe) listed compound used as a food flavoring and fragrance additive. Chemical formulations containing MA have been found to be effective bird aversion agents as MA acts as chemosensory repellent, irritating pain receptors associated with taste and smell (Umeda and Sullivan 2001). When applied as a formulated spray, MA has been found to be effective in repelling birds from feeding on crops such as cherries, blueberries, and table grapes. In addition, MA is used as a repellent for Canadian geese on lawns and in small pools of water. To date, MA is thought to have limitations for topical application as it is considered highly volatile and breaks down readily under exposure to ultraviolet light. The most appropriate application of MA on the RSPP would be to small areas of ponding water or perhaps where known nesting has previously occurred. Repeat topical application would be necessary due to the breakdown of the chemical with exposure but may still prove useful as a short-term deterrent. After removing a current season unoccupied nest, the ECM could apply MA to deter nest rebuilding in that location. Prior to the use of MA at the RSPP, research into the most current application of MA to deter raven activity should be conducted by the DB and methods could be designed in coordination with the ECM and CEC.

Lethal Removal (Depredation)

If ravens are still attracted to the RSPP even after the implementation of PDFs, modification to PDFs, and implementation of control measures, it may be necessary to consider lethal removal. There is no evidence that lethal removal will have a long-lasting effect on raven population levels, raven foraging behavior, or survival of juvenile DT. In addition, identifying, targeting, and successfully removing individuals is also considered time consuming. However, this method is often used in management plans when specific raven pairs are determined to be responsible for taking relatively large numbers of DT (Boarman 2002). These individuals can often be identified by the presence of juvenile DT shells beneath their nests, which are often used for consecutive years by the same pair of breeding ravens (Boarman and Heinrich 1999). By removing those birds known to prey on DT, survival of juvenile DT in that vicinity may increase. However, it is very difficult to identify the target bird(s) with absolute certainty, much less locate and lethally remove both members of a pair.

Under this control method, targeted ravens would be shot by rifle or shotgun. If shooting is not possible (e.g., on power lines) or has been unsuccessful, ravens could be trapped and humanely euthanized. Young ravens found in nests of removed adults need to be euthanized humanely if they can be captured safely.

7.0 REPORTING

The ECM will prepare monthly monitoring reports during construction and the first year of operation summarizing the results of the biweekly and breeding season monitoring events as well as observations reported by operations staff and describing any noted raven activity in the Project Area. Following the first year of operation, a summary of monitoring data will be provided

monthly and a report will be submitted annually. These reports will summarize the survey results, discuss the success or failure of PDFs, and make recommendations for modification of PDFs or implementation of control measures as necessary. These monitoring reports will be submitted to the Applicant and the DB for review. The Applicant will forward the reports to the CEC, USFWS, BLM and CDFG.

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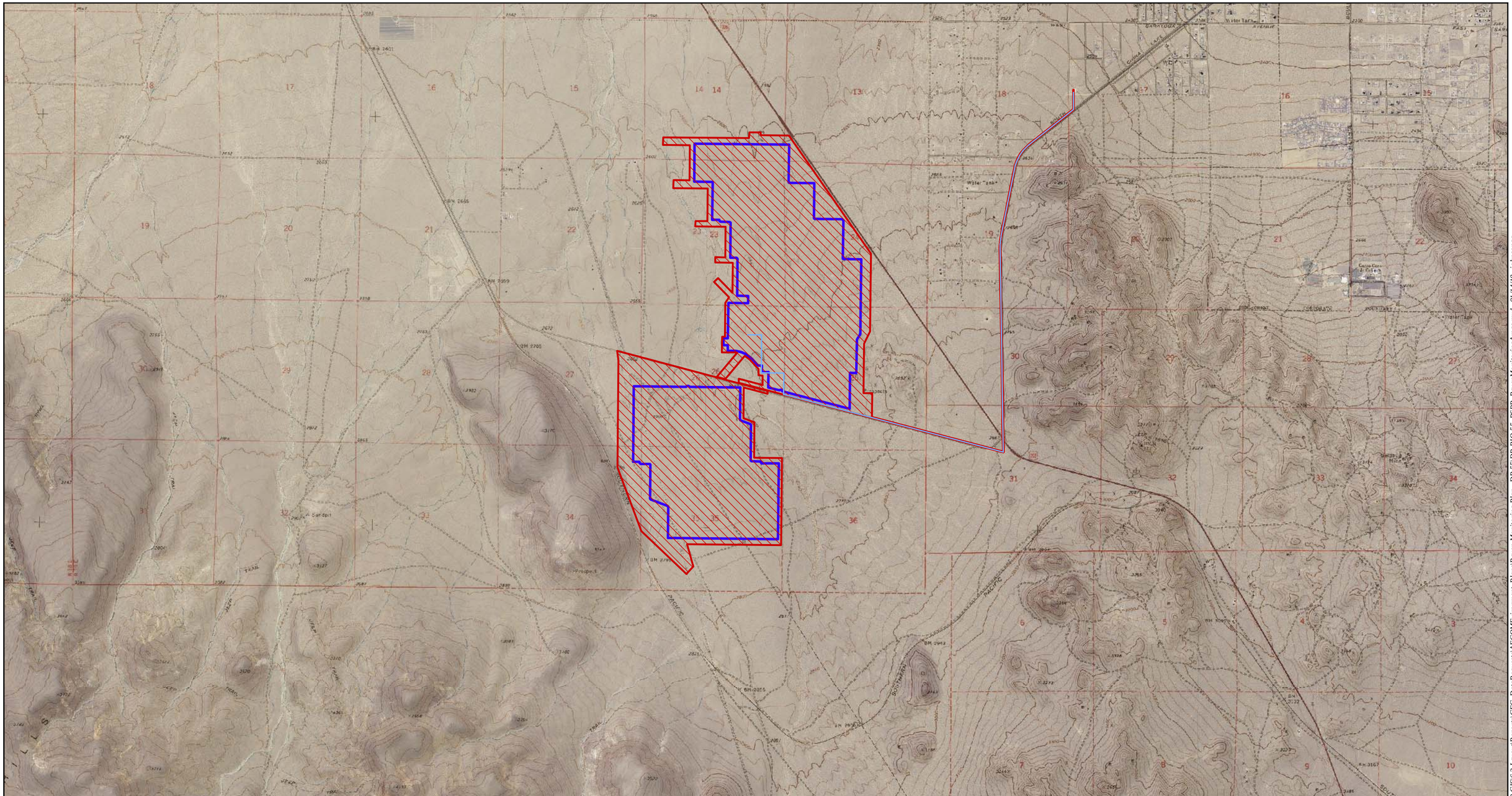

Map Location

Legend

- Plant Site/Annual Biweekly Monitoring Area
- Breeding Season Survey Area
- Water Line

Source: NAIP 2005; AECOM 2009; EDAW 2009

N
W E
S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-55
Site Location and
Raven Monitoring Areas

Solar Millennium

AECOM

Date: January 2010

Path: P:\2009\09\80080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\Raven Monitoring Plan - DR 55\DR-BIO-55_RSPP_RavenMonitoringAreas.mxd, 01/14/10, johnsonaa

Attachment DR-Bio-56

Draft Burrowing Owl Relocation/Translocation Plan

RIDGECREST SOLAR POWER PROJECT
DRAFT
BURROWING OWL
RELOCATION/TRANSLOCATION PLAN

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I. INTRODUCTION

Ridgecrest Solar I, LLC (hereafter referred to as the Applicant), proposes to construct, own, and operate the Ridgecrest Solar Power Project (RSPP or Project). The Project would have a nominal output of 250 megawatts (MW) and consist of a single power plant utilizing two solar fields.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, California, about five miles southwest of the City of Ridgecrest, California (Figure DR-BIO-56-1). The Project right-of-way (ROW), for which the Applicant has applied to the Bureau of Land Management (BLM), includes approximately 3,995 acres of public lands owned by the Federal government. The total disturbance area is estimated at 1,944 acres plus an additional 16.3 acres resulting from construction of the water pipeline off site.

Phase I, II, and III protocol surveys for western burrowing owl (*Athene cunicularia*) (WBO), a California Department of Fish and Game (CDFG) Species of Special Concern, were conducted from February 14 through June 15, 2009. A minimum of five WBO were detected in the Project disturbance area (including at least one nesting pair with juveniles) and a minimum of three individuals (including one nesting pair and at least one juvenile) were found in the survey buffer area. WBO sign (droppings, feathers, prey remains, or pellets) was also observed in association with 78 burrows.

To reduce impacts on sensitive biological resources, the Project site plan was reconfigured to minimize impacts to the El Paso Wash. The Project description, including acreage calculations, presented below are based on the reconfigured site plan. However, survey results presented in this report are based on survey conducted in 2009, prior to site redesign. Additional biological surveys will be conducted after the site plan has been finalized in spring 2010 to ensure that all sensitive biological resources in the reconfigured Project footprint have been accurately identified and quantified. Following completion of spring 2010 surveys, impacts to sensitive biological resources will be updated and environmental compliance documents will be revised as appropriate. The Project mitigation will be developed based on the revised impact calculations.

II. BACKGROUND

A. Project Description

The proposed Project site is entirely on Federal land, BLM ROW # CACA 49016, in Township 28 South, Range 39 East and Township 27 South, Range 39 East. Access to the northern portion of the Project site would be provided by a new 24-foot wide paved access road from Brown Road, approximately 1.6 miles west of the intersection of Brown Road with U.S. Highway 395. This access road runs about 450 feet from Brown Road to the location of the new office building and continues for approximately another 3,000 feet to the entrance of the power block. Access to the southern portion of the Project site would also be provided by a new 24-foot wide paved

access road from Brown Road, approximately 2.25 miles west of the intersection of Brown Road with U.S. Highway 395. This access road would run about 600 feet from Brown Road to the security gate for the south solar field.

The Applicant has applied for a ROW grant for approximately 3,995 acres of land owned by the Federal government and managed by the BLM. The Project site is composed of undeveloped desert with naturally vegetated areas. There are no existing structures that would need to be demolished, but existing 115 and 220-kilovolt (kV) Southern California Edison (SCE) transmission lines that traverse the southwestern portion of the site will require relocation. Construction and operation of the RSPP would disturb approximately 1,944 acres. This disturbance area includes areas outside the fence line of the Project facilities themselves, primarily rerouted drainage channels that avoid Project facilities, a water line, and access roads.

The Applicant proposes to develop a 250-MW solar energy facility on approximately 1,448 acres (Plant Site). The Project will utilize solar parabolic trough technology to generate electricity. Arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. A heat transfer fluid (HTF) is heated to high temperatures (750 degrees Fahrenheit) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced. The power plant will have two solar fields. The north solar field is approximately 894 acres and the south field is approximately 554 acres. The northern solar field is located north of Brown Road and the southern solar field is located south of Brown Road.

The power block is located north of Brown Road, immediately southwest of the northern solar field. The power block is composed of its own administration, control, warehouse, maintenance, and lab buildings; the HTF pumping and freeze protection system; solar steam generator; a propane-fired auxiliary boiler; one steam turbine generator; an air-cooled condenser; generator step-up transformer, transmission lines and related electrical system; potable and treated water tanks; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

In addition to the main power generating facility, the site includes a main office building and parking lot, a main warehouse with laydown area, on-site access roads, a tie-in switchyard, and a land treatment unit for bioremediation or land farming of HTF-contaminated soil.

The Project will generate electric power solely via solar energy. Propane will be used to fire an auxiliary boiler overnight to support startup operations until the HTF system is up to operating temperature, at which time the generation of electricity can commence. A second fired heater will be used as needed, mostly during the winter, to prevent freezing of the HTF. A new, approximately 5-mile-long water pipeline will be installed within the Brown Road and China Lake Boulevard ROWs to connect the Project with the Indian Wells Valley Water District

supply. (The diameter of the pipe could be 12 inches in diameter or smaller depending on the Water District's determination.) A new 230- kV transmission line from the turbine generator to a new nearby switchyard will interconnect with SCE existing 230 kV InyoKern/Kramer Junction transmission line located west of the Project site.

B. 2009 Burrowing Owl Survey Results

Surveys for WBO were conducted by AECOM biologists in the spring of 2009 per the California Burrowing Owl Consortium (CBOC 1993) protocol and were focused on determining the presence or absence, distribution, abundance, and breeding status of the species. Surveys were conducted within the Project disturbance area and the 492-foot (150-meter [m]) CBOC protocol buffer. Two additional California Energy Commission- (CEC-) recommended transects within a 1-mile buffer were also conducted. Transects located at ¾-mile and 1-mile intervals from and parallel to the disturbance boundary were surveyed. The limits of the survey extend to this 1-mile CEC buffer. The surveys discussed in this document were performed prior to changes to the proposed disturbance area. The site plan has undergone several revisions. Surveys presented in this document included areas that were eliminated from subsequent site plans. Information collected on WBO was included in the biological resources analysis in the Project Application for Certification (AFC), which quantifies potential impacts on WBO and identifies avoidance, minimization, and mitigation measures.

Suitable WBO nesting habitat occurs throughout the Project disturbance area with the exception of a volcanic outcrop along the western edge, granite rock outcrops in the central-eastern portion of the site, and developed areas. The Project disturbance area and 492-foot buffer is dominated by Mojave creosote bush scrub but also includes Mojave Desert wash scrub, unvegetated ephemeral dry washes, and developed land (Figure DR-BIO-56-2). Vegetation within the Mojave creosote bush scrub is dominated by creosote bush (*Larrea tridentata*), burroweed (*Ambrosia dumosa*), cheesebush (*Hymenoclea sa*lsola), and Virgin River brittlebush (*Encelia virginensis*). Common herbaceous species include redstem stork's bill (*Erodium cicutarium*), Mediterranean grass (*Schismus sp*.), needle goldfields (*Lasthenia gracilis*), and blue dicks (*Dichelostemma capitatum*). The dominant and indicator plant of the Mojave Desert wash scrub community is scale-broom (*Lepidospartum squamatum*), which occurs in patches throughout the dry washes scattered amongst creosote bush, spiny senna (*Senna armata*), cheesebush, burroweed, Virgin River brittlebush, and rayless goldenhead (*Acamptopappus sphaerocephalus*). Common herbaceous plants include California desert dandelion (*Malacothrix californica*), Fremont pincushion (*Chaenactis fremontii*), distant phacelia (*Phacelia distans*), and Wallace eriophyllum (*Eriophyllum wallacei*). Non-vegetated ephemeral dry washes are dominated by sandy substrate and little to no perennial vegetation. Non-vegetated ephemeral dry wash predominantly occurs between desert wash scrub and locations where the washes transition to sheet flow. There were no dominant perennial plant species observed in association with non-vegetated channels as these areas are primarily devoid of vegetation. Developed areas within the

disturbance area consist of roadways. Brown Road is a two-lane paved roadway that traverses the entire central portion of the Project from east to west. In addition, numerous unpaved dirt roads (approximately 10 miles in total) traverse the Project site. Borders of paved roadways are highly managed and many of these areas are devoid of vegetation. Vegetation is also very limited on dirt roads; plants occasionally grow along the center line and are indicative of surrounding vegetation.

Figure DR-BIO-56-3 displays the locations of burrowing owls observed, active burrows (i.e., occupied by burrowing owl), and other locations where sign was observed during surveys. During Phase II and Phase III of the CBOC protocol surveys, seven active burrows were located in three separate regions of the survey area, including five main or nest burrows and two satellite burrows; all of these except one main burrow are located in the Project disturbance area. A minimum of five WBO were detected in the Project disturbance area (including at least one nesting pair with juveniles) and a minimum of three individuals (including one nesting pair and at least one juvenile) were found in the survey buffer area. The following summarizes the burrowing owl occupancy and abundance documented for these three locales within the survey area.

1. At the eastern edge of the Project disturbance area north of Brown Road, three main or nest burrows were located within 500 feet of each other (burrows A, B, and C on Figure DR-BIO-56-3). A pair of owls was observed at each of burrows A, B, and C; fledged juveniles were also observed at burrow B. However, the total number of pairs in this area is uncertain because pairs were never observed at these burrows simultaneously. At burrow A, one adult owl was observed first on April 29, 2009, and regularly throughout the remaining survey period, and a pair was observed there on June 12, 2009. At burrow B, a pair was observed and flushed on June 12, 2009. On June 14, four burrowing owls, including at least two fledglings, flushed from burrow B and flew toward satellite burrows to the west (see Figure DR-BIO-56-3). During this event, at least one adult burrowing owl was observed and remained at burrow A; it did not appear to be associated with the group at burrow B. At burrow C, a pair was flushed on May 23, 2009, during desert tortoise and Phase II burrowing owl surveys. Although owls were not observed at burrow C later during Phase III surveys, abundant burrowing owl sign and a well-maintained burrow entrance indicate concentrated and regular use by owls. It is likely that at least two pairs occupied this area during the survey period, with one pair confirmed to nest successfully and fledge at least two juveniles at burrow B.

2. In the central portion of the Project disturbance area south of Brown Road, one burrowing owl was first documented at burrow D (Figure DR-BIO-56-3) during Phase II surveys on March 24, 2009, and observed again on April 17 and 18, 2009, during Phase III surveys. This location is a burrow complex composed of six burrow entrances. No burrowing owls were found at burrow D during follow-up surveys conducted on April 30, May 12, May 14, May 15, June 12, and June 14, 2009; and, on June 12, 2009, a kit fox family was observed

occupying this complex. The kit foxes appeared to be the same family of two adults and four pups that occupied a burrow complex approximately 500 feet south of burrow D as recently as May 14, 2009. On June 14, 2009, burrow D was inspected to document its condition and search for any burrowing owl sign or remains. The entrances had been excavated by the kit foxes and burrowing owl feathers were observed within and outside one entrance.

3. In the northwest corner of the survey area, a burrowing owl pair and at least one juvenile were located at burrow E, approximately 175 feet outside the previous 492-foot CBOC survey buffer and 675 feet beyond the previous disturbance area; this location is approximately 1,200 feet beyond the current disturbance area. The pair was first observed in this area on June 13, 2009. On June 14, 2009, the nest burrow (burrow E, Figure DR-BIO-56-3) was located and mapped. The female flushed from the burrow while the male was perching on a creosote shrub nearby. Although juvenile burrowing owls were not observed, at least one owl was heard inside the burrow while both adults were away.

III. PLAN PURPOSE

The primary purpose of this Plan is to provide an effective and feasible strategy that would ensure the protection of WBO from the construction and operational impacts of Project development. This Plan also fulfills some of the Project mitigation measures identified in the AFC document (AECOM 2009a), which include requirements for relocation/translocation of WBO. This Plan includes both passive relocation and active translocation. At this time, it is unclear what method would be most effective in terms of minimizing impacts to WBO. The Applicant would prefer to use passive relocation rather than translocation whenever feasible. It is assumed that the decision to relocate or translocate WBO will be determine as part of future consultation with the resource agencies. Once this plan is approved by the CDFG and CEC, the elements described herein would become part of the Project conditions of approval with which compliance is required.

IV. PLAN GOALS

The goals of this Plan are to:

- Provide a relocation/translocation strategy and protect WBO during Project construction.
- Relocate rather than translocate WBO whenever feasible.
- Ensure that WBO within the Project disturbance area are relocated/translocated to a nearby area that provides suitable nesting and foraging habitat.
- If translocation is implemented, minimize impacts to resident WBO and other sensitive species (e.g., desert tortoise) within the translocation site, and minimize stress and injuries to any translocated WBO.

V. WESTERN BURROWING OWL RELOCATION/TRANSLOCATION PLAN

This section discusses management strategies for the relocation or translocation of WBO for the RSPP. A multi-tiered approach is proposed to prevent or reduce the loss of WBO during the construction activities and operation of the Project. While mitigation often focuses on protecting animals *in situ* by making adjustments to construction activities near occupied burrows, moving individuals out of impact areas to off-site locations is sometimes the best alternative. Because WBO are resident within the Project area, it may be necessary to actively move individuals out of the Project disturbance area scheduled for construction. If active WBO burrows are documented outside of the Project disturbance area but within the CBOC buffer area, passive relocation as outlined by the CBOC may be implemented instead of translocation. Passive relocation would include the installation of exclusion fencing to ensure that no disturbance occurs within 160 feet of active burrows during the non-breeding season and within 250 feet of active burrows during the breeding season. The management strategy includes the following elements:

1. Pre-activity surveys,
2. Passive relocation options,
3. Translocation options,
4. Construction monitoring at the Project site, and
5. Post-translocation monitoring.

The multi-tiered approach includes pre-activity surveys to assess the resident population of WBO, options for passively relocating or actively translocating WBO to an approved area prior to construction activities, monitoring to ensure that relocated/translocated WBO have not returned to the Project site during construction activities, and monitoring the translocation site (if applicable) to determine the fate of any translocated birds. If translocation is implemented, WBO would be translocated outside the nesting season and before construction begins, to minimize the likelihood of translocated individuals returning to the site. The following sections describe the proposed relocation/translocation approach, which incorporates measures to minimize the likelihood of WBO returning to the Project site.

A. Pre-Activity Surveys

A pre-activity survey of the Project disturbance area would be conducted during the non-breeding season (December 1 to January 31) prior to construction to locate and identify active WBO burrows, estimate the current number of WBO individuals or pairs on site, and attempt to determine if they are breeding pairs or migrating transient birds. The survey would consist of walking parallel transects to allow for 100 percent coverage of the site and noting any fresh WBO sign or presence of WBO. Pre-activity surveys would be conducted throughout the Project disturbance area and within the 492-foot-buffer surrounding the Project disturbance area. The results of the pre-activity survey and recommended protection measures based on the location of any identified WBO would be provided to CDFG. Pre-activity surveys would be conducted no

more than 30 days prior to construction with a follow-up pre-construction survey conducted within three to five days of construction initiation.

At all times, surveyors will maintain a minimum distance of approximately 10 feet from known occupied burrows or observed WBO to minimize disturbance. If WBO are present within 500 feet of the Project site or linear facilities during the pre-construction surveys, CDFG WBO mitigation guidelines will be implemented.

If, during preconstruction surveys, WBO activity is detected at a burrow, every attempt would be made to avoid disturbance to the burrow by modifying either the placement or the timing of work activity. During the breeding season (February 1 through August 31), a 250-foot buffer will be flagged surrounding the occupied burrow per CBOC guidelines and all work activity will remain outside of the flagged area until a Designated Biologist determines the burrow is no longer occupied (e.g., juveniles are foraging independently and are capable of independent survival). During the non-breeding season (September 1 to January 31), a 160-foot buffer will be maintained per CBOC guidelines. If construction activity cannot be moved or rescheduled, then passive relocation techniques may be implemented with permission from CDFG as long as the WBO have not begun egg-laying, incubation, or have juveniles that are still dependent upon their parents and are incapable of independent survival.

All unoccupied but potentially suitable WBO burrows located on site during the initial surveys and still present during the 30-day pre-activity survey would be carefully excavated and filled under the supervision of a qualified biologist prior to site grading, to ensure that WBO are not occupying on-site burrows within the disturbance area during construction.

B. Passive Relocation Strategy

Several factors would determine whether passive relocation would be implemented, including the number of WBO found within the Project disturbance area during pre-construction surveys and the availability of suitable burrows outside the Project disturbance area. Passive relocation would be a favorable option if very few WBO are detected and if WBO are only found in buffer areas. The decision to proceed with passive relocation or translocation (discussed below) would be made in consultation with CDFG and the CEC.

After pre-activity surveys determine how WBO currently use the Project site, WBO would be passively excluded from entering burrows within the construction footprint and a surrounding 160-foot buffer zone by installing exclusionary one-way doors. If relocation would occur near the breeding season, focused monitoring of the WBO would be conducted to ensure nesting is not underway or to determine if nesting has been concluded prior to relocation efforts. Burrows will be excavated after determined vacant by use of a down-hole camera, monitoring, and use of one-way doors.

Excluded burrows would be monitored daily for one week to confirm no additional owl use before excavating the burrows. After burrows are confirmed to no longer be in use, the burrow would be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe or burlap bag would be inserted into the tunnels during excavation to maintain an escape route for any WBO inside the burrow.

Prior to passive exclusion efforts, WBO to be displaced may be captured and color banded to later evaluate the success of the passive relocation.

C. Translocation Strategy

There is no agency-approved protocol for translocating WBO in California; however, the following translocation procedures have been developed in consultation with Mr. Peter Bloom. Mr. Bloom is a zoologist who specializes in birds of prey, is permitted to trap and relocate WBO in California, and is a member of the Project team (DR-BIO-56-B). If translocation is implemented, prior to any translocation activities, permission would be obtained from CDFG to relocate WBO from the site. Translocation involves the capturing of individual WBO and moving them to a location away from the Project site with suitable habitat for the species. WBO would be removed by Mr. Bloom during the months of December, January, and February, prior to the beginning of the core nesting season. The translocation procedures would involve translocation site selection, site management and preparation, pre-construction surveys, trapping, care of WBO while captured, monitoring of release sites, and post-release monitoring. These elements are described below.

Translocation Site Selection

The identification of potential translocation sites is currently in progress, concurrent with identification of potential acquisition lands for overall compensatory mitigation of Project impacts. The CBOC recommends that, to mitigate for unavoidable impacts to WBO, 6.5 acres of habitat per pair or occupied burrow should be set aside to provide suitable foraging and nesting habitat. The translocation sites must meet the CBOC minimum size requirements and either occur in suitable habitat similar to habitat at the RSPP site or along the edge of an existing alfalfa field that could be managed for WBO (personal communication, Peter Bloom 2009). Translocation sites could be just outside the Project disturbance area or can include areas that are farther away from the Project site. However, priority lands for WBO translocation would be close to the RSPP, contain an abundance of available suitable burrows, and provide suitable nesting and foraging habitat with year-round prey availability (i.e., small mammals, songbirds, lizards and insects). Sites with existing or likely future conservation status (e.g., lands acquired specifically to mitigate for Project impacts) would also be considered priority sites. Importantly, the area selected must be an area protected in perpetuity and at least partly managed specifically for WBO.

More than 6.5 acres of land per pair may be required for managing WBO either long term or short term. Radio telemetry studies during the nesting season have revealed males foraging out as much as 1.6 km (1 mile) from the nest and regularly using an area within 600 m (1,968 feet) of the nest at night (personal communication, Peter Bloom 2009). When identifying lands for mitigation, this will be a necessary consideration in terms of the long-term habitat needs of WBO and to ensure that acquired land can support WBO pairs.

Once an appropriate translocation area has been identified, CBOC Phase II (burrow mapping) and III (presence/absence) surveys for WBO will be conducted to characterize the existing or potential use of the translocation site by WBO and to determine habitat management potential.

If the selected translocation site does not contain an adequate number of suitable natural burrows as determined in consultation with the CDFG and CEC, artificial burrows for nesting and escape burrows will be installed. Prior to ground disturbance at the translocation site, surveys for other sensitive species (e.g., desert tortoise, sensitive plants) may be required to ensure that the construction of artificial burrows at the release site will not adversely impact those species.

Translocation Site Management

Private lands acquired for WBO translocation would be managed over the long term for WBO viability and habitat suitability per a site-specific management plan to be approved by the CDFG. An appropriate monetary endowment for translocation site management will also be secured to ensure the management plan components are implemented. A property title transfer to CDFG may also be required where private lands are acquired for translocation purposes.

Completion of a public land lease per BLM realty provisions and/or development of a Memorandum of Understanding with a local BLM field office would be necessary to utilize public lands managed by BLM for translocation. Public land status under the recently adopted Land Tenure Adjustment Plan (BLM 2005), i.e., lands identified for retention or disposal, as well as their Multiple Use Classification (Limited, Moderate or Unclassified), would be primary considerations in such an endeavor. Approval by BLM's California State Office is also required for any public land wildlife translocation.

Site-specific National Environmental Policy Act documentation likely would be required for any translocation action involving federal public lands. The BLM's multiple-use mandate would be applicable and potential translocation site management needs would need to be considered and implemented in a manner consistent with that mandate.

Translocation Site Preparation

Once the translocation site has been identified, release enclosures and additional artificial burrows would be constructed for each WBO individual or pair identified for translocation. The release enclosure would include an approximately 12-foot by 12-foot by 6-foot cage surrounding

1-2 artificial burrows. Artificial burrows would be designed to maximize their suitability and effectiveness. If improperly designed, an artificial burrow may attract predators, fill with rainwater, dirt, or debris, or fail to provide adequate cover. Four additional artificial burrows per released pair would also be installed, each at varying distances outside each release enclosure, to provide refugia (i.e., escape burrows) and potential nest burrows. The additional artificial burrows would provide potential escape cover and help reduce mortality as the fledglings venture from the enclosure. These artificial burrows could also provide additional nest sites for WBO native to the translocation area including burrows for dispersing young and adults, and temporary burrows for winter migrants. Figure DR-BIO-56-4 depicts an example of a design layout for the construction of an artificial burrow.

Translocation Protocol

If translocation is implemented, WBO individuals and/or pairs identified for translocation would be trapped immediately prior to the breeding season and placed into their enclosures at the translocation site as a pair. The enclosures prevent the pair from immediately returning to the Project site. Ideally, the WBO pairs would breed, lay eggs, and successfully rear young in the enclosure and artificial burrows; thus increasing site fidelity of both adults and young at the translocation site once the enclosure is removed and reducing the risk of the WBO returning to the Project site. The translocation protocol consists of the following steps:

- WBO would be captured using a combination of noose carpets, mist nets, or bow-nets (Bloom et al. 2007).
- Once the WBO pairs are captured, they would be banded with unique color bands and immediately driven to the release site and deposited in their respective enclosures.
- Any remaining burrows within the Project disturbance area would be monitored and subsequently excavated and collapsed as described in the passive relocation protocol.
- WBO would be moved to and maintained at the release site inside enclosures until mid-April through approximately mid-May when eggs should have been laid. If eggs or young are not present by these dates, a decision will be made based in part upon project progress and owl breeding biology. Specifically, if construction disturbance at the project is complete, the owls may be released even without eggs or young. Between mid-April and mid-May the adults will either return to the project site and find no nesting opportunities or, more likely, establish their own natural burrow or artificial burrow on the new site. They may also select a nest burrow nearby their place of origin. This level of attention would require active monitoring by a qualified biologist and may require the use of a down-hole camera.
- Permitted raptor biologists would provide feedings of dead or live house mice (*Mus musculus*) at a rate of two mice per WBO per day during the holding period.

- During the holding period, the qualified biologist would continually evaluate and address problems from trespassers and possible predators (e.g., coyotes, feral dogs, raptors) at the release site. Appropriate management actions would be established prior to Project implementation and would be followed if any actions are required. Any actions taken will be included in the annual and interim report.

- The enclosure would be removed in April or May, or when it has been determined that the pair have successfully produced a clutch of eggs, or it is recognized that the best opportunity for the particular pair to lay eggs is higher if the pair is released sooner.

- In addition to banding the translocated adult pairs, fledglings would also be uniquely banded in order to monitor their behavior, survival, and movements.

Post-Release Monitoring

Monthly monitoring would be initiated once birds have been released from the enclosures. Monitoring would involve searches for banded translocated adults and include burrow maintenance at the translocation area. The monitoring process is outlined below.

- Only qualified raptor biologists familiar with methods and techniques necessary to reduce owl harassment and experienced in reading color bands with proper equipment would conduct monthly monitoring.

- The sites would be monitored for two years post release unless the birds are known to have died. One visit would be made each month for a total of 24 visits.

- Searches would be conducted with binoculars, spotting scopes, and down-hole cameras using techniques that would reduce owl harassment.

- Monitoring would also include remote cameras placed around burrow complexes to help provide re-sight data.

- If released owls disappear from the release site, monitoring of the Project area and adjacent lands would immediately commence to determine if the adult WBO returned to the Project site.

- Post-release monitoring would also include maintenance of artificial burrows three to four times each year as necessary to ensure boxes are usable for the breeding and non-breeding seasons.

D. Reporting

An annual report would be submitted following each breeding season for two years post-translocation. Additional interim reporting on the relocation efforts would be provided via

electronic mail and would include the date trapping efforts begin, the date of burrow excavations, findings, and initiation of activities. Additionally, any owl injuries, mortality, or other unforeseen circumstances would be reported to all resource agencies within 24 hours.

Annual reports would be submitted to the CEC, CDFG, BLM, and U.S. Fish and Wildlife Service. Reports would include, but not be limited to the following data:

- Project name, locations, and all pertinent information pertaining to the origin site.
- Dates and numbers of WBO placed into enclosures including band numbers and color bands.
- Information gained while WBO are in the release enclosure: feeding schedules, nest status, eggs laid, eggs hatched, chicks fledged.
- Known predators or humans visiting or disturbing the site.
- Dates of release from enclosures.
- Monthly monitoring results (re-sights of color banded birds, use of artificial burrows versus natural burrows by released adults and young).
- Any other pertinent data gathered through the relocation, release and post release monitoring.

VI. CONTINGENCY PLANNING AND PROGRAM CONTACTS

To address any unforeseen circumstances, the Applicant is committed to implementing an adaptive management program that functions within the constraints of the Project permits and approvals. Adaptive management decisions will be made with the input from pertinent regulatory agency staff in a timely manner so that mid-course corrections can be made to ensure the protection of WBO.

In the event that unforeseen circumstances arise relative to this Relocation/Translocation Program, or any CEC Condition of Certification, the CEC's Compliance Project Manager for this Project, the CEC's Project Manager, or the CEC's Siting Office Manager will be notified by the Relocation/Translocation Program's Designated Biologist to resolve the issue or determine a corrective course of action.

Peter Bloom, zoologist and Project team member, will be consulted on an ongoing basis on the technical aspects and review of relocation/translocation data monitoring and reporting.

VII. **REFERENCES**

AECOM

2009a Ridgecrest Solar Power Project Application for Certification. Prepared for Ridgecrest Solar I, LLC. August.

2009b Ridgecrest Solar Power Project Western Burrowing Owl Technical Report. Prepared for Ridgecrest Solar I, LLC. September.

Bloom, Peter.

2009. Personal communication via email. December.

Bloom, P.H., W.S. Clark, and J.W. Kidd.

2007 Capture techniques. IN Bird and Bildstein (eds). Raptor research and management techniques. Hancock House, Blaine, WA.

Bureau of Land Management (BLM).

2005 Final Environmental Impact Report and Statement for the West Mojave Plan A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Vol 1. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

California Burrowing Owl Consortium (CBOC)

1993 Burrowing Owl Survey Protocols and Mitigation Guidelines. Sacramento, California. April.

Haug, E.A., B.A. Millsap, and M.S. Martell.

1993. Burrowing Owl (*Athene cunicularia*), The Birds of North America Online (A. Poole, ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online. Accessed at: http://bna.birds.cornell.edu/bna/species/061.

Zarn, M.

1974. Burrowing Owl. U.S. Department of Interior, Bureau of Land Management. Technical Note T-N 250. Denver, Colorado. 25 pp.

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Ridgecrest Solar Power Project Responses to 12/22/09 Data Requests

Figure DR-BIO-56-1 Regional Map

Source: ESRI; AECOM 2009

Solar Millennium

AECOM

Date: January 2010

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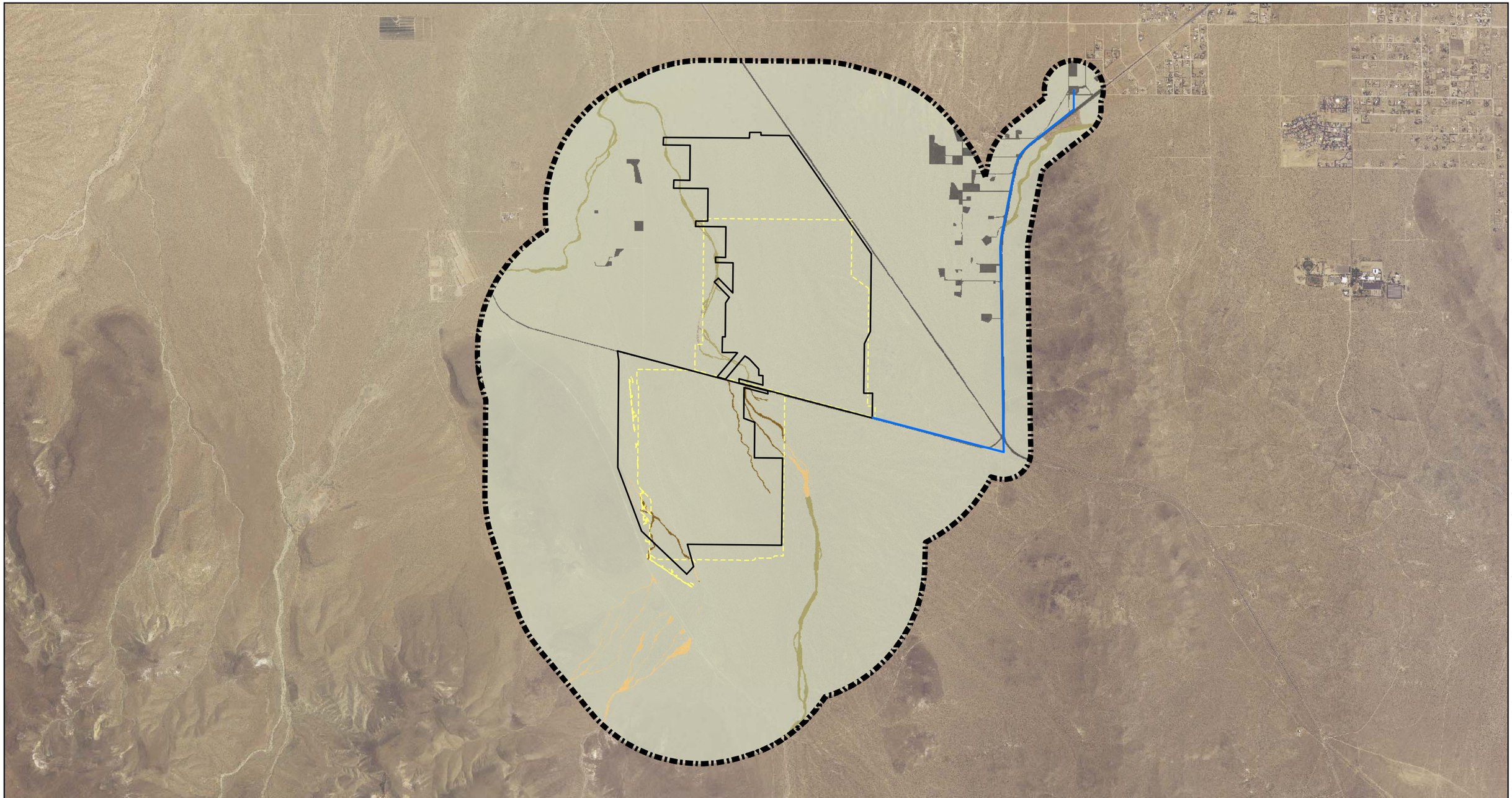

Map Location

Legend

- Surveyed Biological Resources Survey Area (BRSA)
- Surveyed Disturbance Area
- Reconfigured Disturbance Area
- Water Line Disturbance Area

Vegetation Communities

Riparian

- Mojave Desert Wash Scrub
- Unvegetated Ephemeral Dry Wash
- Unvegetated Ephemeral Dry Wash (Presumed) [1]

Upland

- Mojave Creosote Bush Scrub

Other

- Developed

[1] NOTE: Due to minimum mapping unit within buffer (1.0 mile), these areas are presumed to be unvegetated

Source: NAIP 2005; CNDDB 2009; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-56-2
Vegetation Communities

Solar Millennium

AECOM

Date: January 2010

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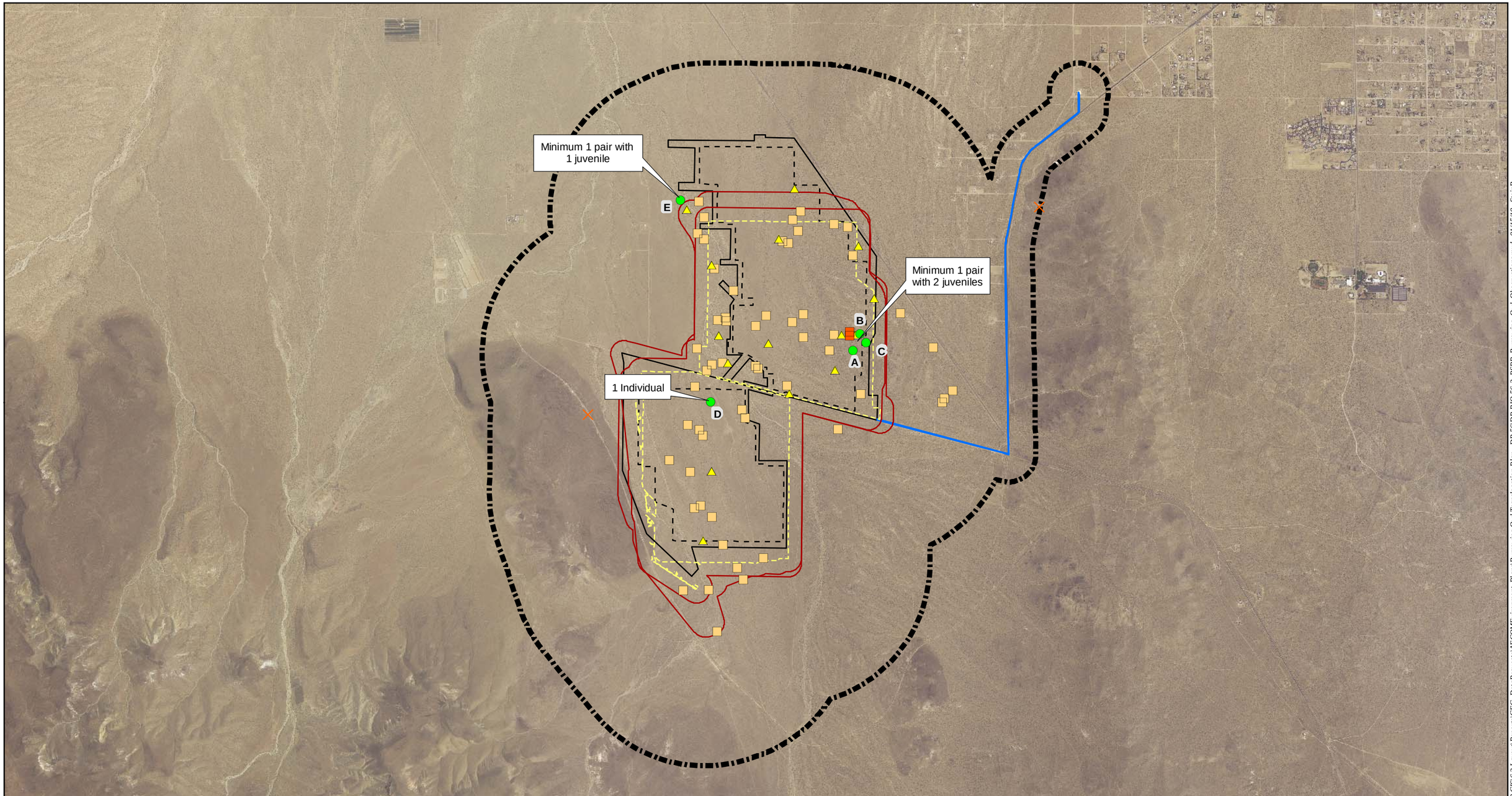

Map Location

Legend

- Biological Resources Survey Area (BRSA)
- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Burrowing Owl Survey Buffer

- Previous CBOC 492-foot

Burrowing Owl Observations

- Active Burrow (Main)
- Active Burrow (Satellite)
- Burrow with Abundant Sign
- Burrow with Sign
- Burrowing Owl

Source: NAIP 2005; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-56-3
Burrowing Owl Observations

Solar Millennium

AECOM

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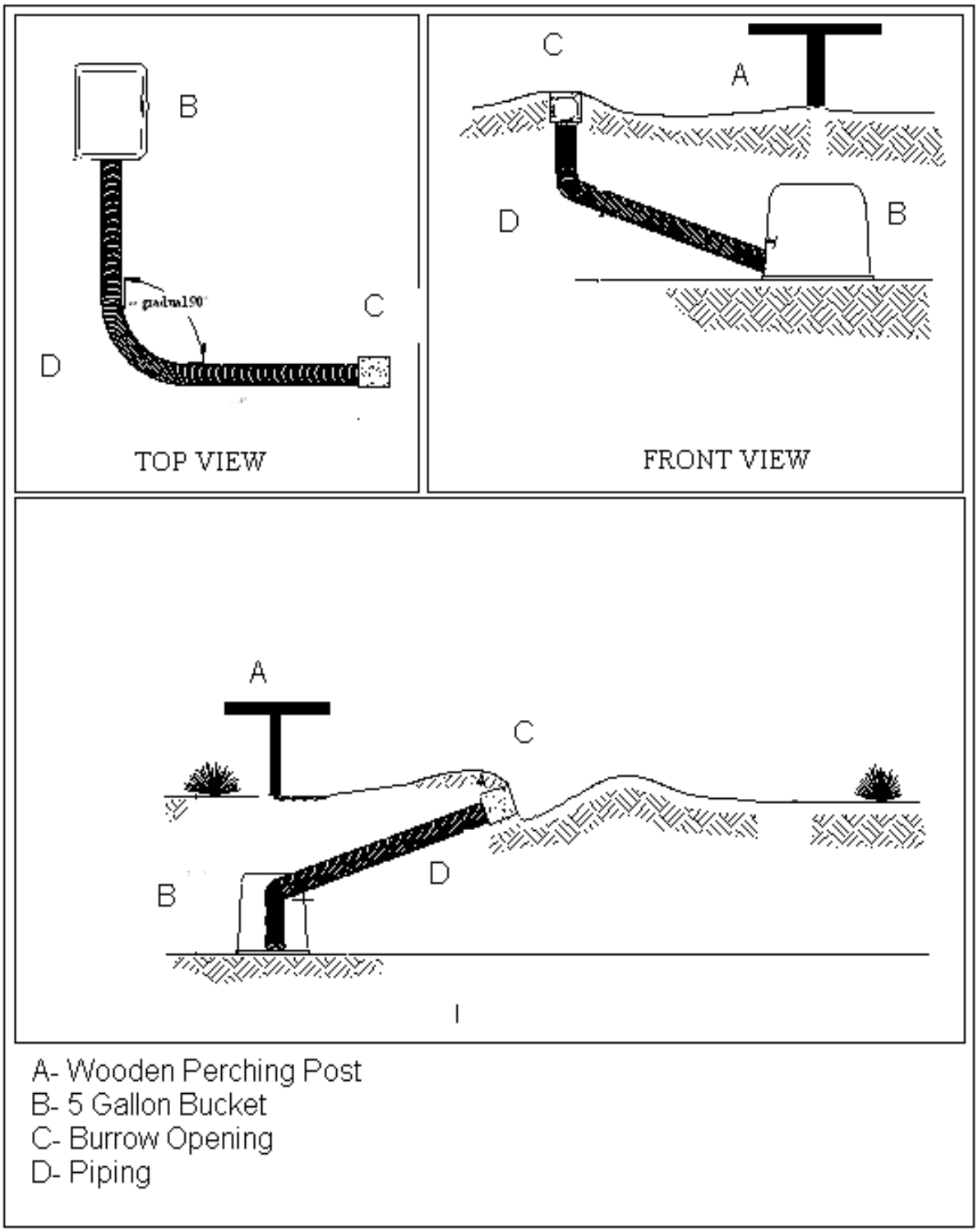
DR-BIO-56-4 Example of a design layout for the construction of an artificial burrow.



Peter H. Bloom
13611 Hewes Avenue, Santa Ana, CA 92705.
(714) 544-6147, phbloom1@aol.com

EDUCATION:

8/01-Present PhD candidate, College of Natural Resources, University of Idaho, Moscow. Dissertation topic: Natal Dispersal and Philopatry in Sympatric Buteos in Southwestern California.

9/79 - 8/89 California State University, Long Beach, M.S. Degree in biology August 1989. Thesis: Red-shouldered Hawk habitat home range and habitat use in southern California.
Graduation with Honors. Outstanding thesis award, School of Natural Sciences.

9/71 - 5/79 California State University, Long Beach, B.S. Degree in zoology, May 1979.

PROFESSIONAL HISTORY:

1/77-present President Bloom Biological Inc. Independent research biologist/consultant. Supervised 1-7 employees/year and/or 50 sub-consultants. Responsible for performing surveys of nesting and wintering birds of prey for the California Department of Fish and Game, Bureau of Land Management, U.S. Forest Service, Department of Defense, and numerous private land owners. Countless general biological surveys. Monitored radio tagged adult California red-legged frogs in Ventura County 4-6 times per month for 6 months. Numerous focused surveys for California gnatcatcher, southwestern willow flycatcher, least Bell's vireo, arroyo southwestern toad, red-legged frog, coast horned lizard, flat-tailed horned lizard, desert tortoise, orange-throated whiptail, coastal whiptail, coast-patched nosed snake, coastal glossy snake, red-diamond rattlesnake, Pacific pond turtle (which included trapping and surveying habitat) , two-striped garter snake (which included trapping and surveying habitat) and Pacific pocket mouse. Numerous general herpetological, small mammal, breeding bird and winter bird surveys in southern California. Translocated several hundred arroyo toads at MCB, Camp Pendleton. Managed 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. Prepared numerous biological assessments, and worked on several avian research projects in the western U.S., Alaska, Peru, Ecuador, and India. Over 500 hours of helicopter and fixed wing nest survey work and aerial radio tracking of eagles, California condors, hawks and herons. Fiber-optics and electrical powerline installation surveys and construction monitoring.

7/90-present: Research Biologist, Western Foundation of Vertebrate Zoology. Served on Science Advisory Board of the South Orange County Natural Communities Conservation Program and Tejon Ranch. Herpetological input into the Orange County environmental GIS and Cleveland National Forest environmental inventory. Management of long-term (30 yr.) raptor ecology study in California. Management of successful Great Blue Heron mitigation project designed to increase numbers of nesting herons through artificial nest platforms. Supervised and performed predator management activities related to protection of California least terns, snowy plovers, and light-footed clapper rails in southwestern California from avian and other vertebrate predators for FWS. Locations included Vandenberg Air Force Base, Naval Weapons Station, Seal Beach, Batiqutios 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 in southwestern California and their relationship to California least terns. Organized and finished 7 years of a MAPS passerine monitoring station.

1/93-2001: Research biologist/advisor in India (7 visits) for Indo-US wildlife conservation project sponsored by the U.S. Fish & Wildlife Service International Affairs Office, Indian Government, and Bombay Natural History Society. Responsibilities involve educating local biologists in the various techniques needed to capture birds, and radio-telemetry research.

1993-present: Professor at Saddleback College, Department of Technology and Applied Sciences. California Natural History.

1990-present: Dept. of Biology, Calif. State Univ., Long Beach, thesis advisor to seven students, C.S.U., Humboldt, one student, and C.S.U., Fullerton, one student.

5/82-6/90 Research Biologist, National Audubon Society. Responsible for writing the grant proposal and ultimately the successful award of two grants totaling $300,000 for 6 years of full time research on the ecology of southern California raptor populations. Responsible for 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.

5/81-9/83 Research biologist, University of California, Santa Cruz. Principal investigator on a three year study designed to determine the status of goshawk populations in California for the Department of Fish and Game.

1/80-8/81 Research biologist. Trapped, and placed transmitters on great gray owls for the U.S. Forest Service, prairie falcons for the Department of Fish and Game, and peregrine falcons in Peru, South America for the Bodega Bay Institute of Pollution Ecology.

4/79-10/79 Wildlife Biologist. U.S.D.I., Bureau of Land Management. 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 final report. Resulted in listing of the Swainson's hawk.

1/79-6/79 Research biologist. Camp Pendleton Marine Corps Base. Awarded a contract to survey, and report on the ecology, and distribution of raptors inhabiting the 200 sq. mile base.

6/75-10/79 Biological technician. U.S.D.I., Bureau of Land Management. California and Nevada. Conducted reptile, amphibian, small mammal, and avian surveys of 3.25 million acres of public land as part of a grazing EIS.

PERMITS

Federal Endangered Species Permit (TE-787376-8) for Red-legged Frog (transmitters, transponders), Arroyo Southwestern Toad, California Gnatcatcher (banding), Least Bell's Vireo (banding), Southwestern Willow Flycatcher (banding), California Least Tern, Snowy Plover, Peregrine Falcon, Bald Eagle, and Swainson's Hawk. Federal Bird Marking and Salvage Permit. Predator Management Permit. Migratory Bird (Burrowing Owls etc.) relocation permit. Cowbird trapping authorization. Desert Tortoise surveys.

AWARDS:

The Wildlife Society Western Section, 2005 Professional of the Year.
Association of Field Ornithologists 1981 Bergstrom Award.
The Nature Conservancy – 2004 & 2006, $27,000 in Satellite Transmitters.

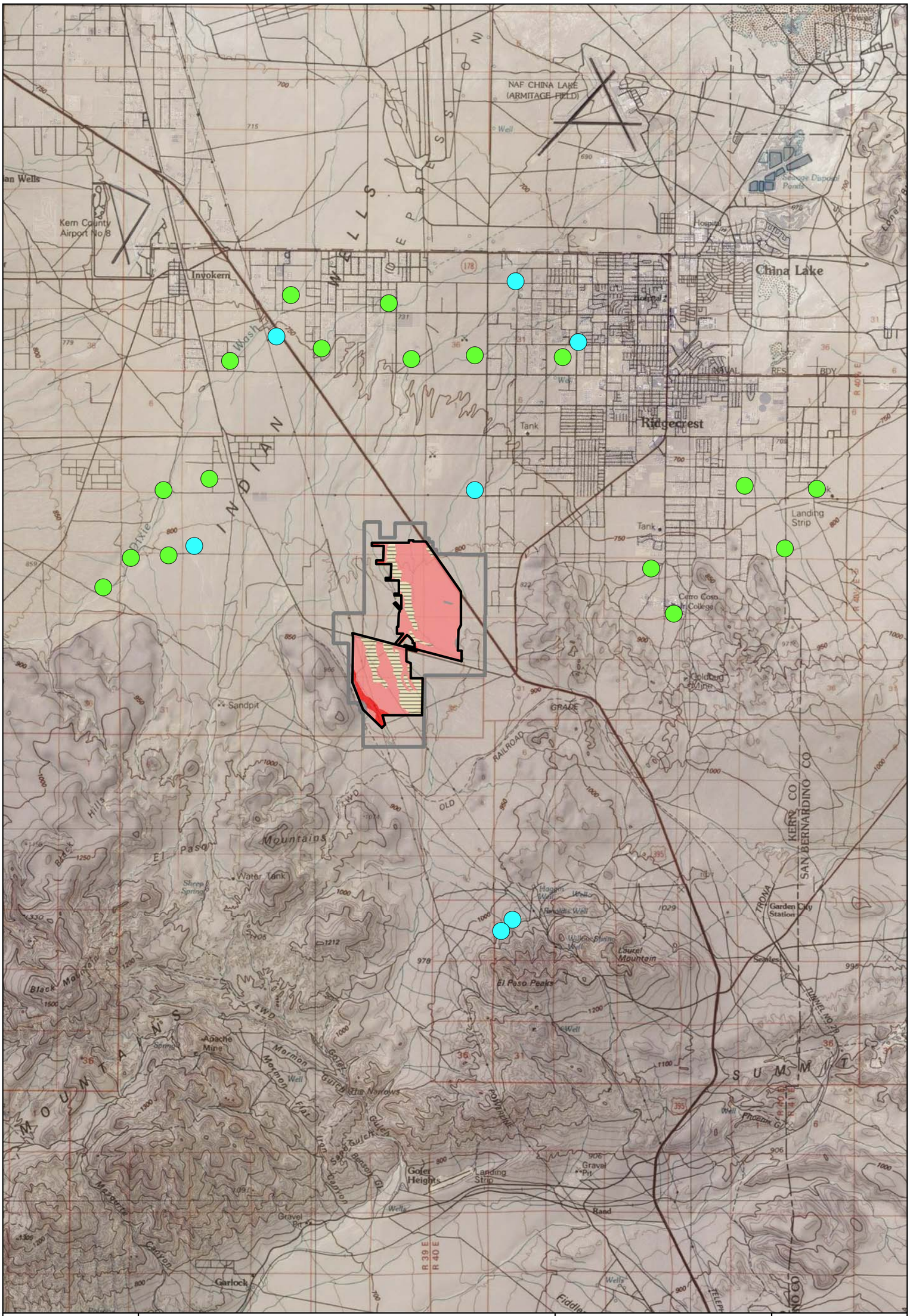
OTHER ACTIVITIES:

PROFESSIONAL MEMBERSHIPS The Western Section - Wildlife Society (Life), The Raptor Research Foundation (Life), American Ornithologists Union, Cooper Ornithological Society (Life), Association of Field Ornithologists (Life), Western Bird Banding Association (Life), Society for Conservation Biology (Life), Society for the Study of Amphibians and Reptiles, Hawk Migration Association (Life), California Native Plant Society (Life).

BOOK REVIEWS The Auk (Johnsgard. 1990 - Hawks, Eagles, and Falcons of North America), Journal of Raptor Research (Wheeler and Clark. 1995 - A photographic guide to North American Raptors), Journal of Raptor Research (Glinski 1998 The Raptors of Arizona).

Attachment DR-BIO-58

Figures



Map Location

Legend

MGS Occurance

- Prior to 1988
- 1988 to Present
- Disturbance Area

Habitat Quality

Mohave Ground Squirrel

- High - Desert Washes and Adjacent High Diversity Creosote Bush
- Medium - Low Diversity Creosote Bush
- Low - Monotypic Creosote Bush
- Unsuitable - Rocky Terrain
- ROW

1 inch = 2 miles

0 1.5 3 Miles

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-58-1
Overview Mohave Ground Squirrel
Records within 5 Miles of ROW

Source: USGS; NAIP 2005; CNDDB; Leitner 2009

Solar Millennium

AECOM

Date: January 2010

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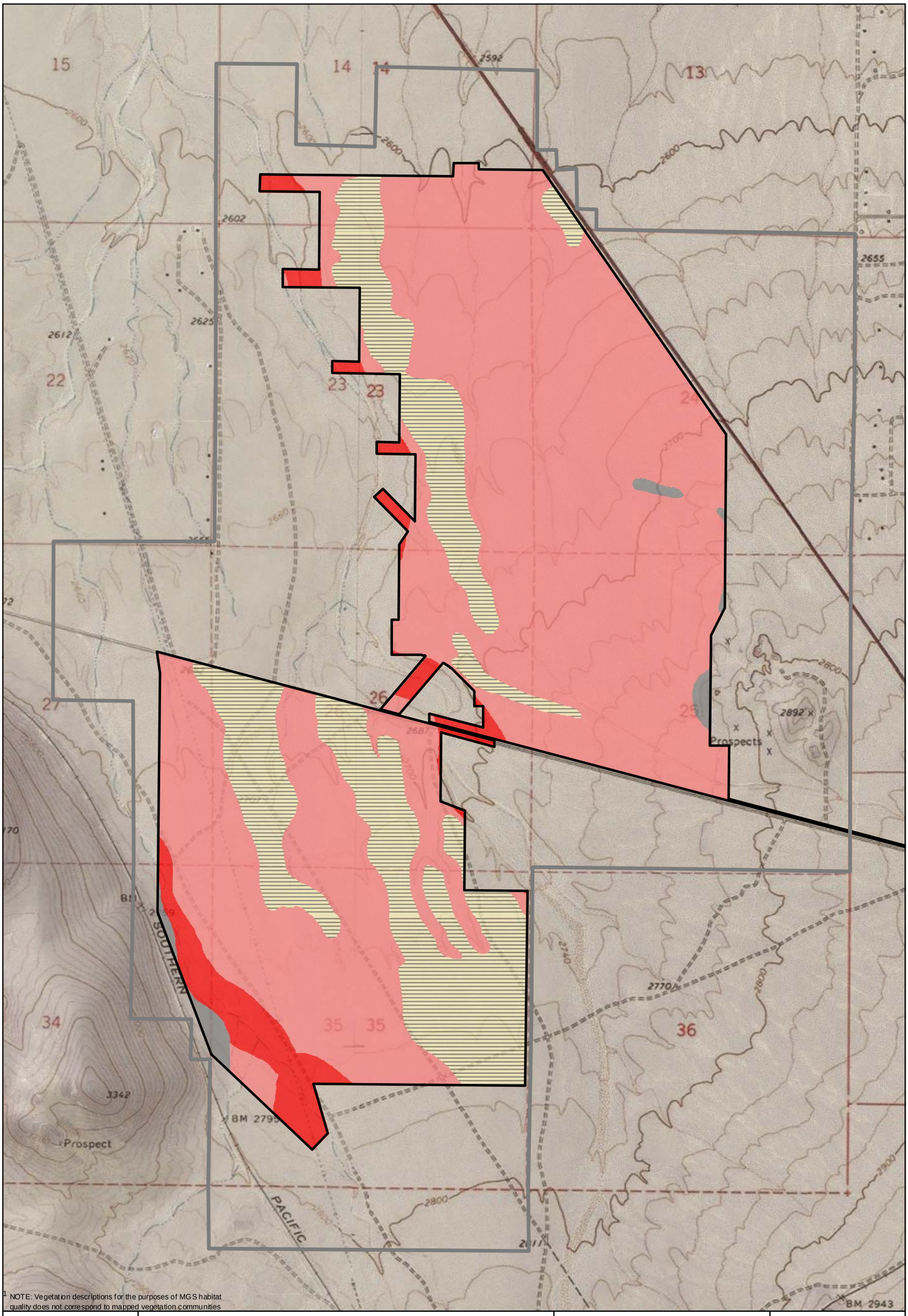

[1] NOTE: Vegetation descriptions for the purposes of MGS habitat quality does not correspond to mapped vegetation communities

Map Location

Legend

ROW

Disturbance Area

Habitat Quality

Mohave Ground Squirrel [1]

- High - Desert Washes and Adjacent High Diversity Creosote Bush
- Medium - Low Diversity Creosote Bush
- Low - Monotypic Creosote Bush
- Unsuitable - Rocky Terrain

1 inch = 1,500 feet

0 1,500 3,000 Feet

N W E S

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-58-2
Habitat Quality
Mohave Ground Squirrel

Source: USGS; NAIP 2005; Leitner 2009

Solar Millennium

AECOM

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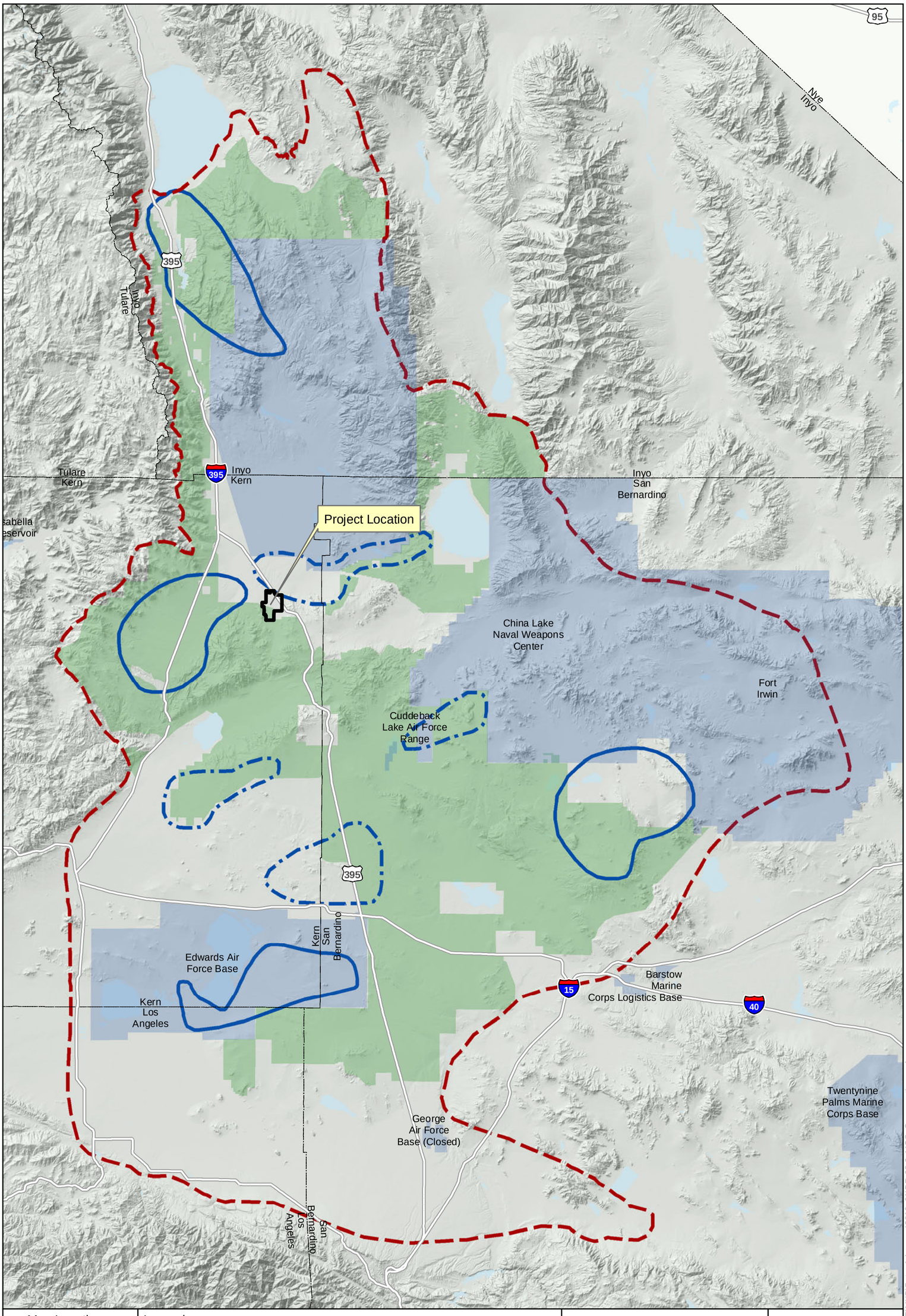

Map Location

Legend

- Mohave Ground Squirrel Range
- Identified Core Areas
- Other Known Populations
- West Mojave Plan MGS Conservation Area

1 inch = 60,000 feet

0 30,000 60,000 120,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-58-3
Mohave Ground Squirrel
Conservation

Source: Leitner 2008, BLM 2004, CaSIL 2008, ESRI 2008

Solar Millennium

AECOM

Date: January 2010

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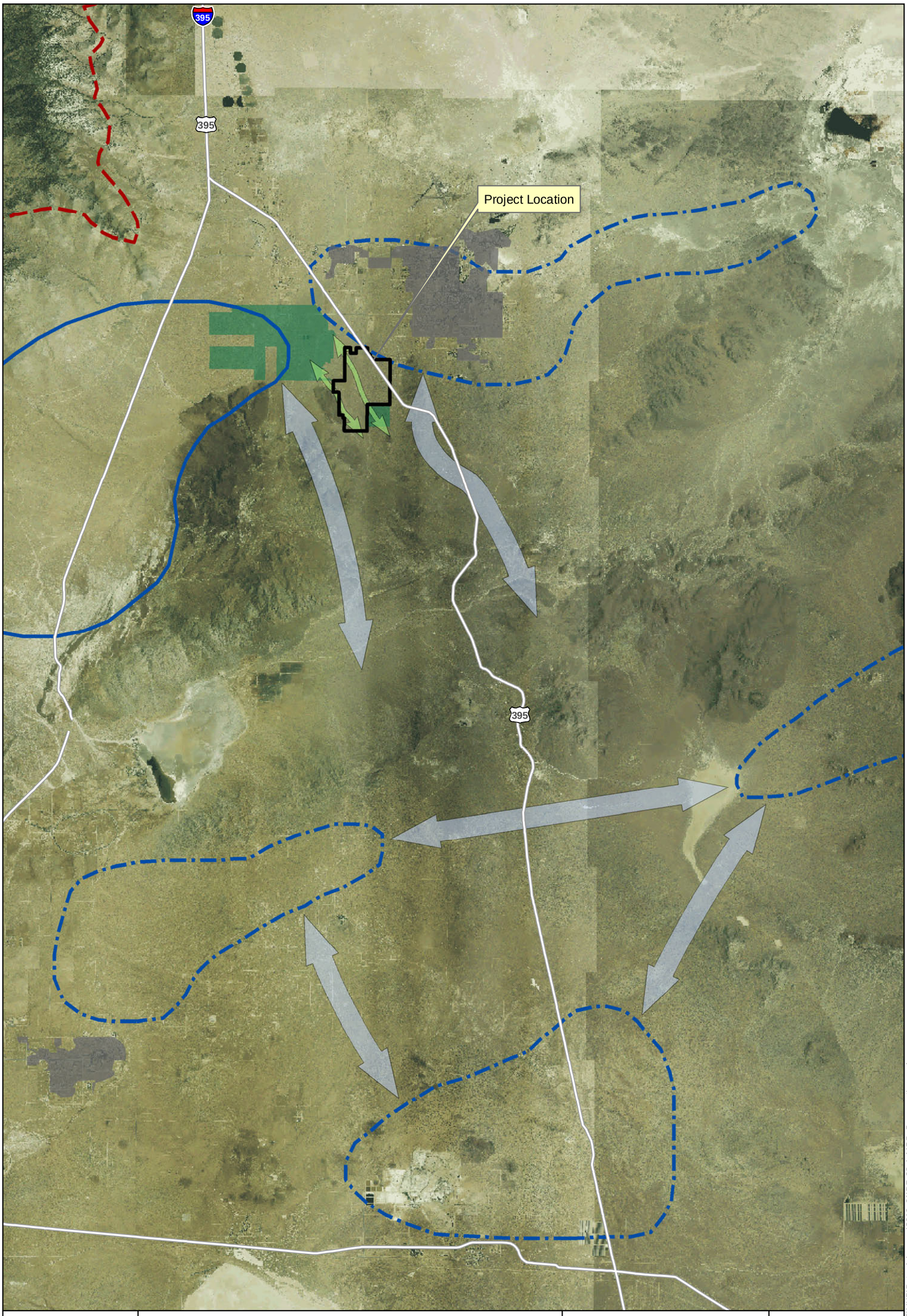

Map Location

Legend

- Potential Mitigation Land
- Potential Offsite Movement Corridors
- Potential Onsite Movement Corridors
- Identified Core Areas
- Other Known Populations
- Mohave Ground Squirrel Range

1 inch = 4 miles

0 2 4 8 Miles

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-58-4
Mohave Ground Squirrel
Conservation

Source: Leitner 2008, BLM 2004, CaSIL 2008, ESRI 2008

Solar Millennium

AECOM

Date: January 2010

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Attachment DR-BIO-65

Draft Channel Maintenance Plan

DRAFT
CHANNEL MAINTENANCE PROGRAM
RIDGECREST SOLAR POWER PROJECT

Prepared for:
Ridgecrest Solar I, LLC
1625 Shattuck Ave, Suite 270
Berkeley, CA 94709

Prepared by:
AECOM
2020 J Street
Sacramento, California 95811
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January 2010

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LIST OF ACRONYMS

AFC	Application for Certification
BLM	Bureau of Land Management
BMPs	Best Management Practices
CDFG	California Department of Fish and Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CMP	Channel Maintenance Program
CWA	Clean Water Act
DT	Desert Tortoise
ESA	Endangered Species Act
IMP	Individual Maintenance Plan
RMP	Routine Maintenance Plan
ROWD	Report of Waste Discharge
RSPP	Ridgecrest Solar Power Project
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
USACE	U.S. Army Corps of Engineers
WDR	Waste Discharge Requirement

I. Channel Maintenance Program

A. Purpose

Ridgecrest Solar I, LLC (hereafter referred to as the Applicant), proposes to construct, own, and operate the Ridgecrest Solar Power Project (RSPP or Project). The Project would have a nominal output of 250 megawatts and consist of a single power plant utilizing two solar fields.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, California, about five miles southwest of the City of Ridgecrest, California (Figure DR-BIO-65-A-1). The Project right-of-way, for which the Applicant has applied to the Bureau of Land Management (BLM), includes approximately 3,995 acres of public lands owned by the Federal government. The Project facilities would occupy approximately 1,448 acres of the 3,995-acre site, and there would be a total disturbance area (including areas outside the facility fenceline) of approximately 1,944 acres.

The Channel Maintenance Program (CMP) provides for a comprehensive long-term management plan for channel maintenance-related activities that are associated with the Project. The purpose of this CMP is to provide for the maintenance of the engineered channels through and adjacent to the site. The objectives are to meet the channels' original design geometry to provide flood protection to the site.

This CMP describes the Applicant's long-term management strategy for maintaining the channels associated with the Project and discusses alternative channel maintenance techniques and documents policies and procedures. It would be used as a comprehensive guide for the Project's channel maintenance activities and to inform agencies and the public of practices and actions. This CMP, while long term in nature, is designed to accommodate new information or changes as developments occur. Revisions would be prepared, coordinated and distributed as necessary.

B. Drainage and Flood Control

For purposes of this report, the Project shown in Figure DR-BIO-65-A-2 will be referenced herein as "Project."

On-site flow patterns as indicated by aerial photography and vegetation patterns indicate that the overall drainage pattern inside the Project area concentrates flows in several well-defined washes through the area (Figure DR-BIO-65-A-3). Storm flows generated by the existing site itself generally sheet to washes in the northeast and northwest directions. See Figure DR-BIO-65-A-3 for the flow paths and flow spread across the site. Off-site hydrology drains a combined set of distinct watersheds totaling approximately 37 square miles, which generally drain from local topographic highs located south of the Project site northward to relatively more gradual-sloped areas at the southern and northern solar fields.

There are three watercourses that run through the Project site. The El Paso Wash, which drains 22 square miles upstream of the Project site (Area E2), runs approximately through the center of the Project site. This wash drains water from the south hills and crosses Brown Road northeast of the south solar field property boundary. Currently, the El Paso Wash flows over Brown Road at a low point in the road and continues sloping in a northwest direction along the Project site. An unnamed water course drains 4 square miles (Area E1) southwest of the Project site. This water course crosses the southwest section of the Project area continuing in the northwest direction toward Brown Road. A small water course drains 0.8 square miles toward the center of the southern field area (Area E1b). Collected water in this drainage area flows westward along the road, moving water away from the Project site. The eastern drainage area (Area E3) extends east and west of the U.S. Highway 395 (Three Flags Highway) covering 10 square miles. Drained water crosses U.S. Highway 395 at several points in both east-west and west-east direction, hydrologically connecting all the catchments in this drainage area. Water collected in this eastern drainage area flows westward toward the Project site from near the intersection of Brown Road and U.S. Highway 395. This water course crosses the Project site, changing flow direction from the westward direction to a more northward direction midway through the Project site.

An elevated railroad grade is located south of the Project site (Figure DR-BIO-65-A-3). The railroad grade interrupts several natural drainage paths concentrating flows to several water courses that cross the railroad grade through pipes, concrete culverts and timber bridges.

Proposed drainage modifications to the Project seek to replicate the existing flow patterns as nearly as possible. For this reason, ten channels would be created adjacent to or across the Project area. These channels intercept the flows prior to their entry to the Project and convey them in natural re-aligned channels to where they exit the Project under existing conditions. On-site flows would be directed to these receiving dry washes to mimic existing conditions.

The Project would not change the existing upstream off-site drainage patterns. The existing downstream drainage patterns and flow rates would be slightly changed due to minor adjustments in the sub basin size through the creation of these ten diversion channels. These diversion channels would re-align the drainage pattern of the on-site flows. The proposed on-site drainage improvements seek to replicate the existing flow patterns as nearly as possible by being created within the same drainage areas as the existing dry washes (Figure DR-BIO-65-A-3). For this reason, ten channels have been proposed across the Project.

The ten engineered channels would be designed to move water through the Project area as swiftly as possible while preventing erosion and sedimentation to the extent practicable. The channels would be constructed with native on-site soil material, and scour protection would be added in stress areas (i.e., locations where the erosion potential is greater than a straight, uniform channel reach, and includes junctions, transitions, and curves). The channels are designed as

trapezoidal channels. No scour protection is proposed for the channel bottom in the straight sections of the channels (AECOM 2009a).

C. Goals and Objectives

This CMP has been prepared to provide a comprehensive approach to channel maintenance for the Project. The extent and frequency of maintenance activities are dependent upon many factors including the degree of flood hazard and the environmental impacts to natural habitats, water quality, sensitive species, and natural fluvial processes. This CMP is intended to achieve the following goals and objectives:

- Maintain the diversion channels to meet their original design to provide flood protection, support mitigation efforts, protect wildlife habitat, allow movement for large wildlife species, and maintain groundwater recharge.
- Develop a monitoring and reporting schedule and an outline for on-going routine maintenance of diversion channels to provide for public safety and protection of property.
- Develop a review process to simplify the authorization process required from State and Federal agencies with regulatory authority over wetlands for annual maintenance activities consistent with the Project.
- Minimize the disruption of adjacent property from diversion channel maintenance activities.

The engineered channels for this site are all relatively narrow in cross section and as such are not necessarily intended to serve as wildlife habitat or as mitigation. These engineered channels are all located on the periphery of the Project and outside the Project fence lines. They all have side slopes of 3:1 to allow for desert tortoise movement in or out of the channels and would be allowed to naturally re-vegetate to a minor extent, but not so much as to affect the drainage function of these engineered channels.

D. Annual Planning and Approval Process

This CMP includes a specific annual planning and approval process. The sequence of events in this process are summarized herein and discussed further in Section IV, Reporting Requirements – Step 1: Conduct Surveys and Develop Maintenance Projects; Step 2: Develop Annual Routine Maintenance Plans; Step 3: Public Review; Step 4: California Environmental Quality Act (CEQA) Compliance; and Step 5: Plan Approval.

E. Funding and Implementation Plan

The Applicant would be responsible for implementation of this CMP. The Project would retain a biologist with over three years of experience monitoring and reporting for native habitat mitigation programs (herein after referred to as a Designated Biologist). The Applicant would maintain the

diversion channels and undertake all activities needed in order to preserve the integrity, design, and discharge capacity of the diversion channels. The Applicant would be the financially responsible entity in charge of implementing all diversion channel maintenance activities.

II. STATE AND FEDERAL PERMITS

Most maintenance activities, which occur in natural water courses and involve modification to the channel bed, banks, and in-channel vegetation, are regulated by the California Department of Fish and Game (CDFG) under Section 1602 of the Fish and Game Code. Activities that result in the discharge of dredged or fill material into Federal natural water courses (such as bank stabilization and channel shaping) are regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA). The Project would require a Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB) if a 404 permit were required from the USACE. The Project is not expected to require a 404 permit because the USACE is expected to agree with the Applicant's finding that there are no "jurisdictional waters of the United States" on the Project site. If no 404 permit is required from the USACE, the RWQCB would issue a Waste Discharge Requirement (WDR) under the requirements of the Porter-Cologne Act. The Applicant would submit a Dredge and Fill Permit to the RWQCB.

This CMP would require permits and review from various agencies, on an annual basis, such as those listed in Table DR-BIO-65-1.

Table DR-BIO-65-1
Agency Permits/Approvals

Agency	Permit/Approvals
USACE	Jurisdictional Determination of Isolated Waters (*only required once, at project inception*)
CDFG	1602 Streambed Alteration Agreement
RWQCB	Report of Waste Discharge Requirement

A. USACE-Regulated Activities

USACE-regulated activities under Section 404 involve a discharge of dredged or fill material including, but not limited to, grading, placing of riprap for erosion control, pouring concrete, laying sod, and stockpiling excavated material into waters of the U.S. Activities that generally do not involve a regulated discharge (if performed specifically in a manner to avoid discharges) include driving pilings, some drainage channel maintenance activities, constructing temporary mining and farm/forest roads, and excavating without stockpiling.

Based on the results of the Project's Jurisdictional Delineation Report (AECOM 2009b), the USACE is expected to make a formal determination that all waters delineated within the Project site are "isolated waters" not under the USACE's jurisdiction.

B. Regional Water Quality Control Board

The RWQCB regulates activities within State and Federal waters under Section 401 of the Federal CWA and the State Porter-Cologne Act.

Section 401 of the Clean Water Act

Section 401 of the CWA requires that "any applicant for a Federal permit for activities that involve a discharge to Waters of the U.S., would provide the Federal permitting agency a certification from the State in which the discharge is proposed that states that the discharge will comply with applicable provisions under the Federal Clean Water Act." Therefore, in California, before the USACE will issue a Section 404 permit, the Applicant must apply for and receive a Section 401 Water Quality Certification or waiver from the RWQCB.

Since waters delineated within the Project are expected to be considered "isolated" by the USACE, and thus not under the USACE's jurisdiction, a Section 401 Water Quality Certification is not expected to be required for the Project. USACE has not yet provided an official Jurisdictional Determination letter.

Porter-Cologne Act

The RWQCB regulates actions that would involve "discharging waste, or proposing to discharge waste, with any region that could affect the water of the state" (Water Code 13260(a)), pursuant to provisions of the state Porter-Cologne Act. "Waters of the State" are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" (Water Code 13050(e)). All parties proposing to discharge waste that could affect the quality of waters of the State would file a Report of Waste Discharge (ROWD) with the appropriate RWQCB. The RWQCB would then respond to the ROWD by issuing a WDR in a public hearing, or by waiving WDRs (with or without conditions) that propose discharge.

Since waters delineated within the Project are expected to be considered non-jurisdictional by the USACE, the Applicant must file a ROWD and obtain WDRs from the RWQCB prior to ground-disturbing activities.

C. California Department of Fish and Game

Pursuant to these sections, the CDFG regulates all changes to the natural flow, bed, or bank of any river, stream, or lake that supports fish or wildlife resources. A stream is defined broadly as a body of water that flows at least periodically, or intermittently, through a channel that has banks and that supports fish or other aquatic biota. Such areas are formally referred to as "waters of the State." Impacts to vegetation and wildlife from sediment, diversions, and other disturbances are included in the review.

As the Project contains "waters of the State," the Applicant has submitted a Streambed Alteration Agreement (SAA) application to the CDFG for construction. The SAA review process is subsumed within the California Energy Commission's (CEC's) review and approval process for the Application for Certification (AFC) (AECOM 2009c). A separate channel maintenance permit from CDFG would be needed for activities within the channels during operations (e.g., activities described in this CMP).

III. GUIDELINES AND STANDARDS FOR ROUTINE MAINTENANCE ACTIVITIES

This section describes the typical maintenance methods that would be utilized in maintaining the Project's diversion channels. Table DR-BIO-65-2 presents the generally anticipated maintenance methods and frequency for the maintenance activities of the diversion channels that would be maintained by the Applicant. The decision as to which technique and/or equipment would be used would ultimately be based upon the density and volume of accumulated material, the size of the channel, its flow-characteristics, and access conditions.

The engineered channels would be kept relatively free of impediments to flowing water, the original design geometry of the channel cross section would be maintained, erosion/scour damage to side slopes and channel bottoms would be kept at a minimum and vegetation/weeds would be managed. In-stream repairs would be promptly made to repair eroding banks and drop structures, erosion at storm drain outfalls, fences, incising toes of slopes and scoured channel beds. Trash and loose debris would be collected at a minimum on a monthly basis. Access roads would also be maintained as necessary to allow continuous monitoring of the channels. At a minimum, repairs and/or management actions need to be implemented when the problem 1) causes or could cause significant damage to the Project, adjacent property, or structural elements of the channels; 2) is a public safety concern; 3) negatively affects adjacent plant communities or poses a hazard to wildlife.

Dry channel conditions are anticipated for almost all maintenance work within the diversion channels. No mechanized equipment would be allowed to work within any wet channel areas, unless deemed necessary by the Project's Compliance Project Manager to respond to an emergency situation.

The Applicant would obtain and comply with all terms and conditions of each regulatory agency permit, including the CDFG 1602 SAA and the RWQCB WDR.

A. Preconstruction Biological Surveys and Avoidance Measures

Maintenance activities would require the use of equipment and have the potential to impact special-status plant and wildlife species. Therefore, a Designated Biologist would inspect all maintenance areas prior to the start of maintenance activities to determine if any special-status plants or wildlife species are present, or habitats for these species are present. If special-status plants or wildlife species are determined to be present, the Applicant would modify maintenance activities to avoid removal or substantial disturbance of the key habitat areas or features.

Table DR-BIO-65-2
Recommended Methods and Frequency of Maintenance Activities

Maintenance Category	Identification of Maintenance Problem	Recommended Maintenance Methods	Recommended Maintenance Frequency
Sediment Removal	Sediment comprises more than 10 percent of channel cross-section.	Monthly channel inspection. Remove sediment by hand tools for smaller channels. Remove sediment by hydraulic excavator for larger channels.	After rain events of 0.50 inches or greater, and on an as-needed basis.
Debris Collection and Blockage Removal	Culverts are clogged by straw, mud, dead animals, garbage, and/or aquatic plants.	Monthly channel inspection, trash and debris removal. Manual cleaning of culverts every two months, or as needed to minimize outlet clogging and prior to rainy season.	Prior to expected rain events of 0.50 inches or greater, and on an as-needed basis.
Repair and Installation of Fences, Gates & Signage	Holes, tears and/or broken fences, gates & signage.	Manually repair fences, gates and/or signage.	On an as-needed basis.
	Central Channel desert tortoise-proof fence.	Manually repair fence.	Monthly and immediately following rainfall events of 0.25 inches or greater.
Access Road Maintenance	Accumulation of debris, unsafe driving conditions present.	Repair access roads in order to maintain safe access to channels.	On an as-needed basis.
Vegetation/Weed Management	Weeds 15 inches in height or less within channel bed and/or on channel banks.	Mechanical removal by mowing.	On an as-needed basis.
	Weeds 15 inches in height or more within channel bed and/or on channel banks.	Manual removal with hand tools.	On an as-needed basis.
Erosion Control	Banks and embankment are deteriorated.	Riprap installation for deteriorated embankments (most common solution) or lining by plain concrete.	Infrequently needed, on an as-needed basis as determined by the Contractor to maintain bank stability.
	Embankment pitching is less than 15 inches.	Collect obstacles (trees, bushes, weeds, and silts) by crawler dozers.	On an as-needed basis and outside of the rainy season (October to April).
	Incising toes and/or scoured channel beds.	Rehabilitate bank and/or channel beds with compacted sand and coarse-grained gravels using motor grader, maintaining road slope as close to1 percent as possible.	On an as-needed basis and outside of the rainy season (October to April).

Avoidance and minimization measures would be described in the Annual Routine Maintenance Plan (RMP) for each maintenance activity. If a special-status plant species would potentially be affected, the Applicant would relocate the plant by cultivation or seeding methods to a suitable nearby site in coordination with CDFG. If a special-status wildlife species is determined to be present at a maintenance Project during the work period, the Designated Biologist would attempt to relocate the species or population per the Project's Desert Tortoise Relocation/Translocation Plan (DR-BIO-54, AECOM 2010a), Burrowing Owl Relocation/Translocation Plan (DR-BIO-56, AECOM 2010b), American Badger Relocation/Translocation Plan (DR-BIO-70, AECOM 2010c), and/or Desert Kit Fox Relocation/Translocation Plan (DR-BIO-77, AECOM 2010d) with approval from the CDFG or United States Fish and Wildlife Service (USFWS), as appropriate. This measure applies to all currently known special-status species that occur in the diversion channels, as well as special-status species that are recognized in the future. Endangered species experts with handling permits would be consulted during relocation efforts as described in the plans above to provide additional assurances that relocation is effective. Such consultation would include assistance in field efforts, as warranted.

B. Site Preparation and Access

Prior to initiating work for approved maintenance activities, the edge of the low-flow channel (if present) and a 10-foot buffer zone on each side of the low-flow channel would be clearly marked by the maintenance personnel using lath stakes with flagging (for no access by mechanized equipment). If no water is present in the channel, then the maintenance personnel would rely on the Designated Biologists' results of the Individual Biological Evaluation (refer to Section IV). The 10-foot buffer strip would be marked from the edge of the low-flow channel towards the bank. A single crossing through the surveyed channel would be allowed at each work site (one crossing at each maintenance site) for access to opposite sides of the channel. The crossing would be identified and clearly marked with lath and flagging for the equipment operator (Figure DR-BIO-65-A-4 and Figure DR-BIO-65-A-5).

C. Equipment

The types of equipment used in the course of maintenance activities may include, but are not limited to: backhoes, excavators, loaders, dump trucks, and bulldozers. Smaller equipment such as hand tools may also be used as appropriate.

D. Construction Monitoring

The Designated Biologist would be responsible for overseeing monitoring and compliance with protective measures for the biological resources. A Section 10(a)(1)(A) permit under the Federal Endangered Species Act (ESA) would be necessary for the monitoring or handling of federally listed species, otherwise a Designated Biologist would supervise maintenance activities to ensure compliance with Federal laws and regulations, such as the ESA and the CWA, as well as with State laws and regulations administered by the CDFG and the RWQCB. Maintaining

compliance requires an extensive authorization process each year for planned maintenance activities (refer back to Section II). The need for monitoring and the areas to be monitored would be determined during the Maintenance Activity Biological Evaluation (refer to Section IV). The objective of construction monitoring is to ensure that key habitat features or species locations are avoided to the maximum extent feasible.

The types of construction monitoring activities are summarized below and would be part of each Annual RMP:

Initial: Conducted as the first inventory assessment of a watercourse segment or after the implementation of a drainage improvement project.

Routine: Conducted on a cyclical (every 2-3 years) basis to assess current conditions and needed maintenance as determined by a Designated Biologist.

Event: Conducted after a significant flow or weather event that may have altered the existing conditions. A significant flow event is defined as a flow that is great enough to potentially alter or damage the diversion channel. Depending on the characteristics of a particular location in a diversion channel, a significant flow event can be associated with different flows.

Interim: Conducted upon the request of a concerned party or individual.

E. Maintenance Activity Categories

Repair and Installation of Fences, Gates & Signage

Fencing for the Project was designed so that the diversion channels carrying off-site drainage water would not be impacted by any obstruction that would preclude movement along or through the diversion channels. Fencing would be placed at the top of each channel beyond the channel maintenance road. The channels would be located outside of the facility's security fence; however, to ensure that no desert tortoise (*Gopherus agassizii* [DT]) or other small animals perish in the channels, a permanent DT-proof fence, or similar structure sufficient to exclude DTs, would be installed across inflow and outflow points of the central channel that traverse the solar fields to keep DT from entering.

At any location where a fence is required to cross a diversion channel for security reasons, a box culvert would be installed to allow unrestricted passage by wildlife within the diversion channel. Fencing would be provided at the perimeter of all the solar fields and other site improvements to preclude animals from coming onto the Project and potentially becoming injured (AECOM 2009a).

Following installation, the fencing, or similar structure, would be inspected monthly and immediately following rainfall events of 0.25 inches or greater. Damage to the fencing, or similar structure, would be repaired immediately and a clearance for any DTs that may be in the

channel would be conducted in all areas with shrub cover. A minimum of two clearance passes would be completed after the fencing, or similar structure, is repaired to ensure that no DTs entered the channel and become trapped inside. Any DT found would be moved by a Designated Biologist to a location immediately outside of DT-proof fencing, or similar structure, at the nearest channel inflow or outflow point using Agency-approved techniques (AECOM 2009a).

Where fences are installed, they would be maintained to provide warning and/or prevent unauthorized human or livestock entry. Gates and signs would be immediately repaired due to any vandalism, vehicular, or livestock damage.

Access Road Maintenance

Controls would be in place to minimize or eliminate soils from being tracked off site from vehicular traffic. A stabilized entrance/exit would be provided to clean vehicle wheels prior to exiting the Project. The majority of the Project would be stabilized with coarse gravel, except for paved access roads (AECOM 2009a).

The distance between access ramps to the diversion channels would be determined by balancing the impacts of driving equipment on the channel bed versus creating extra access points. Access ramps would be placed in areas with minimum potential for erosion. Access roads and ramps would be maintained in a manner that minimizes disturbance to native vegetation, wildlife, and aquatic organisms. The width of all new ramps would be minimized to the extent feasible. Paved access roads would be kept clean of earthen material and debris. The Project would be maintained so that a minimum of sediment-laden runoff enters the diversion channels.

Debris Collection and Blockage Removal

The engineered channels would be inspected monthly and all trash and loose debris would be collected and disposed of in a proper manner. Blockage removal would be conducted on an as-needed basis by the Applicant and would usually occur as a result of notification of a problem by a Contractor or public entity. Trash or vegetation debris may also cause a blockage and require more frequent removal. Trash and associated debris removal is necessary to maintain channel design capacity and storm drain outfalls. Spoils, trash, or any debris would be removed off site to an approved disposal facility. A trash abatement program would also be established (AECOM 2009a).

Sediment Removal

Sediment removal activities would be conducted within the diversion channels at their driest. The number of sediment removal projects undertaken and the quantity of sediment removed in a given year depends on the frequency and extent of past maintenance activities, as well as weather and hydrologic conditions during recent years. The channels would be provided with monitoring poles to gage the amount of sediment deposited within the channel. The poles would be set at

quarter mile intervals along the length of all constructed channels. At each quarter-mile location, the poles would be set at the toe of slope and the center of the channel and at not more than 50 foot increments spanning the width of the channel. Sediment removal needs following wet winter with higher than usual runoff, slope erosion, and sediment delivery to (and transport within) the diversion channel would likely be greater than maintenance requirements following an average or dry winter.

In most cases, larger equipment would operate within the channel itself. Equipment would enter the channel via an adjacent access road at various entry points (i.e. culvert crossings). The equipment would push the accumulated material with a bucket to a central location within the Project. From there, the material would be scooped up with a loader and loaded into a dump truck. The loaded dump truck would then leave the facility and transport the material to an approved off-site disposal area. Compostable green waste material would be taken to an approved composting facility, if available.

Erosion Control

Erosion and scour may be a problem in the desert environment. Prompt action would be taken when signs of erosion and scour first appear before they become major repairs. In addition to monthly inspections of the channels, inspections would be made after any significant rainfall event.

Erosion control would be performed as necessary within and adjacent to each diversion channel. Natural scouring and aggregation in the diversion channels is part of the natural successional processes. However, scour protection would be added in stress areas. A stress area is defined as a location where the erosion potential is greater than a straight, uniform channel reach, and includes junctions, transitions and curves. Highly erodible areas such as the sweeping turns in the rerouted channel may be reinforced with riprap, if erosion is determined to be a recurring problem area. Since the slope of the upper banks would be mild (4:1 or less), it is not necessary to include riprap along the straight portions of the upper banks (AECOM 2009a).

Erosion concerns for the Project focus on those situations where infrastructure (access roads, fencing, etc.), solar facilities, or off-site property could be damaged or compromised if repairs are not made. Any identified erosion problems would be addressed in a timely manner. Erosion control materials include, but are not limited to, natural fiber matting, rock or riprap, straw wattles, vegetation bundles, gravel bags, gully repair, collection/retrieval of sediment, and seeding. Weed-free fiber matting and rice straw or other certified weed-free materials may be used. The channel bottom widths were set to promote relatively shallow flows. This was done to help minimize erosive forces and to shorten the daylight length required at the downstream end of the channel (AECOM 2009a).

Erosion control minimization measures would take wildlife movement into consideration. No erosion control method would inhibit the passage of wildlife species across the Project and each would ensure proper crossing routes through the diversion channels. In order to minimize the impact of maintenance activities on the environment, erosion control measures would incorporate the following protocols, as appropriate.

- Minimize new ground disturbance to the maximum extent feasible, through efforts such as limiting grading to the minimum area required, and restricting vehicle access and maneuvering to designated areas.
- Minimize maintenance activities during the rainy season (October to April).
- When maintenance activities cannot be avoided during the rainy season, prepare and implement a "weather triggered" action plan for activities to provide enhanced erosion and sediment control measures prior to predicted storm events (i.e., 40 percent or greater chance of rain).
- Schedule grading, earth disturbing and restoration activities as far in advance of the start of the rainy season as feasible, to maximize the opportunity for vegetation to reestablish prior to the advent of storm runoff.
- During maintenance activities, use sediment controls within channels, access roads and staging areas to prevent off-site sediment transport, including measures such as silt fence, fiber rolls, gravel bags, etc. Remove temporary erosion control measures upon completion of maintenance.
- Provide appropriate training for personnel responsible for Best Management Practices (BMP) installation and maintenance.
- Monitor erosion control measures during the rainy season to ensure their effectiveness.
- Comply with local dust control requirements, including measures such as material stockpile and restriction of grading during high winds.

Bank Stabilization

Bank stabilization involves the repair and stabilization of eroded or eroding channel banks. Destabilized banks that are not repaired would continue to erode and shed sediment into the diversion channels. The banks along the diversion channels would be routinely repaired and stabilized to reduce the potential for eroding banks, incising toes and sourced channel beds. Eroding banks that are not repaired would continue to destabilize and deposit sediment into the diversion channels.

The Project would need to implement, at a minimum, in-channel repairs or management action when the problem could:

- Cause significant damage to the Project, adjacent property, or the structural elements of the diversion channel;
- Cause a public safety concern;
- Negatively affects groundwater recharge; and
- Negatively affects adjacent plant communities or poses a hazard to wildlife.

The construction of bank protection measures would be limited to situations when banks are vulnerable to continued erosion which could cause a threat to critical public infrastructure and/or valuable habitat, and it has been determined that natural slope settling would not achieve the necessary stability. The Applicant would evaluate different types of bank protection methods, then select one that is most suitable based on the following order of decreasing preference: (1) ungrouted rip rap with vegetation; (2) pipe and wire revetment while retaining vegetation; (3) grouted rip rap; and (4) concrete sackwalls, gabion walls, soil cement, and gunite.

Hard bank protection such as grouted and ungrouted rip rap, pipe and wire revetment, gunite, concrete sackwalls, gabion walls, and soil cement would only be used if it is determined that the above methods would not achieve the desired results, are not cost effective, are logistically or technically infeasible, and/or would create greater incidental environmental impacts.

Nonnative Vegetation Management

Invasive nonnative (weed) species would be eradicated wherever they occur in or adjacent to (i.e., within 10 feet) each diversion channel. Colonization of an area by weeds is most likely to occur in the periods after disturbance (e.g., after the rerouted wash is graded and newly established). It is anticipated that vegetation or weed control would not be of concern until at least the second year after the channels are constructed due to the slow growth in the desert ecosystem. The proposed initial control after the diversion channel is established would enhance the function of the channels by maintaining positive conditions for natural flow regimes, and by removing competing nonnative plants and providing substrate for native plants to regenerate naturally. In addition, nonnative plant control on site would reduce weed propagules that would otherwise be transported downstream.

For the purposes of this CMP, nonnative plant species that require control include those species listed in Table DR-BIO-65-3. Please refer to the Weed Management Plan for further details (DR-BIO-69) (AECOM 2010e).

Table DR-BIO-65-3 Weed Species Observed within Project Boundaries

Scientific Name	Common Name
Festuca sp.	Fescue
Schismus sp.	Mediterranean grass
Brassica tournefortii	Saharan mustard
Salsola tragus	Russian thistle, tumbleweed
Tamarix aphylla	Athel tree

Source: AECOM. 2009d. Ridgecrest Solar Power Project Biological Technical Report, Riverside County, California. Prepared for Ridgecrest Solar I, LLC. August.

The following weed control avoidance and minimization measures would be followed:

- Invasive weeds would be controlled by herbicide spraying or hand-pulling. Weeds would be controlled prior to seed set to reduce competition with native plants.
- Herbicide use would be conducted by workers trained in native and invasive weed plant identification. Care would be taken when spraying herbicides to avoid native plant species.
- Herbicide would not be applied during periods of precipitation or on windy days.
- If herbicide is sprayed when standing water is present, a non-water soluble herbicide would be used such as Rodeo or Aquamaster.
- Workers would also have received annual training in herbicide use and safety. The supervisor of the workers would possess a Qualified Applicators Certificate and/or License. Recommendations for herbicide use would be written by a licensed Pest Control Advisor and submitted to the County Agricultural Advisor.
- All weed debris would be collected and properly disposed of off site (refer back to Section 3.5.3).

Native Vegetation Management

Maintenance of native vegetation on the channel banks is prescribed in order to reduce the hydraulic roughness, improving flood conveyance capacity, but to also maintain adequate cover to protect stream banks from erosion. Maintenance of native vegetation above the toe of the bank would conform to the same prescriptive requirements as designated for native vegetation removal in the buffer zone. Vegetation maintenance can be performed by mechanized equipment or by hand tools.

The Applicant would remove no more native vegetation from the channel bottom than is necessary to achieve the specific maintenance objectives (i.e., removing obstructive vegetation or silt-trapping vegetation). Brushing and herbicide application for vegetation control on the channel bottom would be conducted in a manner that allows small patches of in-channel native vegetation to persist.

The Project Contractor and employees would maintain native vegetation within the buffer zone and between the buffer zone and below the toe of the channel bank. The Contractor also has the option of thinning vegetation above the toe of the channel bank. This action would occur only after it has been determined necessary, during the site screening, in areas where vegetation maintenance in combination with sediment grading activities do not meet a reasonable flood flow standard.

A 10-foot wide buffer zone would be maintained on either side of the low-flow channel. The buffer zone would be delineated in the Individual Maintenance Plan (IMP) (refer to Section IV). However, when maintenance actually begins, regardless of the IMP, the physical edge of water (if present) would be flagged and used as the definitive boundary for the 10-foot wide buffer zone. Maintenance of native vegetation within the 10-foot wide buffer zone would conform to the following prescriptive requirements and would be performed by hand only.

Vegetation maintenance can be accomplished using either hand or mechanical methods, but no equipment would be allowed in the wetted channel areas. Mechanized and/or hand removal of vegetation may be conducted on the channel bottom and sandbars within areas below the banks and away from the surveyed low-flow dry channel and the 10-foot buffer zone. To the extent possible, roots of native species would be left intact within the sediment surface to minimize suspended sediment and changes to channel morphology during elevated flows. The preferred method of vegetation removal below the toe of the bank would be mowing.

Coordination with CDFG would occur and the CEC License would be consulted for further details on mitigation measures related to special-status plants found within the diversion channels (AECOM 2009c).

IV. REPORTING

A. Annual Planning and Approval Process

This CMP includes a specific annual planning and approval process. The sequence of events in this process is summarized below:

Step 1: Conduct Survey and Develop Maintenance Projects

Each year, surveys of the diversion channels would be conducted. These are labor-intensive field investigations to identify areas that may require maintenance and to gather information on Project conditions. An assessment of the need for maintenance would be prepared using principles of engineering and stream geomorphology. The nature and extent of the proposed maintenance activities would be described. Please refer to Attachment DR-BIO-65-B, which contains a sample Maintenance Activity Report Form.

Biological field surveys would be conducted by a Designated Biologist to determine the presence of any sensitive species that may be impacted by maintenance activities. Impacts of the proposed actions would be evaluated and mitigation measures identified. A map of the proposed maintenance activity areas would be developed, as well as documentation of any biological field investigations. Please refer to Attachment DR-BIO-65-C, which contains a sample Maintenance Activity Biological Evaluation Report Form.

Additionally, surveys and minimization measures would be conducted in compliance with all applicable permit conditions.

Step 2: Develop Annual Routine Maintenance Plan

An Annual RMP would be prepared by Project staff each year (and would be submitted to the CEC Compliance Manager for approval) which would include the following Sections:

- Section 1: Introduction and summary of planned maintenance activities.
- Section 2: Notice of Exemption and description of exempt drainages (if applicable).
- Section 3: Reference to other environmental documents, as needed.
- Section 4: Impacts analysis and applicable mitigation measures identified by the Designated Biologist.
- Section 5: Photographs and reporting forms.
- Section 6: Copies of applicable agency approvals/permits obtained.

Step 3: CEQA Compliance and Regulatory Agency Permit Approvals

The CEC is the lead agency under CEQA and has a certified regulatory program under CEQA. Under its certified program, the CEC is exempt from having to prepare an Environmental Impact Report. Its certified program, however, does require environmental analysis of the Project, including an analysis of alternatives and mitigation measures to minimize any significant adverse effect the Project may have on the environment.

As a CEQA lead agency, the CEC has the authority to determine which maintenance activities and projects are exempt from CEQA. Maintenance projects that are exempt from CEQA generally include the following categories of activities, as described in Annual RMPs.

Rubbish Removal. Removal of rubbish or other unnatural material from the riparian corridor.

Concrete Channels. Maintenance activities in fully concrete-lined channels without habitat.

Flood Control Devices. Cleaning, repair, and replacement of such flood control devises as check structures, drop structures, chute structures, culverts, weirs, or stream flow measures stations.

Access Ways. Maintenance activities on access ways or roads outside of riparian corridor.

Earthen Channels. Maintenance activities in earthen channels, which have been developed to convey stormwater and that support little to no vegetation and do not support listed species.

Unvegetated Basins. Maintenance activities in sediment, debris, and retention basins which have been constructed for such purposes and which support little to no vegetation and do not support listed species.

Non-exempt projects are subject to environmental review in the Annual RMP to be approved by the CEC. Addenda are prepared by Project staff for each maintenance project, which would include the following elements:

- Project description,
- Wildlife and plant surveys,
- Cultural resource surveys,
- Engineering analysis, and
- Impact analysis and mitigation measures.

As noted above, the Annual RMP includes a description of each maintenance project to be conducted. In addition, it represents the environmental documentation required to comply with CEQA. Once the CEC has approved the maintenance activities, application can be made to the BLM (land owner), CDFG, USACE and RWQCB for environmental permits and/or approvals.

Applicable permits must be obtained from local, State and Federal regulatory agencies prior to project implementation.

Step 4: Plan Approval

The Annual RMP would be revised to respond to any CEC comments, and would then be presented to the CEC for approval each year.

B. Report Requirements

Annual Routine Maintenance Plan

On an annual basis, the Applicant would determine which diversion channels require maintenance in the coming year. Once the maintenance activities are identified, the following series of actions would be undertaken for each proposed maintenance activity carried out in accordance with this CMP.

Individual Maintenance Plan

An IMP would be prepared for each maintenance activity every year identified under the Annual RMP. Each IMP would identify the following:

- Width of channel clearing;
- Maintenance method(s) to be used;
- Equipment type; access roads/paths;
- Staging areas;
- Spoils storage sites; and
- Schedule.

As appropriate, the IMP would incorporate construction BMPs required by the RWQCB to prevent pollutants from entering the diversion channels, and the CDFG to prevent further impacts to streambeds and banks. The maintenance requirements would be based on empirical and/or quantitative evaluation of what is required to achieve the desired flood control capacity of the diversion channels. The goal of the IMP would be to, wherever possible, minimize the amount of clearing in order to reduce impacts on biological resources while providing adequate flood control capacity. The IMP would utilize existing access roads within environmentally sensitive lands to minimize the need for creating new access paths.

Maintenance Activity Biological Evaluation

The location of each proposed activity would be inspected by a Designated Biologist to determine whether sensitive biological resources could be affected by the proposed maintenance activity.

A Maintenance Activity Biological Evaluation Form would be prepared for each facility where the Designated Biologist determines that the proposed maintenance activity could affect sensitive biological resources. The Maintenance Activity Biological Evaluation Form would include:

- A summary of the biological resources associated with the diversion channel;
- Quantification of potential impacts to sensitive biological resources; and
- Mitigation measures, if applicable, required which compensate for those impacts.

The Maintenance Activity Biological Evaluation Form would also identify which CMP guidelines and standards would be incorporated into the proposed maintenance activity. Please refer to Attachment DR-BIO-65-C, which contains a sample Maintenance Activity Biological Evaluation Form.

Table DR-BIO-65-4 would be consulted to score the quality of each maintenance site and to quantify the condition of each diversion channel inspected to prioritize maintenance activities. Table DR-BIO-65-5 would be consulted to assess which type of channel monitoring and maintenance activities are recommended.

Annual RMP Plan Approval

Prior to commencing any maintenance activity that was determined in the Maintenance Activity Biological Evaluation Form to potentially impact biological resources, USACE and/or RWQCB and the CDFG would review the Annual RMP. The Applicant must verify that the proposed maintenance activities and mitigation measures are consistent with the analysis contained in the AFC (AECOM 2009c). No maintenance activities would be undertaken until these entities have indicated their approval of the relevant Annual RMP.

Prior to commencing any maintenance activity that was determined in the Maintenance Activity Biological Evaluation Form to potentially impact biological resources; the mitigation measures identified in the Maintenance Activity Biological Evaluation Form would be carried out. In general, the boundaries of sensitive biological resources that are to be avoided must be clearly delineated with flagging, signage and/or fencing.

Monitoring and Reporting Schedule

A Status Report for maintenance activities of significance in any 30-calendar day period is to be submitted to the Compliance Project Manager at least 15-calendar days prior to undertaking the maintenance. Activities of significance are defined as: 1) Sediment removal exceeding 500 cubic yards, 2) Weed or vegetation eradication covering more than 5 gross acres, 3) Debris removal exceeding 100 cubic yards, and 4) Erosion/scour remediation exceeding 500 cubic yards of new material. An initial report would be prepared indicating the extent of the planned maintenance activity, location on the site, projected starting and completion dates, and the

disposal method/location for any material being removed from the channels. A final report would be submitted to the Compliance Project Manager within 15 calendar days of completion of the maintenance activity that summarizes the final extent of the maintenance undertaken.

An Annual Report of Maintenance Activities is to be submitted to the Compliance Project Manager by January 31 of each year. The Annual Report would report on the maintenance activities undertaken on each of the three channels. The report would include for each channel: 1) An evaluation of the condition of the channel for each monitoring standard, 2) A summary of Status Reports, and 3) An estimate of planned maintenance activities for the next year including activities of significance. In addition, ground and or aerial photos would be included to illustrate the state of the channels.

Construction activities would be monitored full time during start up and during any in-stream works or sensitive activity, otherwise on a daily basis to the completion of the Project. As required, the Designated Biologist would be on site during maintenance activities, where these resources are determined to be present, to assure that required mitigation measures are followed. At the end of the monitoring period, the Designated Biologist would prepare a letter report summarizing the results of the monitoring and any remedial actions that were carried out.

Table DR-BIO-65-4
Channel Condition Assessment Ratings

Rating	Condition	Description of Observations	Recommended Action Option
6	Good	Channels do not exhibit erosion/scour, sediment accumulation, debris build-up, or resistance to flow. Structural controls may show minor deterioration, but all components are stable.	Routine Monitoring
5	Satisfactory	Channels exhibit minor erosion/scour, sediment accumulation, debris buildup, or resistance to flow. Structural controls exhibit limited, minor defects or deterioration, such as corrosion, overstressing, and movement.	Routine Monitoring
4	Fair	Channels exhibit increased scour, sediment accumulation, debris buildup, or resistance to flow. Minor deterioration may be observed to conveyance structures. Structural controls are sound and stable, but minor to moderate defects or deterioration is observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the ability of the structure to function as intended.	Increased Monitoring Frequency
3	Poor	Channels exhibit scour, sediment accumulation, debris buildup, and resistance to flow. Moderate deterioration is observed to conveyance structures. Conveyance and flow structures not functioning as intended. Structural controls exhibit advanced deterioration or overstressing, but structure is functioning as intended. Maintenance/repairs may need to be performed with moderate urgency to avoid further deterioration or increased likelihood of flooding.	Maintenance/ Repair
2	Serious	Channels exhibit serious scour, sediment accumulation, debris buildup, and resistance to flow. Advanced deterioration is observed to conveyance structures. Conveyance and flow structures not functioning as intended. Structural controls exhibit advanced deterioration, overstressing, or breakage. Repairs may need to be performed on a high-priority basis with urgency. Conditions may result in flooding.	Redesign/ Replacement
1	Critical	Channels exhibit critical scour, sediment accumulation, debris buildup, and resistance to flow. Advanced deterioration is observed to conveyance structures. Conveyance and flow structures not functioning as intended. Structural controls exhibit extreme deterioration, overstressing, or breakage and have resulted in localized failure(s). Repairs may need to be performed on a very high priority basis. Flooding is imminent.	Redesign/ Replacement

Table DR-BIO-65-5
Recommended Channel Monitoring and Maintenance Options

Action Options	Description
Routine Monitoring	Recommended when no further action is necessary until the next scheduled routine inspection.
Increased Monitoring Frequency	Recommended when no further action is necessary, but shorter inspection schedule is warranted to monitor potential problems.
Maintenance/ Repair	Recommended whenever monitoring deems necessary. The Project's Compliance Project Manager would determine and notify the responsible party for maintenance.
Redesign/ Replacement	Recommended whenever monitoring deems necessary. The Project's Compliance Project Manager would determine priority and implement action. Depending on the specific conditions, several phases may be utilized, such as: ***Engineering Evaluation**:* Recommended whenever significant damage or defects are encountered that require an evaluation to quantify the existing condition, determine whether repairs are required, or determine which method of repair is appropriate. ***Special Investigation**:* Recommended to determine the cause or significance of a typical deterioration, before designing repairs. Special analysis, monitoring, or field data gathering is typically required. This may include surveys, soil borings, etc. ***Repair Design Inspection**:* Recommended immediately prior to, or during the preparation of necessary design documents. ***Develop Design Documents**:* Recommended after all evaluations, investigations, and inspections have been completed. Indicates that the field data has been collected and that the watercourse is ready to have repair documents prepared.
Emergency Action	Recommended whenever an unsafe condition is observed. If the situation is life threatening or if significant property damage or environmental damage may occur, the Project's Compliance Project Manager would be contacted immediately.

V. REFERENCES

AECOM

2009a Ridgecrest Solar Power Project Drainage Report. Prepared for Ridgecrest Solar I, LLC. July.

2009b Ridgecrest Solar Power Project Jurisdictional Delineation Report for Regulated Waters of the U.S. and State. Prepared for Ridgecrest Solar I, LLC. August.

2009c Ridgecrest Solar Power Project Application for Certification. Prepared for Ridgecrest Solar I, LLC. Submitted to California Energy Commission. August.

2009d Ridgecrest Solar Power Project Biological Technical Report, Riverside County, California. Prepared for Ridgecrest Solar I, LLC. August.

2010a Ridgecrest Solar Power Project Desert Tortoise Relocation/Translocation Plan. Prepared for Ridgecrest Solar I, LLC. January.

2010b Ridgecrest Solar Power Project Burrowing Owl Relocation/Translocation Plan. Prepared for Ridgecrest Solar I, LLC. January.

2010c Ridgecrest Solar Power Project American Badger Relocation/Translocation Plan. Prepared for Ridgecrest Solar I, LLC. January.

2010d Ridgecrest Solar Power Project Desert Kit Fox Relocation/Translocation Plan. Prepared for Ridgecrest Solar I, LLC. January.

2010e Ridgecrest Solar Power Project Weed Management Plan. Prepared for Ridgecrest Solar I, LLC. January.

ATTACHMENT DR-BIO-65-A

FIGURES

Ridgecrest Solar Power Project Responses to 12/22/09 Data Requests

Figure DR-BIO-65-1 Regional Map

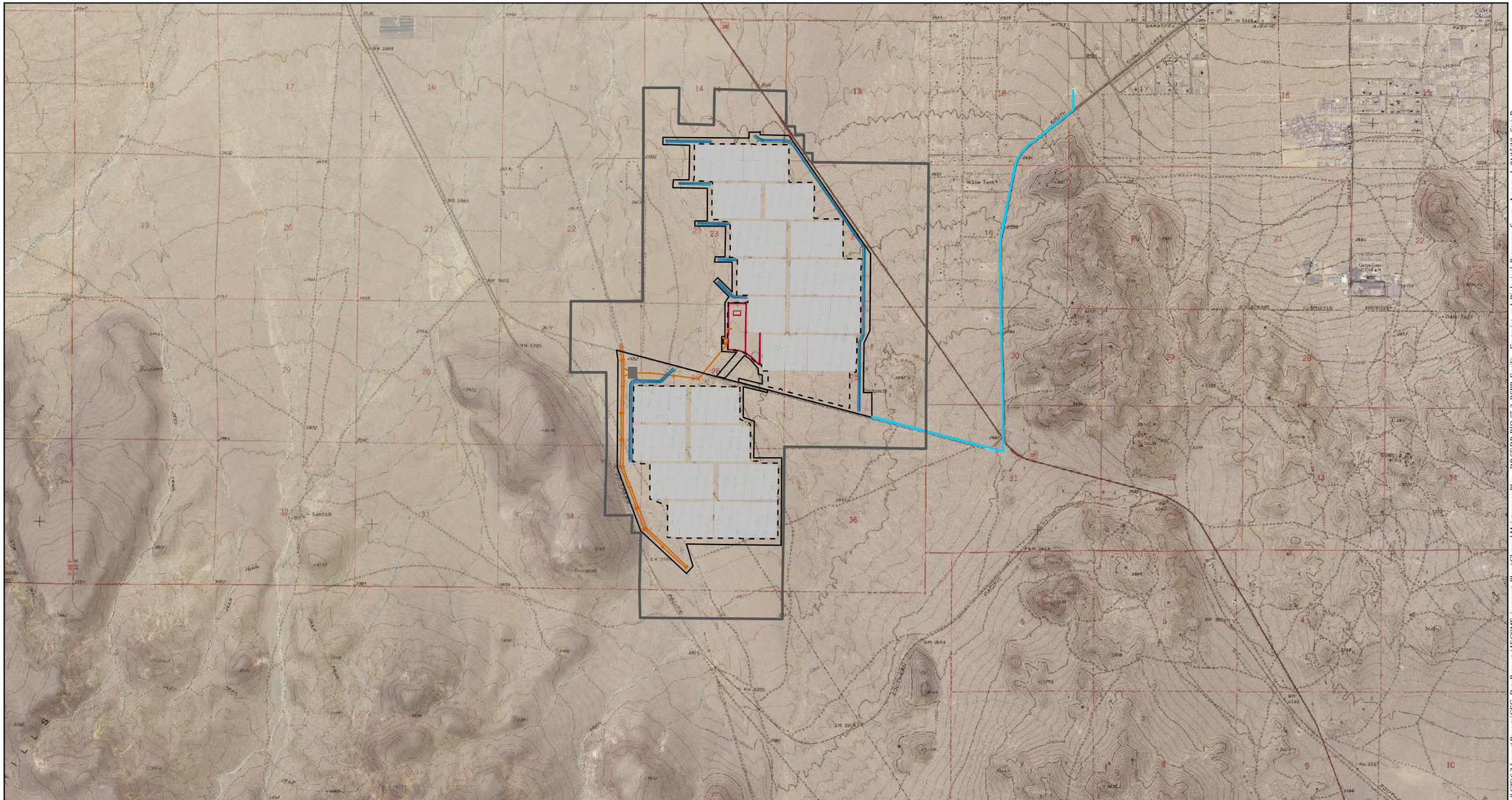
Source: ESRI; AECOM 2009

Solar Millennium

AECOM

Date: January 2010

Path: P:\2009\09080080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\Channel Maintenance Plan - DR 65\DR-BIO-65-1_RSPP_RegionalLocation.mxd, 01/14/10, johnsonaa



Map Location

Legend

- ROW
- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area

Proposed Project Elements

- Drainage Channel
- Transmission Line
- Power Block Area
- Solar Loops
- Switchyard

Source: NAIP 2005; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project Responses to 12/22/09 Data Request

Figure DR-BIO-65-2 Proposed Project Elements and Project Area

Solar Millennium

AECOM

Date: January 2010

Path: P:\60090080080\Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\Channel Maintenance Plan - DR 65\DR-BIO-65-2_RSPP_Facility_Footprint_and_Biological_Resources_Survey_Area.mxd, 01/15/10, SteinB

Map Location

Legend

- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Source: NAIP 2005; AECOM 2010

N W E S

1 inch = 400 feet

0 400 800 1,200 1,600 Feet

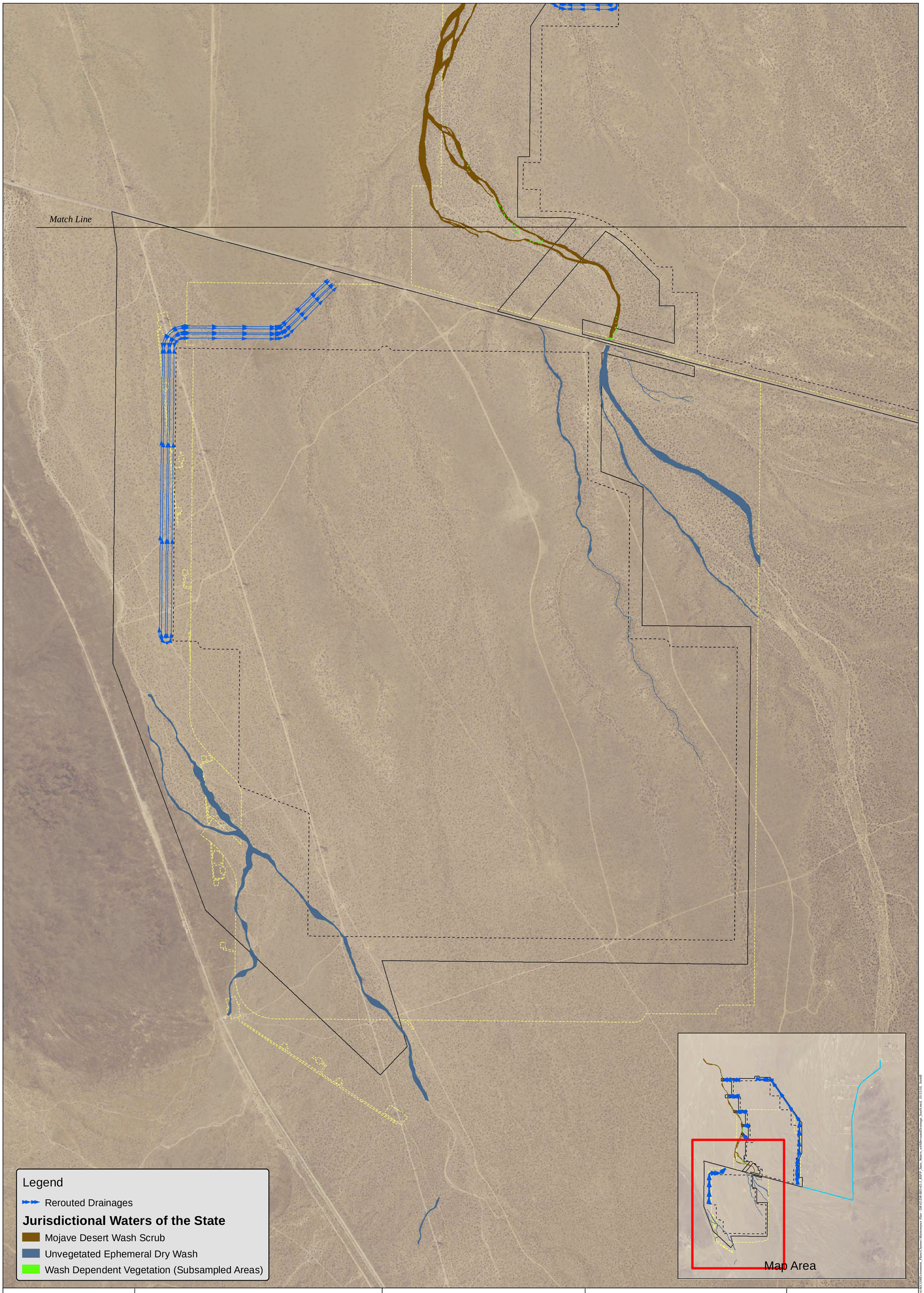
Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-65-3
Jurisdictional Waters of the State and Rerouted Drainages
Northern Extent

Solar Millennium

AECOM

Date: January 2010



Map Location

Legend

- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Source: NAIP 2005; AECOM 2010

N
W E
S

1 inch = 400 feet

0 400 800 1,200 1,600 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-65-3
Jurisdictional Waters of the State and Rerouted Drainages
Southern Extent

Solar Millennium

AECOM

Date: January 2010

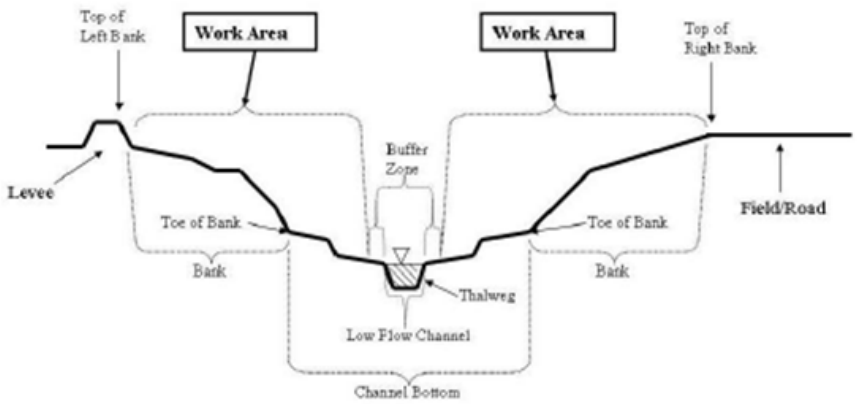


Figure DR-BIO-65-4 - Dry River Channel Conditions

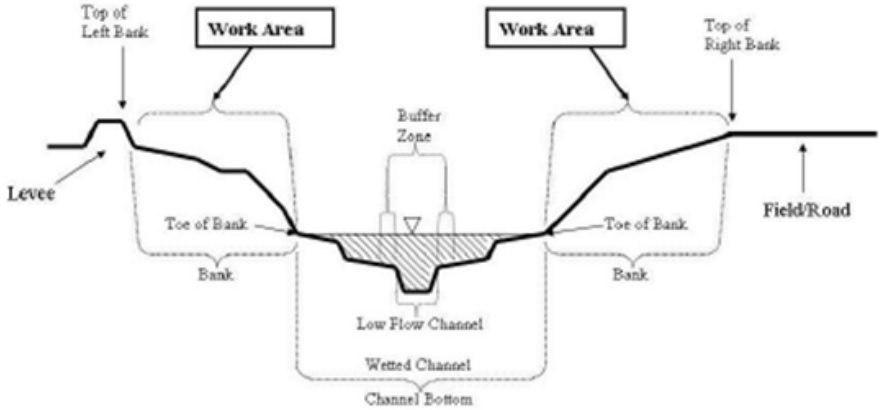


Figure DR-BIO-65-5 - Wet River Channel Conditions

Path: P:\2009\09080080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\Channel Maintenance Plan - DR 65\DR-BIO-65-4and5_Dry-Wet Channel graphic.mxd, 01/07/10, johnsonaa

ATTACHMENT DR-BIO-65-B

SAMPLE MAINTENANCE ACTIVITY REPORT FORM

Maintenance Activity Report

Site Name/Facility_____

Date_____

District Representative_____

Instruction: *This form must be completed whenever any work is done at in a diversion channel. Attach additional sheets if needed.*

Description of Work (e.g., routine, re-occurring; also note general frequency maintenance at this site)	
Location of Activity: West Side Channel _____East Side Channel _____Center Channel_____ Latitude:_____ Longitude:_____	
Maintenance Facility Type: Channel:_____ Culvert:_____ Other:_____	
Describe Ground Disturbing Activities: Length:_____	Is Drainage Lined: ____Yes ____No Notes:_____
Access Via Previously Disturbed Area: ____Yes ____No Access Route: _____	Maintenance Equipment Used:
Vegetation Removal (if applicable): Type of Vegetation Removed:_____ Linear Length (in feet): _____	
Were Erosion Controls Necessary? ____Yes ____No	Describe Interim Erosion Control Measures (if applicable):
Work to be conducted during nesting bird season (Feb-August)? ____Yes ____No	Biologist/Monitor Present? ____Yes ____No Names:_____
Water Quality Sampling Required? ____Yes ____No	**Attach photographs of each maintenance activity work area.*

Additional Maintenance Activity Description:

_____
_____
_____
_____
_____
_____

Describe surrounding land use within work area (assume 500-foot buffer area):

_____
_____
_____
_____
_____
_____

Identify temporary/permanent impacts to habitat by area (acres/square footage) as determined by Biologist:

_____
_____
_____
_____
_____
_____

Reviewer Recommendations (Avoidance, Minimization, and Mitigation Measures:

_____
_____
_____
_____
_____
_____

Additional Comments (Describe unusual conditions, situations or special requirements needed to do the work such as diversion of water, construction staging area, replacement of bank material, presence of utilities, etc.)

_____
_____
_____
_____
_____
_____

ATTACHMENT DR-BIO-65-C

SAMPLE MAINTENANCE ACTIVITY BIOLOGICAL EVALUATION FORM

Maintenance Activity Biological Evaluation Report Form

Site Name/Facility_____

Date_____

Biologist(s) Name_____

Instruction: *This form must be completed for each target maintenance activity area following the completion of the Individual Maintenance Plan (IMP) Report form and prior to any work being conducted. Attach additional sheets if needed.*

Habitat Description (vegetation communities, including adjacent uplands; general habitat quality; anticipated level of disturbance):	
Wildlife Species Observed/Detected During Field Visit (Including Habitat Type)	
Types/Amount of Wetland Vegetation to be Removed (in acres/square feet) Riparian Forest/Riparian Woodland_____ Riparian Scrub_____ Freshwater Marsh/Emergent Wetland_____ Cismontane Alkali Marsh_____ *Arundo donax*-Dominated Disturbed Wetland_____ Other Disturbed Wetland_____ Streambed/Unvegetated Drainage_____	
Types/Amount of Upland Vegetation to be Removed/Disturbed for Maintenance Activity Access:	
Sensitive Plant Species Observed? _____Yes _____No	Sensitive Wildlife Species Observed?_____Yes_____No
Is there moderate or high potential for listed wildlife species to occur in or adjacent to the impact area? _____Yes _____No If Yes, which species? _____	
Could work be conducted during the bird breeding season without the need for a pre-construction nesting survey? _____Yes _____No If yes, provide jusitification:_____	
**Attach photographs of each maintenance activity work area.*	

Maintenance Protocols (list the applicable maintenance protocols based on the biological resources occurring or likely to occur on site):

_____
_____
_____
_____
_____
_____

Habitat compensation requirements (including wetland enhancement, restoration, creation, and/or purchase of wetland credits in a mitigation bank; etc.):

_____
_____
_____
_____
_____
_____

Additional Biologist Recommendations:

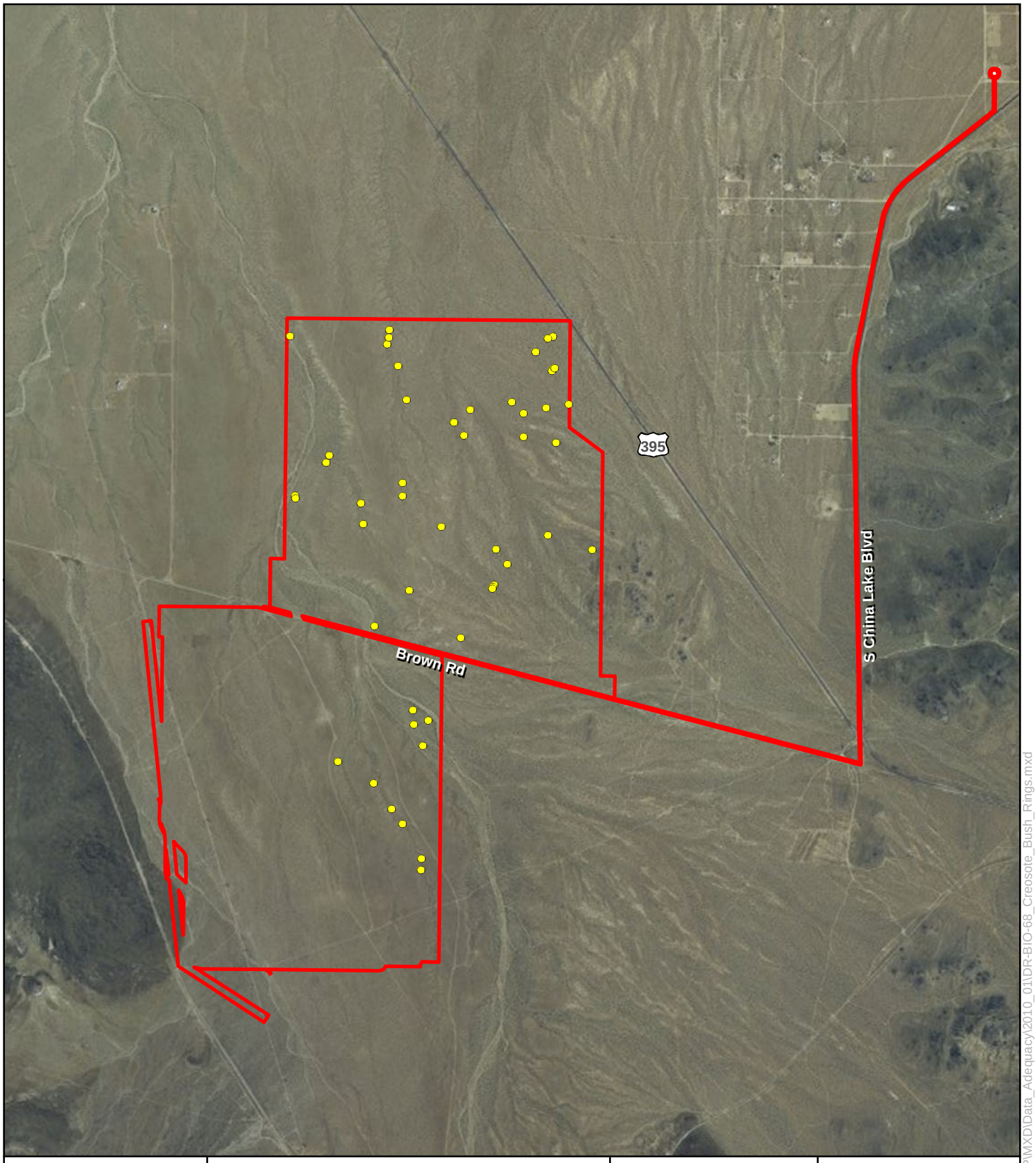
_____
_____
_____
_____
_____
_____

Additional Comments:

_____
_____
_____
_____
_____
_____

Attachment DR-BIO-68

Figure



Map Location

Legend

Disturbance Area

Potential Creosote Bush Ring

1 inch = 0.5 miles

0 0.25 0.5 1 Miles

N W E S

Ridgecrest Solar Power Project

CEC Data Request Figure DR-BIO-68 Creosote Bush Rings

Source: ESRI 2009, AECOM 2009

Solar Millennium

AECOM

Date: January 2010

Y:\Projects\Solar_Millennium\RSPP\MXD\Data_Adequacy\2010_01\DR-BIO-68_Creosote_Bush_Rings.mxd

Attachment DR-BIO-69

Draft Weed Management Plan

DRAFT
WEED MANAGEMENT PLAN
RIDGECREST SOLAR POWER PROJECT
Docket 09-AFC-9

Prepared for:
Ridgecrest Solar I, LLC
1625 Shattuck Ave, Suite 270
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January 2010

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LIST OF ACRONYMS

AFC	Application for Certification
BLM	Bureau of Land Management
Cal-IPC	California Invasive Plant Council
CDFA	California Department of Food and Agriculture
CEC	California Energy Commission
CNPS	California Native Plant Society
COC	Conditions of Certification
EA	Environmental Assessment
ECM	Environmental Compliance Manager
EPA	U.S. Environmental Protection Agency
°F	Fahrenheit
gen-tie	generation tie
GIS	Geographic Information System
GPS	Global Positioning System
HTF	heat transfer fluid
IWVWD	Indian Wells Valley Water District
kV	kilovolt
mph	miles per hour
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
PAR	Pesticide Application Record
PUP	Pesticide Use Proposal
Project	Ridgecrest Solar Power Project
Progress Reports	Long Term Weed Control Progress Reports
ROW	right of way
SCA	solar collector assembly
SCE	Southern California Edison
WCA	Weed Control Area
WMP	Weed Management Plan

I. INTRODUCTION

A. Plan Purpose

This Draft Weed Management Plan (WMP) includes measures to fulfill the conditions of certification (COCs) identified in the Application for Certification (AFC) submitted to the California Energy Commission (CEC) for the Ridgecrest Solar Power Project (RSPP or Project). The COCs include development of a noxious weed control plan to provide (1) monitoring, preventative, and management strategies for weed control during construction and operation of the Project; (2) control and management of noxious weeds in areas temporarily disturbed during construction; (3) a long-term strategy for noxious weed control and management during the operational phase of the Project; and (4) a noxious weed control program for the decommissioning phase.

The purpose of this WMP is to prescribe methods to monitor for, prevent the introduction of, and control the spread of noxious weeds on site prior to, during and subsequent to maintenance and construction activities. The WMP is intended to prevent resource degradation on site caused by noxious weeds and ultimately prevent a net increase in the percentage of the Project infested with weeds. Ridgecrest Solar I, LLC (the Applicant) acknowledges that construction may promote the introduction and spread of noxious weeds on public lands and, therefore, will be responsible for carrying out the methods described in this WMP. The Project boundaries are shown in Figure DR-BIO-69-1 and Figure DR-BIO-69-2. This document was prepared following guidance from other documents, including Bureau of Land Management (BLM) Manual 9015 Integrated Weed Management (BLM 2009a), BLM Weed Prevention and Management Guidelines (BLM 2009b), BLM's Integrated Weed Management Plan and Environmental Assessment for the Bureau of Land Management Ridgecrest Field Office (EA Number CA-650-2005-108) (Harris, 2005), and the Weed Management Plan prepared for the proposed Ivanpah Solar Electric Generating System (SEGS) project. The BLM is currently updating EA Number CA-650-2005-108 and this WMP will be updated as needed to comply with the final version.

B. Goals and Objectives

The goal of this WMP is to provide guidance on the implementation of early detection protocols, define containment strategies, and describe control methods to prevent the introduction and minimize the spread of noxious weeds during maintenance and construction activities. Noxious weeds are opportunistic plants that readily colonize disturbed areas and adversely affect the habitats they invade. Their introduction and spread often results in adverse effects to the environment and may also result in economic impacts. These plant species are able to exclude or out-compete desired native species and their introduction and spread may result in a decrease in overall species diversity. It is important to specify the objectives of a weed management program before Project inception. These objectives need to be consistent with existing and proposed future site conditions, the specific biology of the identified weed species, and environmental context of the Project.

Weed management objectives for the site include the following:

Prevention: Prevent the introduction of invasive weeds to the Project by implementing sound construction and site management strategies.

Monitoring: Monitor the site on a regular basis to ensure early detection and treatment of incipient populations of weeds that may be new to the site and/or area and new populations of weeds already present that may be spreading into new areas.

Eradication: Eliminate all individuals of a particular species within a specified area. This will be the goal for most noxious weed species on the site, and is appropriate where a weed is of considerable economic and environmental concern and the population size is manageable. This method is also important to eliminate incipient populations before they can become problematic.

Suppression: Reduce current infestation density, but not necessarily reduce the total area occupied by the infestation. Suppression is warranted for many widely distributed, high-density weeds where complete eradication is not feasible.

Containment: Prevent infestation expansion and spread, with or without any attempt to reduce infestation density. Containment 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 propagules can be prevented.

Noxious Weed Definition

Various regulatory agencies maintain definitions of "noxious weeds" and how they affect the environment. The California Department of Food and Agriculture (CDFA) Code Section 5004 maintains the most relevant definition to this WMP and defines noxious weeds as, "any species of plant which is, or is liable to be, detrimental or destructive and difficult to control or eradicate" (CDFA 2009). Noxious weeds are typically characterized as non-native plants that aggressively colonize new areas and can grow to dominate native plant communities, if uncontrolled. Noxious weeds could out-compete native vegetation, alter physical or chemical soil conditions, and dominate the landscape to the detriment of native plants and wildlife. Noxious weeds are often quick to colonize disturbed areas, including construction sites, roadsides, irrigated sites, or any other area with altered hydrology, soil structure, or soil chemistry. Due to the climate conditions at the Ridgecrest site, which is characterized by cold winters and a lack of summer moisture, there are relatively few noxious weeds that present problems to range management in the area that the Ridgecrest Field Office manages (Harris, personal communication).

C. Management Roles

The Applicant is ultimately responsible for implementing this WMP. It is anticipated that the Applicant's contractors and other designees responsible for implementing components of this WMP will be subject to the following:

Contractor(s): Contractual language will be included in all construction documents and ongoing maintenance contracts to ensure that all contractors, subcontractors, vendors, maintenance personnel and other parties who perform either construction or ongoing maintenance or repairs at the site abide by and implement the provisions of this WMP. Implementing the construction provisions of this WMP will be a part of construction contracts. Landscape contractors and other specialists will implement specific provisions of this WMP either as subcontractors to the general construction contractor, or through independent contracts with the Applicant.

Construction Manager: The construction manager will have ultimate oversight of the construction contractor to ensure compliance with the provisions of this WMP.

Environmental Compliance Manager: The Applicant will designate an Environmental Compliance Manager (ECM) to provide oversight of construction practices and ensure compliance with the provisions of this WMP. The ECM (including support staff as needed) will be contracted directly by the Applicant and coordinate with the construction manager to ensure contractor compliance with environmental requirements for construction.

Bureau of Land Management: As the administering land management agency, BLM will provide ultimate approval of the contents of this WMP, and compliance oversight of its provisions. BLM will provide timely review of work products including this WMP, modifications or amendments to this WMP, and subsequent reports as required by this WMP.

II. NOXIOUS WEED INVENTORY AND BASELINE CONDITIONS

A list of noxious weeds of concern within the Project area, and therefore discussed in detail in this WMP, was compiled based on a review of a list of noxious weeds ranked by CDFA (CDFA 2007), the California Invasive Plant Council (Cal-IPC) (Cal-IPC 2009), and the U.S. Department of Agriculture (USDA) California list (USDA 2009), as well as those weeds of special concern identified by BLM. In addition, AECOM contacted the BLM Natural Resources Specialist responsible for invasive weed control in the Ridgecrest Field Office to discuss weeds of particular concern in the project area. The main concern expressed was communication with the BLM before chemical treatments occur, as the BLM will need to go through an environmental review process in compliance with The *Final Environmental Impact Statement on Vegetation Treatment on BLM Lands in Seventeen Western States* (USDI 2007). The Natural Resources specialist also stated that relatively few noxious weed problems exist in the area managed by the Field Office.

Weeds currently present at the Project were determined based on a floristic inventory of the Biological Resources Study Area (BRSA) conducted from February to May 2009 during general botanical and special-status plant surveys. Non-native invasive species observed and their ratings are provided in Table DR-BIO-69-1. While these weeds were noted present within the BRSA, their exact locations and extents within the BRSA are not known. A map showing location and extent of noxious weeds and other invasive nonnative plants described in the Project's AFC (AECOM 2009a) will be created during spring and fall special-status plant surveys planned for 2010 and in coordination with the BLM natural resources specialist.

Table DR-BIO-69-1
Non-Native Invasive Species Observed within Biological Resources Study Area

Scientific Name	Common Name	CDFA Rank*	Cal-IPC Rating*	USDA CA Rating*
Bromus madritensis spp. *madritensis*	red brome	-	High	-
Bromus tectorum	cheat grass	-	High	-
Chenopodium murale	nettleleaf goosefoot	-	-	-
Erodium cicutarium	redstem stork's bill	-	Limited	-
Salsoa tragus	Russian thistle	C	Limited	CW
Schismus sp.	Mediterranean grass	-	Limited	-

*** Ranks/Ratings**

CDFA

- C – Generally widespread throughout the state. Action to retard spread outside of nurseries at the discretion of the commissioner. Reject only when found in a crop seed for planting or at the discretion of the commissioner.

Cal-IPC

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

USDA CA

- CW – C list (noxious weeds)

Source: AECOM 2009b. Ridgecrest Solar Power Project Botanical Survey Report, Kern County, California. Prepared for Ridgecrest Solar I, LLC. Berkeley, CA. September.

Of the species listed in Table DR-BIO-69-1, only Russian thistle would meet the definition of noxious weed used in the Ridgecrest Field Office. The distribution of Russian thistle in the Ridgecrest area is mainly limited to roadsides and other disturbed sites and the BLM manages its distribution on an as needed basis such as near facilities.

Mediterranean grass (*Schismus*) is widely spread in the Project area, but is not managed by the BLM because it is considered naturalized and considered to fulfill a function in the ecosystem.

None of the other species included in Table DR-BIO-69-1 are currently actively managed or controlled by Field Office programs other than at very localized locations where they could present a fire hazard, such as dense stands of annual grasses next to buildings or facilities (Harris personal communication). These species will be managed on an as needed basis and in consultation with the BLM Ridgecrest Field Office.

A. Field Surveys

An initial botanical field assessment and focused special-status plant survey of the Project were conducted in support of the AFC (AECOM 2009a) from February to May 2009. Invasive species on the Cal-IPC List: High, Moderate, and Limited (Cal-IPC 2009) were noted when occurring in high concentrations (107.64 square feet) and nearly monotypic stands (AECOM 2009b). No non-native invasive weed species at these densities were noted during surveys in 2009. This observation was confirmed by the BLM natural resources specialist (Harris personal communication).

Reconnaissance level surveys of the portion of the proposed water pipeline that was not covered in the spring 2009 surveys were conducted in fall 2009 (AECOM 2009c). These surveys focused on assessing habitat types to determine potential habitat for special-status species and helped plan 2010 surveys and did not focus on non-native invasive weeds.

Non-native invasive species known to occur onsite are listed in Table DR-BIO-69-1. Additional weeds of concern that are known to occur in the Project vicinity and could be of concern to the Project are listed in Attachment DR-BIO-69-A, along with their Cal-IPC, CDFA and USDA ratings.

B. Preconstruction Survey and Treatment

To prevent adverse effects from noxious weeds resulting from Project implementation, the Applicant will designate a qualified biologist with experience in noxious weed inventory and mapping (herein referred to as an Authorized Biologist) who will survey the site and adjacent buffer for noxious weeds prior to the start of construction. For efficiency, the mapping may be completed in conjunction with other surveys, such as special-status plant surveys that are floristic in nature and cover the entire Project disturbance area. All populations of noxious weeds encountered will be mapped using a Global Positioning System (GPS), and data on the species, location, extent and threat for further spread will be recorded. The data collected will then be evaluated to determine whether pre-construction treatment is necessary and what type of treatment is recommended. This determination will happen in coordination with the BLM natural resources specialist. If preconstruction treatment is necessary, populations will be flagged prior to construction and will be treated according to methods approved in the final WMP.

III. WEED MANAGEMENT AREA/WEED CONTROL AREAS

The Weed Management Area for the Project will include all proposed Project facilities including a 100-foot buffer around the perimeter, the transmission line corridor, a 100-foot buffer on either side of the transmission corridor, and all access roads, including a 25-foot buffer on either side of the roads. Within the Weed Management Area, specific Weed Control Areas (WCAs) will be designated on an as needed basis. Different areas are expected to require specific management considerations depending on a range of factors.

A. Temporary Disturbance Areas

Linear Project features include the new transmission line right-of-way (ROW), the relocated transmission lines, and a water pipeline. Construction staging areas and temporary access roads are also included. In most cases, disturbance at these facilities will be temporary. Transmission line construction will involve some temporary disturbance along with permanent tower placement and an access road for maintenance.

Soil disturbance during construction and temporary use will create habitat well suited to disturbance-adapted invasive weed species. Therefore, measures to minimize the potential for weed introduction by personnel and equipment will be needed. Areas temporarily disturbed will continue to be prone to weed invasion and establishment, and ongoing monitoring and management will be required. Potential areas meeting these criteria are described below. Weed management measures for these areas, including monitoring frequency, target weed species, and control methods are included in this WMP.

Fuel Supply

An auxiliary boiler and heat transfer fluid (HTF) heater will be fueled by propane. Propane will be delivered to the site via truck from a local distributor and stored in an 18,000-gallon above-ground tank. Since the tank and associated fuel distribution pipelines will be constructed within the existing disturbance area, it is not anticipated that additional weed control measures will be required.

Water Supply

Groundwater, provided through the Indian Wells Valley Water District (IWVWD), will be used to supply domestic and industrial water needs (AECOM 2009a). A new 12-inch diameter, approximately five-mile long water pipeline will be installed entirely within public road ROWs. Regular weed monitoring and management during construction will be required. Some areas temporarily disturbed during construction will require weed management.

Transmission Lines and Relocations

The Project will be connected to the Southern California Edison (SCE) transmission system by constructing a new single-circuit three-phase 230 kilovolt (kV) transmission line from the turbine generator that would interconnect to a new nearby switchyard owned by the Applicant. The

transmission line would be approximately 0.75 miles long and located within the disturbance area. Therefore, it is not anticipated that additional weed control measures will be required beyond what is proposed for the disturbance area. However, ongoing vehicle access for construction and regular operations will occur along the new transmission line. This has the potential for ongoing introduction of non-native invasive weed species through soil disturbance and equipment entrance, with ongoing weed management requirements.

Plant site construction will require the relocation of approximately 1.6 miles of existing overhead 115-kV and 230-kV SCE transmission lines that currently traverse the southwestern portion of the Project site. A linear corridor within the Project's ROW but outside the plant fence line, is reserved for the relocated transmission lines. It is anticipated that this corridor will be assigned to SCE as part of the transmission line relocation process. Since the relocated lines will be located within the disturbance area, it is not anticipated that additional weed control measures will be required.

Staging and Laydown Areas

Portions of the main Project site will serve for storing pipe and other construction materials. Although most portions will be permanently developed, any remaining portions will be restored, with the same weed monitoring and management requirements of other temporary disturbance areas.

B. Permanently Developed Areas

The areas described 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 properly managed.

Project facilities include the following:

- Northern and southern solar fields;
- Power block;
- Access road from Brown Road to on-site office;
- Office and parking;
- LTU for bioremediation/land farming of HTF-contaminated soil;
- Warehouse/maintenance building and laydown area;
- On-site transmission facilities, including central internal switchyard; and
- Dry wash rerouting.

Solar Collector Assembly Support Structures

Each solar collector assembly (SCA) will be supported by structures (stands) that connect the parabolic troughs to the drive mechanism. Each array will be supported by multiple individual foundations with a foundation located approximately every 63 feet along the assembly. Foundation design will be based on site-specific geotechnical conditions to ensure that the SCA stands are able to support all loading conditions (including wind loading) at the Project site (AECOM 2009a).

Soil disturbance during construction will create habitat well suited to disturbance-adapted non-native invasive species, and the continual use of the area by personnel and heavy equipment has the potential to introduce additional propagules of these species. The area will require ongoing monitoring and maintenance during construction and all equipment will require cleaning at wash stations as specified below. During operations, equipment and personnel will continue to access the area for heliostat cleaning and other maintenance. Wash water overflow from the ongoing cleaning of heliostat mirrors will provide a water source that would potentially lead to noxious weed establishment and growth. These areas will require continual weed management, and application of pre-emergent herbicides will be implemented to inhibit weed germination and establishment.

Landscaped Areas

Landscaped areas may be established at the administrative building, entrance gate, and at a limited number of other visually prominent locations. Because there may be irrigation application, which could contribute to noxious weed germination or establishment, ongoing weed control would be anticipated.

Roads

Roadsides and the medians of unpaved service tracks are vulnerable to weed invasion. Roads often alter local hydrology; are subject to initial and ongoing disturbance during construction, maintenance, and use; 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 during the operational phase of the Project.

Other Permanent Facilities

Additional areas where conditions are suitable for noxious weed establishment may be present. These may include areas where soils have been cleared of their natural vegetative cover, compacted, or otherwise disturbed; areas where hydrology is altered from its natural conditions, such as due to increased surface flow from adjacent developed areas; or areas with continued vehicle or foot traffic. Ongoing weed management will include monitoring and treatment of these areas on as needed basis.

C. Linear Facilities

Project related linear facilities located outside the Project fence line include a portion of the 12-inch diameter, approximately five-mile long water pipeline, the relocated SCE transmission lines, and the 600-foot long access road from Brown Road to the south solar field. Regular weed monitoring and management during construction will be required. Some areas temporarily disturbed during construction will require weed management.

IV. WEED RISK ASSESSMENT

Consistent with BLM guidelines for weed management, the Applicant will conduct a weed risk assessment for each component of the Project, including construction, operation and closure; all of which will involve soil disturbing activities or the alteration of vegetation. BLM's stepwise risk assessment is available online at: http://blm.gov/ca/st/en/prog/weeds/9015.html and is summarized below.

A. Risk Assessment Process

The primary focus of a risk assessment is on each ground disturbing or site-altering project authorized, funded, or conducted on BLM lands. The Risk Assessment Process must be accomplished by, or closely supervised by, a biologist who has a good understanding of noxious weed ecology. The Risk Assessment Process, per guidelines provided in BLM Manual 9015 Integrated Weed Management (BLM 2009a), is described below.

Pre-Field Review

Review existing information for the subject area.

1. Check local BLM, State/County weed board, and Natural Heritage or Data Conservation Center records to determine if noxious weed species have been sighted in or adjacent to the area. Develop a list of species considered for possible occurrence.
2. Compare the habitat requirements of noxious weed species with habitat known to occur in the area to determine if potential habitat for noxious weed species exists.
3. Determine if a field reconnaissance is needed using the following:
    a. If no noxious weeds are likely to occur within the area, document the results and proceed with the project as planned.
    b. If the presence of noxious weed species or their habitats are within or adjacent to the area is indicated by the pre-field review, conduct a field reconnaissance.
4. Summarize the results, including a list of species considered and any sources of area habitat information. File in the Risk Assessment Report and appropriate National Environmental Policy Act (NEPA) document.

Note: Steps 1 through 3 were completed during preparation of this Draft WMP.

Field Reconnaissance

Use a sampling design in the field reconnaissance sufficient to reliably show that likely areas of noxious weed occurrence were searched at the proper time of year for identification of noxious weed species. Field reconnaissance also includes inspection of potential sawmills, gravel pits, equipment yards, or other areas for the presence of noxious weed species that could be transported onto BLM lands. Take the following actions as necessary as a result of the reconnaissance:

Presence of Class A or B Weeds (CDFA Rank): If class A or B weeds are present:

- Develop and implement management measures to control weeds.
- Install a monitoring system for a minimum of 5 years.
- Determine the risk of introducing noxious weeds.

Presence of Class C Weeds (CDFA Rank): If class C weeds are present:

- Develop and implement management measures to prevent spread of noxious weeds.
- Install a monitoring system for a minimum of 3 years.
- Determine the risk of introducing noxious weeds.

Presence of No Weeds: If no weeds are present or likely to occur:

- Document the results.
- Proceed with the project as planned.

File the Risk Assessment Report and the appropriate NEPA document. Include a list of species for which a reconnaissance was conducted, a description of the survey design, and a narrative of the habitat information developed in the pre-field review. Report all sightings of noxious weed species to the appropriate interested and affected parties including county and/or State agencies, other Federal agencies, and monitoring and oversight groups.

Note: General botanical and special-status plant surveys conducted in 2009 yielded much of the required information and a preliminary list of weed species of concern is included in this WMP. This data will be supplemented with field data to be collected in 2010 and a Risk Assessment Report will be completed at that time.

Risk Determination

The Risk Assessment Report should be used in determining the risk rating of introducing noxious weeds in the area. Document the results, including planned preventative, management, control, and monitoring measures. Include a list of species considered for possible occurrence and any sources of area habitat information and supporting material from the pre-field and field reconnaissance. Summarize the results and file in the Risk Assessment Report and the appropriate document.

Note: To the extent available, this data is included in this Draft WMP and will be updated upon completion of the 2010 field inventory.

Use a Risk rating to describe the relative risk of the potential for noxious weed establishment in the Project area and to serve as a guide for further action regarding project modification or implementation. Calculate the risk rating as follows:

- Risk Rating = Likelihood x Consequence
  - Likelihood = the likelihood that noxious weed species will become established in the Project area.
  - Consequence = the consequence of noxious weed species become established in the Project area.
- Factors. Use the factors in developing the Risk Rating. The factors are:
  - Factor 1: Likelihood of noxious weed species spreading to Project area.
  - Factor 2: Consequence of noxious weed establishment in Project area.

The risk or likelihood and consequence of noxious weeds range from a value of 0 (none) to 100 (high). See below for value ratings and procedural steps for determining the risk rating and monitoring requirements.

Note: This step will be implemented upon completion of the 2010 field inventory.

B. Risk Assessment Factors

Factor 1: Likelihood of Noxious Weed Species Spreading to the Project Area.

- None: Noxious weed species not located within or adjacent to the Project area. Project activity is not likely to result in the establishment of noxious weed species in the Project area.
- Low: Noxious weed species present in areas adjacent to but not within the Project area. Project activities can be implemented and prevent the spread of noxious weeds into the Project area.
- Moderate: Noxious weed species located immediately adjacent to or within the Project area. Project activities are likely to result in some areas becoming infested with noxious weed species even when preventative management actions are followed. Control measures are essential to prevent the spread of noxious weeds within the Project area.
- High: Heavy infestations of noxious weeds are located within or immediately adjacent to the Project area. Project activities, even with preventative management actions, are likely to result in the establishment and spread of noxious weeds on disturbed sites throughout much of the Project area.

Factor 2: Consequence of Noxious Weed Establishment in Project Area.

- Low to Nonexistent (1): None. No cumulative effects expected.
- Moderate (5): Possible adverse effects on site and possible expansion of infestation within Project area. Cumulative effects on native plant community are likely but limited.
- High (10): Obvious adverse effects within the Project area and probably expansion of noxious weed infestations to areas outside the Project area. Adverse cumulative effects on native plant community are probably.

Note: This step will be implemented upon completion of the 2010 field inventory.

C. Risk Rating Factors

Step 1: Identify level of likelihood and consequence of adverse effects and assign values according to the following:

- None – 0
- Low – 1
- Moderate – 5
- High – 10

Step 2: Multiply level of likelihood by consequence.

Step 3: Use the value resulting in Step 2 to determine Risk Rating and Action as follows:

- None (0): Proceed as planned.
- Low (1-10): Proceed as planned. Initiate control treatment on noxious weed populations that get established in the area.
- Moderate (25): Develop preventative management measures for the Project to reduce the risk of introduction or spread of noxious weeds in the area. Preventative management measures should include modifying the Project to include seeding the area to occupy disturbed sites with desirable species. Monitor area for at least 3 consecutive years and provide for control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations.
- High (50–100): Project must be modified to reduce risk level through preventative management measures including seeding with desirable species to occupy disturbed sites and controlling existing infestations of noxious weeds prior to Project activity. Project must provide at least 5 consecutive years of monitoring. Project must also provide for control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations.

Note: This step will be implemented upon completion of the 2010 field inventory.

V. MONITORING AND SURVEY METHODOLOGY

A. Weed Identification

Monitoring and removal of weeds requires skill and training in plant identification. Training in plant identification and field manuals with photographs of native desert plants and of common weeds will be provided to all field staff including biological monitors, weed abatement contractors, plant operators and staff, and construction workers.

- The University of California digital library at http://www.calflora.org/ contains species information and an extensive photo collection.
- The Cal-IPC website at http://www.cal-ipc.org. This website contains an invasive plant database, plant profiles, and extensive other information on invasive plants and control.
- The USDA National Invasive Species Information Center at http://www.invasivespeciesin fo.gov/. This website 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 (CNPS) 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, and can be accessed at http://www.weedcenter.org/.
- The Mojave Weed Management Area maintains a website with profiles of problem weeds in the Mojave Desert and management options (http://www.mojavewma.org/index/php.)
- *Weeds of the West* by Tom D. Whitson is a valuable resource and available at many online book suppliers. This source is currently used in the Ridgecrest Field Office.

B. Survey and Monitoring Methodology

Surveys and monitoring will ensure timely detection and prompt eradication of weed infestations, which are essential to a long-term strategy for weed management. The methods outlined below refer to surveying and monitoring during construction and operation. For preconstruction surveys and treatment, please refer to Section II.A above.

Construction Areas

The ECM will oversee biological monitors who will be present during site clearing and construction activities. Biological monitors will be responsible for inspecting all construction areas, identifying the presence of noxious weeds, and inspecting equipment cleaning facilities for weed seed removal. The ECM will be responsible for prescribing management activities consistent with this plan when weeds become established. Monitoring of all construction areas will be conducted daily, including access routes, and will consist of walking or driving slowly over construction areas and observing for seedlings of exotic species. This will continue on a daily basis until ground-disturbing construction activities are completed. Semi-monthly monitoring will continue thereafter.

General Operations and Monitoring

General site monitoring of the operating facility will be conducted by grounds personnel on an ongoing basis. Weed control will be conducted, as needed, by grounds personnel, at a minimum of every other week during the growing season (March through August), and once a month otherwise. Grounds personnel will be trained to identify non-native invasive weed species and native vegetation.

Known Infestation Areas

Where weed infestation occurs, and treatment is implemented, the area will be targeted for ongoing monitoring to ensure that treatments are effective and that complete eradication or the desired level of control has been achieved. Visits to known infestation areas will continue until noxious weeds in the area are controlled.

Database and Mapping

Weed mapping is an important tool in effective weed management programs. Map inventories of noxious weeds can provide useful information on the species present and the extent of the infestations. They can also serve as the basis for monitoring programs. The information may be used to set priorities for which weed species to treat first and what specific infestations to target. Weed surveys will be conducted annually at the time of year when target weed species would be present and identifiable. Casual observances made by field personnel will also be recorded and tracked, as appropriate. Field personnel will be trained to identify weeds of concern.

A noxious weeds database with data on species, detection date, growth stage, infestation extent, treatments implemented, results of treatment, and current status will be maintained during the construction and operation phase of the Project. A geographic information system (GIS) will be used to map and store data. The priority of infestation areas to be treated will be established based on species, vulnerability of the site to invasion, growth stage, and effectiveness of treatment. Also included will be areas mapped as vulnerable to weed invasions. Vulnerability will be assessed on the following: (1) availability of weed propagule sources, such as along roadsides or near soil stockpiles:(2) areas disturbed, such as through land clearing and earthwork; or (3) areas near known prior or treated weed infestations or existing infestations that are out of the managed area.

VI. WEED MANAGEMENT GUIDELINES

A. Species Descriptions and Management Strategy

Descriptions of the more common or troublesome noxious weeds occurring or potentially occurring at the site are provided in this section, along with the basic weed management strategy applicable to each. Attachment DR-BIO-69-A provides a complete list of the weed species of concern in this area, and Table DR-BIO-69-2 (Harris 2005) provides additional information on management strategy and control methods for all observed and potentially occurring noxious weed species. Management strategies must encompass not only eradication, but also identify the means of eradication and the plant species to be eradicated.

The following list provides brief descriptions of the weed species of particular concern at the site:

- Russian thistle (*Salsola tragus*): This species is know from the project area, was observed on site, and is actively managed by BLM as necessary. It will be eradicated form the project site in consultation with the BLM Ridgecrest Field Office.

New Weeds

Weeds not identified above or included in Table DR-BIO-69-1, or previously reported for the area or anticipated, could colonize the Project or invade facilities, both during construction and operation. During construction, the ECM will be required to regularly update the list of potentially noxious weeds, and identify any new potential threats. This will include developing a management strategy and management methods appropriate to the plant species and the nature of any potential invasion. Similarly, the facility plant manager or appropriate designee during operations will be required to continually update the potential noxious weed list and provide monitoring and management appropriate to any new species.

B. Preventative Measures

Prevention is the first measure that will be implemented to manage the spread of non-native invasive species. A variety of techniques have proven effective for managing existing occurrences of non-native invasive species, including mechanical, biological, and chemical methods. The most appropriate management action will be chosen based on the weed species, the physical characteristics of the Project, and economic and social considerations. Monitoring and rapid implementation of control measures will be performed to ensure early detection and eradication for weed invasions.

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 and treating potential sources on or near the Project prior to ground disturbance.

- Limiting disturbance areas during construction to the minimal area required to perform work and limiting ingress and egress to designated routes.
- Maintaining vehicle wash and inspection stations and closely monitoring the types of materials brought onto the Project 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 the most effective long-term strategy to avoid weed invasions.

Some guidelines for preventing weeds from entering public lands and spreading to new un-infested areas are listed below (BLM 2009b).

- Preventing introduction through contaminated seed, feed, mulch, gravel or fill;
- Preventing introduction through movement of animals, people or machinery;
- Preventing introduction through minimizing disturbance; and
- Preventing introduction through proper planning. All of these methods have been considered during preparation of this Draft WMP and will be implemented during construction, operation and decommissioning of the project.

Construction

Worker Environmental Training

Noxious weed management will be incorporated as a part of mandatory Project environmental training for all contractors or related personnel entering the Project during construction. This will include all contractors, subcontractors, inspection personnel, construction managers, construction personnel, and individuals bringing vehicles or equipment onto the Project. Training will include instruction on weed identification and a training module on the impacts of noxious weeds on agriculture, livestock, wildlife, and fire hazard. Impacts of noxious 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 desert ecosystem. The measures to prevent the spread of noxious weeds in areas currently un-infested, and controls on their proliferation when already present, will also be explained.

Wash Stations

To prevent the spread of weed species into new habitats, wash stations will be set up in staging areas to remove any dirt or mud that could be attached to construction vehicles and contain weed seeds. Wash station locations will be determined during final design, but will be located at ingress points to construction areas. Vehicles entering from offsite locations will be required to stop for cleaning. Heavy equipment entering the Project on trailers will also be required to be washed prior to being operated onsite. The Contractor, with ECM oversight, will ensure that

vehicles and equipment are free of soil and debris capable of transporting noxious weed seeds, roots, or rhizomes before the vehicles and equipment are allowed to use access roads. Vehicles will be reasonably dry before leaving the wash station. Some noxious weeds, such as Sahara mustard require water for the scarification process and therefore vehicles leaving the station wet could promote recruitment of species of specific concern to the BLM, such as Sahara mustard.

Wash stations will be located away from sensitive biological resources, and will be constructed with either a concrete wash pad, or a completely cleared and compacted soil or gravel pad. Silt fencing, weed-free certified hay bales, or other means of trapping wash water sediment and seeds will be installed around the perimeter of wash stations.

Vehicles will be washed with high-pressure water equipment before entering the Project area. The wash down will concentrate on tracks, feet, or tires and on the undercarriage, with special emphasis on axles, frame, cross members, motor mounts, and on and underneath steps, running boards, and front bumper/brush guard assemblies. Vehicles or heavy equipment will be required to remove all caked on mud and debris before entering the Project area. Vehicle cabs will be swept out and refuse will be disposed of in waste receptacles. Sediment accumulated from washing will be shoveled out daily and placed in a sealed container for disposal in an approved landfill. If removal requirements exceed the capability of the wash stations, equipment will be washed elsewhere before being allowed on the Project.

Project workers will also inspect, remove, and dispose of weed seed and plant parts found on their clothing and personal equipment. The product will be bagged and disposed of in a dumpster for deposit in local landfills. When vehicles and equipment are washed, a log will be kept stating the location, date and time, serial number and type of equipment, and methods used. The crewmember that washed the vehicle will sign the log. Written logs will be included in the monitoring reports.

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 noxious weed management control measures have been implemented. Contractors will avoid or minimize all types of travel through weed-infested areas. Immediate control measures will be implemented as described in the sections below.

The Contractor will begin Project operations in weed-free areas whenever feasible before operating in weed-infested areas, until the ECM has verified completion of weed treatments within weed-infested areas.

Site Soil Management

The Contractor will limit the size of any vegetation and/or 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 as practicable.

Soil conditions that promote weed germination and establishment include soil excavation/disturbance, vegetation removal, soil compaction, loss or removal of topsoil, introduction of any chemical compounds, including fertilizer, and soil stockpiling.

In areas where 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 noxious weed seeds, roots, or rhizomes. During reclamation, the Contractor will return topsoil and vegetative material from infestation sites to the areas from which they were stripped.

Weed-Free Products

The Contractor will ensure that straw or hay bales used for sediment barrier installations are obtained from certified sources that are free of primary noxious weeds. Additional products such as gravel, mulch, and soil, may also carry weeds. Such products will be obtained from suppliers who can provide weed-free certified materials. Where feasible, mulch will be generated from native vegetation cleared from the Project itself. Soil will not be imported onto the Project.

Weed-Free Seed

If seed is purchased from commercial vendors for Project restoration activities it will be labeled in compliance with the relevant provisions of the CDFA Code. In addition to having the correct label, the seed will be required to be free of noxious weeds and the label should so state. Preferably, seed should be collected as a part of the restoration contract from adjacent areas, which provides the additional benefit of ensuring local genetic stock. No special-status plant species were detected within the BRSA during 2009 surveys. However, if special-status plant species are found during future surveys, to mitigate for potential loss of special-status plant species, seed from target species will be collected from onsite sources (AECOM 2009a).

Operations

Facility Staff Training

Noxious weed management will be incorporated as a part of mandatory training for groundskeepers and maintenance personnel. Training will include weed identification and the impacts on agriculture, livestock, wildlife, and fire frequencies. The importance of preventing the spread of noxious weeds in areas currently un-infested, and controlling the proliferation of weeds already present, will also be explained.

Infestation Containment and Control

During operations, areas of concern will be identified and flagged in the field by grounds keepers. The flagging will alert personnel that weeds are present and will prevent access into these areas until noxious weed management control measures have been implemented. Immediate control measures will be implemented as described below.

Early Detection and Rapid Response

The best time to eradicate noxious weeds is before they get established in an area. Early detection of newly introduced weeds is the best way to prevent establishment. These early detection and eradication efforts should be likened to fire control: early spotted fires are quickly extinguished before they can spread. Early detection programs will include:

- **Weed Identification and Training Sessions** - These will be offered for field employees and will utilize information obtained from local Agricultural Commissioners, Cooperative Extension agents, and other knowledgeable individuals. Suitable weed identification handbooks will also be provided.
- **Weed Location Mapping** - A map of the area will be located in all Field Offices for the field employees to document observations of noxious weeds. Documented sites will be verified by a qualified professional. Encouragement and incentives will be offered to staff members and others who participate in identification and reporting of noxious weeds. Once new infestations are verified, quick response is required in order to eliminate the weed before it spreads. For those areas with ongoing control efforts, locations will be entered into GIS.
- **Determination of High Priority Areas** - Certain areas may be more vulnerable to disturbance and weed invasion, and will be considered high priority areas. These areas will be clearly marked on all weed maps and will be inventoried whenever possible. Cooperate with adjacent landowners and other agencies in order to coordinate early detection efforts around high priority areas.

Project Closure

Control of noxious weed establishment will be a central goal of the Conceptual Decommissioning Plan, which will be provided at a later date.

C. Eradication and Control Methods

Management strategies must encompass not only eradication, but also identify the means of eradication and the plant species to be eradicated. Eradication is usually only feasible for small populations of high priority species due to the large amount of resources required for this level of control. Weed infestations are typically targeted to a level of control that is located somewhere between eradication and elimination of seed production (Gershman & Lane 2000).

Table DR-BIO-69-2 shows summary of proposed control methods.

Table DR-BIO-69-2 Summary of Proposed Control Techniques

Technique	Notes
Cut Stump (Chemical)	Effective on all plants over 3/8” diameter
Foliar spray(Chemical)	For dense stands of small plants
Wipe Method (Chemical)	For dense stands of small plants and regrowth on perennial plants: Similar to foliar spray, but more selective as only target plants aerial parts hit.
Weed Wrench™ or Root Jack™	Works on plants up to 3” with larger version. Will pull up soil on larger plants
Hoe and shovel	May require bagging and removing complete plant with seeds.
Hand Pull	Only works on small <3/8” salt cedar in moist soil

Unacceptable Weed Removal Methods

Tilling

Tilling, or the turning over of soil, is a weed-control practice used on agricultural lands that may be appropriate for agriculture. However, this method is ineffective and inappropriate in desert landscapes, and will not be attempted. Within desert landscapes, 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 is sometimes used to reduce weed cover and thatch late in the growing season, typically after annuals have matured. This method does not remove weeds; it merely cuts back the thatch that develops during the growing season. It is sometimes used as a fire control method, but will result in proliferation of weed seed and aggravation of weed infestation problems. Mowing is problematic for the following reasons: (1) Mowing would severely damage existing native plants, including small individuals that might or might not be visible at the time of mowing, but could be pushing their way through the canopy as they mature; (2) 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 seedbank and ensuring a robust crop of weeds in subsequent years; and (3) Native ground and shrub nesting birds could use the Project, and breed onsite between February and August. The federal Migratory Bird Treaty Act (16 U.S. Code 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, attempt to take, capture, or kill any migratory bird, any part, nest, or eggs of any such bird.” Hence, any mowing activity during the breeding season would potentially violate this federal law.

Physical Removal of Weeds

A number of the targeted weed species lend themselves to manual/hand treatments in certain circumstances. Small infestations of annuals and young seedlings can be effectively eliminated or controlled by this technique. Physical control methods range from manual hand pulling of weeds to the use of hand and power tools to uproot, girdle, or cut plants. The Weed Wrench™ and Root Jack™ are lever arms with cam devices that secure stems; they are found in nurseries and may be used to pull out woody shrubs such as tamarisk or Russian olive. For localized weed control, this is the most effective method. Removal will not involve extensive digging (less than 3 inches deep). Any targeted weed could be removed from the Project at any time if digging is not involved. In addition, tools could be used at any time on disturbed sites such as roads, parking lots, trail heads, active wash bottoms and in desert washes where minor digging may be necessary. All areas at facilities would also be subject to hand treatments and the use of hand tools. No manual/hand treatment work would occur on cultural resources sites without approval from a qualified archeologist.

This effort will be focused on weed species that have a single-root mass, facilitating easy removal. Hand-pulling is less effective in large areas and with weed species that spread through an underground root system (e.g., Bermuda grass).

Hoeing and weed whipping can be employed to control weeds in small areas. However, care must be employed when using these methods adjacent to native plants, so that native plants are not damaged. Hoeing or weed whipping must only be employed before the seed has set, 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 will not be used on weeds approaching maturity, as seeds can mature and be released on cut plants. Hoed plant material will be bagged and removed.
- Weed whipping can be used for weed removal in limited upland areas with herbaceous plant covers; however, it will 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 will be bagged and removed.

Chemical Methods for Weed Removal

Herbicide applications are a widely used, effective control method for removing infestations of invasive weed species. However, inadvertent application of herbicide to adjacent native plants must be avoided, which can often be challenging when weeds are interspersed with native cover.

Permitting and Regulatory Requirements

Before application of herbicide, contractors will be required to obtain any required permits or certifications from state and local authorities. Current requirements call for county applicator permits and a BLM Pesticide Use Permit. In addition, a certified applicator needs to be present.

If pesticides are applied to aquatic plants in waters of the U.S., then a filing under the state general National Pollutant Discharge Elimination System (NPDES) permit (Water Quality Order No. 2004-0009-DWQ) would be necessary. BLM requires the weed coordinator to be currently certified as an Integrated Pest Management and Pesticide Applicator. This training is provided by BLM in course #9000-1 (Certification Integrated Pest Management and Pesticide Application Certification). This certification is good for 3 years. In addition, tailgate training in pesticide handling will be provided to crews. Permits may contain additional terms and conditions that go beyond the scope of this plan. Only a State of California and federally certified contractor, who is also approved by BLM, will be permitted to perform herbicide applications. All herbicides will be applied in accordance with applicable laws, regulations, and permit stipulations. Only herbicides and adjuvants approved by the State of California and Federal agency for use on public lands will be used within or adjacent to the Project.

The *Final Environmental Impact Statement on Vegetation Treatment on BLM Lands in Seventeen Western States* lists 10 herbicides acceptable for use on BLM lands (USDI 2007). Guidelines for the use of chemical control of vegetation on BLM lands are presented in the *Chemical Pest Control Manual* (BLM 2009a.). These guidelines require submittal of a pesticide use proposal (PUP) and pesticide application records (PAR) for the use of herbicides on BLM lands. Sample BLM forms required for the submittal of a PUP and PAR are included in Attachment DR-BIO-69-B and Attachment DR-BIO-69-C, respectively.

The Applicant will submit PARs for each use of herbicides on BLM lands within 24 hours of application. The occurrence of noxious weeds within the Project footprint, or where the weeds occur, will be reported to the BLM district office. The appropriate weed control procedures, including target species, timing of control, and method of control, will be determined in consultation with BLM personnel. The Applicant will be responsible for providing the necessary trained personnel or hiring a contractor to implement the required weed control procedures.

If during the performance of any weed control effort covered under this document, any archaeological or cultural values are discovered, the control effort will be immediately suspended until a cultural clearance can be obtained from a qualified Archaeologist. If target species are located on a cultural resource site, then control at that Project will be deferred until the significance can be determined and appropriate mitigation instituted. As an example, trees planted around an old mining cabin might be left as part of a project.

Types of Herbicides

Herbicides may be characterized as pre-emergent, post-emergent, selective and nonselective. A pre-emergent herbicide is one that generally controls un-germinated seeds by inhibiting germination. Post-emergent herbicides are generally lethal to emerged plants. A few herbicides have both pre- and post-emergent activity. Herbicides can be selective or non-selective. If an herbicide is selective, it will have activity on some species of plants and not others, often distinguishing between monocots (grasses) and dicots (broadleaf plants). 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, stolens, 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 will not be applied in temperatures above 90 degrees Fahrenheit (°F). All of 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 (Rodeo™, Roundup™, and Accord™) 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 will not be applied when the temperature exceeds 90°F.

The U.S. Environmental Protection Agency (EPA) 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. The EPA states that it is minimally toxic to birds, fish, aquatic invertebrates, and honeybees (EPA 1993).

Proposed herbicides for the species that have been found in the BRSA are included in Table DR-BIO-69-3. The herbicides proposed for use do not require certification for application. However, BLM policy requires the direct supervision by a Certified Pesticide Applicator during application of all herbicides on public lands. Additionally, the BLM will be contacted before chemical treatments occur, as the BLM will need to complete an environmental review process as described in Section II. All treatments would be supervised or overseen by a certified BLM pesticide applicator knowledgeable in plant identification and familiar with proper herbicide application techniques. Spray application of herbicides would occur not when winds are likely to cause drift onto sensitive species or water. In addition, herbicides would not be applied when rain is anticipated to avoid washing the herbicide off the target plant into the soil, onto non-target plants or into waters.

Application and Handling

The following general precautions will be implemented for pesticide application: It is the responsibility of the pesticide user to observe all directions, restrictions, and precautions on pesticide labels. It is dangerous, wasteful, and illegal to do otherwise.

- Store all 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 illegal residues or injury to plants and animals.
- Use pesticides carefully to avoid drift or contamination of non-target areas. Surplus pesticides and containers will 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 any action that may threaten a rare, threatened, or endangered species or its habitat.
- Visual observation will be made prior to any herbicide application to ensure the Project does not contain any sensitive wildlife species and the target plants do not contain active avian nests. If sensitive species are encountered then a mitigation plan will be developed that could include alternate timing or techniques. If an active nest is encountered, target plant locations would be recorded, and treatment would be postponed until after the nest is abandoned.
- The rate of application is determined by the label directions. Method of application would conform to label directions. Each treatment effort will be documented on appropriate state and BLM forms included as Attachment BIO-DR-69-B and Attachment BIO-DR-69-C.

Table DR-BIO-69-3 Proposed Herbicides

Species	Herbicide Trade Name	Herbicide Common Name	Notes[1]
Bromus madritensis ssp. *madritensis*	Roundup	Glyphosate	Physical removal techniques may be preferred for this species.
Bromus tectorum	Roundup	Glyphosate	Physical removal techniques also may be used, if needed.
Chenopodium murale	Roundup	Glyphosate	Physical removal techniques may be preferred for this species.
	Garlon, Pathfinder	Triclopyr	
Erodium cicutarium	Roundup	Glyphosate	Physical removal techniques also may be used.
Salsoa tragus	Roundup	Glyphosate	Physical removal techniques also may be used.
Schismus sp.	Roundup	Glyphosate	The small surface area of leaves can make application of herbicide problematic; therefore, if needed, physical removal techniques may be preferred.

1. Other herbicides may be proposed based on the final version of EA Number CA-650-2005-108 or as requested by the BLM Natural Resources Specialist at the Ridgecrest Field Office

Sources: USDI 2007, Harris 2005, and Harris pers. comm..

Cut Stump technique

This technique involves cutting the trunk of the target plant about 3-6 inches from the soil surface. This would be done with hand or mechanical tools such as chainsaws, clearing saw, axes, hand saws and/or hatchets. The debris would be stacked to provide wildlife cover. Immediately following cutting (within 15 minutes), the remaining stem or trunk would be painted or hand sprayed with the herbicide following label directions. The herbicide would be applied with hand equipment such as back pack sprayers, small tank sprayers (2-3 gallon) or small hand sprayers. No powered sprayers would be used. The herbicide is applied at low pressure and is allowed to cover the top of the cut stump and dribble down the sides of the stump. With this technique, only the target plants are hit with the herbicide. Where the target plant occurs as large numbers of small >3/8” diameter dense stands where a clearing saw is used, a more general spray is used to wet the tops of the cut stems. To avoid the potential impacts to insects, amphibians and fish species, the use of small surface area spray application equipment shall be used as well as the use of the smallest possible amount of herbicide at any one time. In addition, herbicides shall be applied with nozzle tips that produce large droplets (not mist) and spray pressures no greater than are required to obtain adequate coverage. Spray application of herbicides shall not be applied when winds are likely to cause drift onto sensitive species or

water. Herbicide application to target species would occur from early spring when target plants are at high moisture contents through late fall when the target plants are translocating their nutrients to the roots for winter storage. A strong sap flow enhances the absorption of herbicides and translocation of the herbicide to the root system.

Triclopyr, sold under the trade name of Pathfinder and "Garlon 4," or Glyphosate, sold under the trade names of "Rodeo" and “Aquamaster” (Rodeo is the old name for Aquamaster) are proposed to be used. Garlon 4 and/or Pathfinder herbicides would be used to treat species such as terrestrial tamarisk, which is found in upland areas. Species adjacent to open water, such as tamarisk (within 10 feet) would be treated with Aquamaster (Rodeo). The rate of application would be determined by the label directions. Method of application would conform to label directions. Pathfinder and Aquamaster are both premixed and would be applied straight to the target species. A 100 percent solution would be applied to freshly cut stumps, or the basal bark, as prescribed under the Cut Stump or Basal Bark methods. An agriculturally-approved marking dye would be added to the herbicide solution to aid in identifying treated individuals. This should prevent double application and missing any target plants. This technique could be used for species such as tamarisk and alanthus. Chainsaws and other motorized equipment to cut targeted weed species would not be used except where plant diameter, density and/or size of infestation require such use to be practical. At this time, the use of such equipment is anticipated only if tamarisk infestations are found that are unusually thick and large.

Foliar Spray technique

Foliar spraying would be used to control weeds in several situations including treatment of resprouting, treating plants that are too small to treat with cut stump methods. There would be some degree of re-sprouting from the remaining stumps and root systems of the targeted plants initially treated with the "cut stump" method, and the establishment of pioneer plants as unoccupied habitat becomes available. Herbicide application is required to completely kill the remaining root system to prevent or prohibit re-growth from the remaining stump and surface roots. The method of treatment for re-sprouts and pioneer plants would be foliar application of herbicide to plants less than six feet tall. When treating re-sprouts, there is a need to wait several years until the re-sprout has enough surface area to absorb sufficient herbicide to kill the root system. Control of a number of perennial herbaceous weeds is only accomplished by herbicide applications which kill the extensive root systems. Telar is not currently approved for use on BLM lands in California and is not proposed for use in this WMP.

With this technique, an herbicide would be applied with hand equipment such as back pack sprayers, small tank sprayers (2-3 gallon) or small hand sprayers. No powered sprayers would be used except where power sprayers could be used. To avoid the potential impacts to insects, amphibians and fish species, the use of small surface area spray application equipment shall be used as well as the use of the smallest possible amount of herbicide at any one time. In addition, herbicides shall be applied with nozzle tips that produce large droplets (not mist) and spray pressures no greater than are required to obtain adequate coverage. Spray application of herbicides shall not be applied when winds are likely to cause drift onto sensitive or non-target

species or water. Herbicide application to woody target species would occur from early spring when target plants are at high moisture contents through late fall when the target plants are translocating their nutrients to the roots for winter storage as a strong sap flow enhances the absorption of herbicides and translocation of the herbicide to the root system. Herbaceous weeds would be treated in the spring and early summer.

Wipe Method

This technique uses a carpet like fabric pad or roller attached to a sprayer in place of the spray tip to apply the herbicide to the target foliage. In use, the herbicide is allowed to flow onto the pad/roller and is applied to the target foliage by brushing thereby transferring the herbicide to the foliage. Application sites, target species, herbicides, season of use and most safety precautions are the same as the foliar spray technique. This technique differs in that there is no spray to drift. Also there is no overspray with impact to non-target species.

Monitoring and Evaluation

Once treatments are initiated, monitoring will be initiated to collect data on percent kill, survival, damage to non-target species, reinvasion of weed species, reintroduction of native species and the need for re-treatments. The monitoring will be conducted yearly until the weeds are eradicated and then would be checked every 2 to 5 years. Treatments over or adjacent to water would include monitoring for water quality as specified in the California State guidelines and BLM guidance.

Limitations

Herbicide applications must follow EPA 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 noxious 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 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.

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.

Herbicide Spills and Cleanup. Reasonable precautions will be taken to avoid herbicide spills. In the event of a spill, immediate cleanup will be implemented. 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), and
- detergent.

Response to herbicide spills will vary with the size and location of the spill, but general procedures include the following:

- BLM 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, and
- transporting the spilled pesticide and contaminated material to an authorized disposal Project.

Controlling Post-emergent Herbaceous Vegetation. To control herbaceous weedy vegetation, implement as follows:

- Apply a foliar application of Rodeo™ on each plant at a minimum rate of 2.5 percent (plus 2 percent by volume [V/V] of nonionic surfactant).
- 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 gloves, masks, and long sleeves as protection from chemical injuries.
- Leave sprayed vegetation undisturbed for 7 days until visible effects of herbicide application are present consisting of wilted and brown foliage and disintegration of root material. The ECM will determine when adequate time has been allowed for this.
- Remove all treated plant material using a flail mower or other appropriate means, and dispose of offsite at an appropriate landfill site.
- Cover all loads while removing vegetation using a tarpaulin.

Controlling Woody Vegetation. Woody vegetation will be controlled using cut and paint method of removal. To control woody vegetation, implement as follows:

- Cut sprouts or woody stems to a height of 12 inches or less above ground and remove all aboveground debris for disposal at a suitable landfill.
- Apply Round-Up™ or Rodeo™ at a 100 percent rate to the cut sprout within 2 minutes of cutting the stem.
- Apply Rodeo™ in areas that are in immediate contact with wetlands and/or other water bodies; Round-up™ will be used elsewhere. The ECM will determine the appropriate herbicide to use at each location.
- Cover all loads while removing vegetation using a tarpaulin.
- Apply follow-up foliar applications as described in the previous section to stem re-growth that occurs after initial control effort.
- Continue monitoring cut stems for as long as necessary to ensure complete mortality.

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 re-sprouts from root crowns, which have been cut, rhizomes, or other material. The following situations may require use of pre-emergent herbicides:

- Areas that have repeated weed problems with annual plants, with evidence of a robust weed seed crop in the seed bank, will be sprayed with pre-emergent herbicides during appropriate pre-germination periods.
- Areas beneath the arrays, because they will receive overflow of wash water, can be particularly vulnerable to weed infestations.
- Areas surrounding the developed plant facilities, where vegetation is not planted, could benefit from pre-emergent treatments if weed problems are persistent.

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.

D. Implementation Schedules

Implementation schedules will be sufficiently flexible to take advantage of the variable precipitation regime of the eastern Mojave Desert.

E. Employee Education and Training

Educating personnel as well as the local landowners and users is essential for an integrated approach to weed prevention and management. The more knowledge exists about weed issues, the more support there will be for weed control efforts. It is important that all levels of management be aware of the weed problem. General meetings that focus on noxious weeds and feature weed videos are good ways to spread the word. It may be useful to have some brief identification training at these meetings as well.

F. Enforcement

None of the proposed control activities will involve the use of motor vehicles, mechanical transport, or the landing of aircraft inside a designated wilderness area. None of the proposed control activities will involve the use of motor vehicles or mechanical transport off of existing ways, i.e., designated vehicle routes, inside of a wilderness study area. The use of chemicals or motorized/mechanized equipment other than vehicles will be permitted only where it is determined to be the minimum action necessary to effectively control the targeted weed species. Any such use will be restricted to use in a manner which is least impacting to the Project.

VII. REPORTING REQUIREMENTS

Implementation of the noxious weed management plan will include the following data collection and reporting elements.

A. Construction Monitoring Reports

During the construction phase, ongoing reporting on noxious weed management will be included in all monitoring reports. Construction weed monitoring reports will include the following information:

- Survey findings on location, type, extent, and density of noxious 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 wash 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.

Weekly and Quarterly Reports

Reporting during construction will include weekly summary reports describing observations and activities relevant to weeds management, and a compilation and analysis of this information will also be included in quarterly reports.

B. Post-Construction Report

Upon completion of construction activities, a Post-Construction Report will be prepared describing the overall results of noxious weed management and current weed status at the Project. The Post-Construction Report will contain a section summarizing the overall results of noxious weed management, and weed status at the Project.

C. Long Term Weed Control Progress Reports

Long Term Weed Control Progress (Progress) Reports will be produced during operations of the Project. The Progress Reports will include information on noxious weeds surveys and management activities for the year, discuss whether the weed management goals for the year were met, and recommend weed management activities for the upcoming year. The surveys conducted to support this are described as follows:

- Quarterly visits will be implemented post-construction in year one. Results of quarterly visits will be summarized and reported in the second year Progress Report.
- Thereafter, semi-annual site visits will be conducted, summarized, and reported in a Progress Report through the completion of the Project.
- At the end of the Project (decommissioning), a final Progress Report will be produced to describe the current status of noxious weed management on the Project.

Progress Reports will be focused on success of eradication of noxious weeds onsite. Noxious weed management measures will be included in these reports, and will include the following relevant information:

- Survey findings on location, type, extent, and density of noxious 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 of efforts, location, types of treatment implemented, and results. Ongoing evaluation of success of treatment will be included.
- Recommendation for ongoing maintenance monitoring efforts.

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ATTACHMENT DR-BIO-69

FIGURES

Ridgecrest Solar Power Project Responses to 12/22/09 Data Requests

Figure DR-BIO-69-1 Regional Map

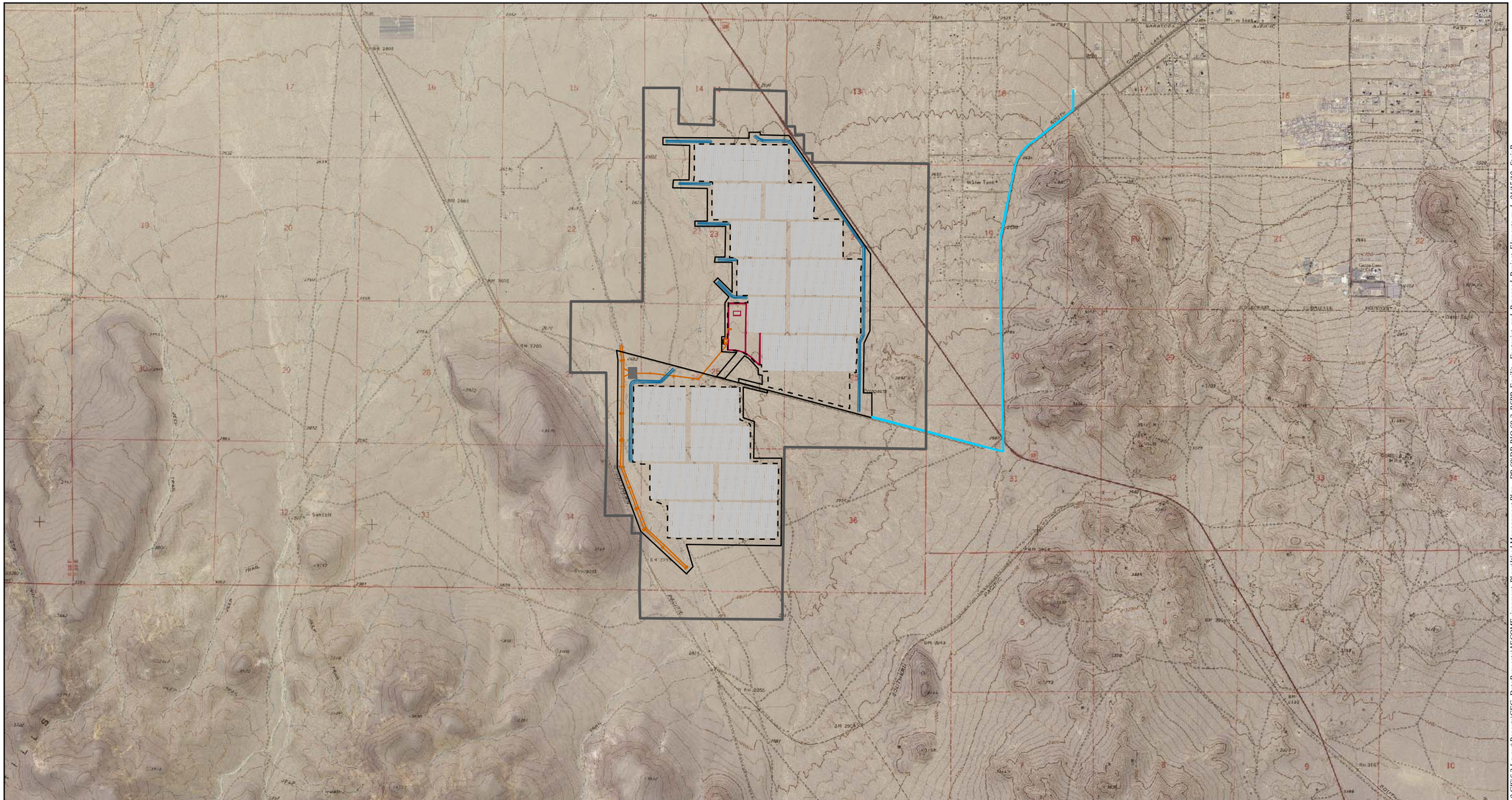
Source: ESRI; AECOM 2009

Solar Millennium

AECOM

Date: January 2010

Path: P:\2009\09080080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\Weed Management Plan - DR 69\DR-BIO-69-1_RSPP_RegionalLocation.mxd, 01/14/10, johnsonaa



Map Location

Legend

- ROW
- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area

Proposed Project Elements

- Drainage Channel
- Transmission Line
- Power Block Area
- Solar Loops
- Switchyard

Source: NAIP 2005; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-69-2
Proposed Project Elements and Project Area

Solar Millennium

AECOM

Date: January 2010

Path: P:\20090\80080\Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\Weed Management Plan - DR 69\DR-BIO-69-2_RSPP_Facility_Footprint_and_Proposed_Project_Elements.mxd, 01/15/10, SteinB

ATTACHMENT DR-BIO-69-A

LIST OF NON-NATVE AND NOXIOUS WEEDS POTENTIALLY OCCURRING ONSITE

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Acacia dealbata	silver wattle			Moderate
Acacia melanoxylon	black acacia			Limited
Acacia paradoxa	kangaroothorn		BW	Eval-No List
Acaena novae-zelandica	biddy biddy		AW	
Acaena pallida	pale biddy-biddy		AW	
Achnatherum brachychaetum	punagrass	A	AW	
Acroptilon repens	Russian knapweed		BW	Moderate
Aegilops cylindrica	jointed goatgrass		BW	
Aegilops	ovate goatgrass		BW	
Aegilops triuncialis	barb goatgrass		BW	
Aeginetia			Q	
Aeschynomene rudis	rough jointvetch		BW	
Ageratina adenophora	crofton weed		Q	Moderate
Agrostis avenacea	Pacific bentgrass			Limited
Agrostis stolonifera	creeping bentgrass			Limited
Ailanthus altissima	tree-of-heaven	C		Moderate
Aira caryophyllea	silver hairgrass			Eval-No List
Albizia lopantha	plume acacia			Eval-No List
Alectra Thunb.			Q	
Alhagi maurorum	camelthorn	A	AW, PN	Moderate
Allium paniculatum	panicled onion		BW	
Allium vineale	wild garlic		BW	
Alternanthera philoxeroides	alligatorweed		AW	High
Alternanthera sessilis	sessile joyweed		Q	
Ambrosia trifida	giant ragweed		BW	
Ammophila arenaria	European beachgrass			High
Antehmis cotula	mayweed			Eval-No List
Araujia sericifera	bladderflower		BW	
Arctotheca calendula	capeweed	A	AW	Moderate
Arundo donax	giant reed			High
Asparagus asparagoides	bridal creeper			Moderate
Asphodelus fistulosus	onionweed		Q	Moderate
Atriplex semibaccata	Australian saltbush			Moderate
Avena sterilis	animated oat		Q	
Azolla pinnata	mosquito fern		Q	
Bassia hysopifolia	fivehook bassia			Limited
Bellis perennis	English daisy			Eval-No List
Brachypodium sylvaticum	slender false brome	A		
Brassica nigra	black mustard			Moderate
Brassica rapa	field mustard			Limited
Brassica tournefortii	Saharan mustard			High
Briza maxima	big quackinggrass			Limited
Bromus diandrus	ripgut brome			Moderate
Bromus hordeaceus	soft brome			Limited
Bromus japonicus	Japanese brome			Limited
Bromus madritensis ssp. rubens	red brome			High
Bromus tectorum	downy brome			High

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Cabomba caroliniana	Carolina fanwort		QW	
Cakile maritima	European sea-rocket			Limited
Cardaria	lens podded hoarycress		BW	Moderate
Cardaria draba	lens podded hoarycress		BW	
Carduus acanthoides	plumeless thistle	A	AW	
Carduus nutans	musk thistle	A	AW	
Cardaria pubescens	lens podded hoarycress		BW	Limited
Carduus pycnocephalus	Italian thistle		CW	Moderate
Carduus tenuiflorus	slenderflowered thistle		CW	Limited
Carpobrotus chilensis	sea-fig			Moderate
Carpobrotus edulis	iceplant			High
Carthamu	smooth distaff thistle		BW	
Carthamus lanatus	woolly distaff thistle		BW	
Carthamus leucocaulos	whitestem distaff thistle		AW	
Carthamu	wild safflower		Q	
Caucus carota	wild carrot			Eval-No List
Cenchrus echinatus	southern sandbur		CW	
Cenchrus	coast sandbur		CW	
Cenchrus longispinus	mat sandbur		CW	
Centaurea calcitrapa	purple starthistle		BW	Moderate
Centaurea diffusa	diffuse knapweed	A	AW	Moderate
Centaurea iberica	Iberian starthistle	A	AW	
Centaurea maculosa	spotted knapweed	A	AW	High
Centaurea melitensis	Malta starthistle	C		Moderate
Centaurea monktonii	meadow knapweed	A		
Centaurea solstitialis	yellow starthistle	C	CW	High
Centaurea squarrosa	squarrose knapweed	A	AW	
Centaurea sulphurea	Sicilian starthistle		BW	
Chenopodium murale	nettleleaf goosefoot			
Chondrilla juncea	skeletonweed	A	AW	
Chorispora tenella	purple mustard		BW	Eval-No List
Chrysanthemum coronarium	crown daisy			Moderate
Chrysopogon aciculatus	pilipiliula		Q	
Cirsium arvense	Canada thistle	B	BW	Moderate
Cirsium japonicum	Japanese thistle		QW	
Cirsium ochrocentrum	yellowspine thistle	A	AW	
Cirsium undulatum	wavyleaf thistle		AW	
Cirsium vulgare	bull thistle			Moderate
Cistus ladanifer	gum rockrose			Eval-No List
Crupina vulgaris	crupina	A		Moderate
Commelina benghalensis	Benghal dayflower		Q	
Conium maculatum	poison-hemlock			Moderate
Convolvulus arvensis	field bindweed		CW	Eval-No List
Coronopus squamatus	swinecress		BW	
Cortaderia jubata	jubatagrass			High
Cortaderia selloana	pampasgrass			High
Cotoneaster lacteus	Parney's cotoneaster			Moderate

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Cotoneaster pannosus	silverleaf			Moderate
Cotula coroonopifolia	brassbuttons			Limited
Crocosmia x crocosmiiflora	montretia			Limited
Crupina vulgaris	bearded creeper, common crupina		AW, Q	
Cucumis melo var. dudaim	dudaim melon		AW	
Cucumis myriocarpus	paddy melon		BW	
Cuscuta	dodder		CW, Q	
Cuscuta reflexa	giant dodder		AW	
Cynara cardunculus	artichoke thistle		BW	Moderate
Cynodon dactylon	bermudagrass	C	CW	Moderate
Cynosorus echinatus	hedgehog			Moderate
Cyperus esculentus	yellow nutsedge		BW	
Cyperus rotundus	purple nutsedge		BW	
Cytisus scoparius	Scotch broom		CW	High
Cytisus striatus	Portugese broom			Moderate
Dactylis glomerata	orchardgrass			Limited
Delairea odorata	cape-ivy			High
Descurainia sophia	flixweed			Limited
Digitalis purpurea	foxglove			Limited
Digitaria	African couch grass		Q	
Digitaria velutina	velvet fingergrass		Q	
Dimorphotheca sinuata	African daisy			Eval-No List
Dipsacus fullonum	common teasel			Moderate
Dipsacus sativus	fuller's teasel			Moderate
Dittricia graveolens	stinkwort			Moderate
Drymaria arenarioides	alfombrilla		Q	
Echium candicans	pride-of-Madeira			Limited
Egeria densa	Brazilian egeria			High
Eichhornia azurea	anchored waterhyacinth		Q	
Eichhornia crassipes	waterhyacinth		CW	
Elytrigia	quackgrass		BW	
Emex australis	three-cornered jack		Q	
Emex spinosa	devil's thorn		Q	
Ehrharta erecta	erect veldtgrass			Moderate
Ehrharta longiflora	long-flowered veldtgrass			Moderate
Eichornia crassipes	water hyacinth			High
Elaegnus angustifolia	Russian-olive			Moderate
Emex spinosa	spiny emex			Moderate
Erechtites glomerata	Australian fireweed			Moderate
Erodium brachycarpum	short-fruited filaree			Eval-No List
Erodium botrys	broadleaf filaree			Eval-No List
Erodium cicutarium	redstem filaree			Limited
Erodium moschatum	whitestem filaree			Eval-No List
Eucalyptus camaldulensis	red gum			Limited
Eucalyptus globulus	Tasmanian blue gum			Moderate
Euphorbia esula	leafy spurge	A	AW	High
Euphorbia lathyris	caper spurge			Eval-No List

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Euphorbia oblongata	oblong spurge		BW	
Euphorbia serrata	serrate spurge		AW	
Euphorbia terracina	Geraldton carnation spurge		QW	Moderate
Festuca arundinacea	tall fescue			Moderate
Ficus carica	edible fig			Moderate
Foeniculum vulgare	fennel			High
Fumaria officinalis	fumitory			Eval-No List
Galega officinalis	goatsrue		Q	
Gaura coccinea	scarlet gaura		BW	
Gaura drummondii	Drummond's gaura		BW	
Gaura sinuata	wavy-leaved gaura		BW	
Genista monspessulana	French broom		CW	High
Geranium dissectum	cutleaf geranium			Moderate
Geranium molle	dovefoot geranium			Eval-No List
Geranium retrorsum	New Zealand geranium			Eval-No List
Glyceria declinata	waxy mannagrass			Moderate
Gypsophila paniculata	baby's breath		BW	
Halimodendron halodendron	Russian salt tree		AW	
Halogeton glomeratus	halogeton	A	AW	Moderate
Hedera helix	English ivy			High
Helianthus ciliaris	blueweed		AW	
Helichrysum petiolare	licoriceplant			Limited
Heracleum mantegazzianum	giant hogweed		Q	
Heteropogon contortus	tanglehead		AW	
Hirschfeldia incana	shortpod mustard			Moderate
Holcus lanatus	common velvet grass			Moderate
Homeria	Cape tulip		Q	
Hordeum marinum	Mediterranean barley			Moderate
Hydrilla verticillata	hydrilla		AW, NAW, Q	High
Hydrocharis morsus-ranae	frogbit		AW	
Hygrophila polysperma	Miramar weed		Q	
Hyoscyamus niger	black henbane		CW	
Hypericum canariense	Canary Island hypericum			Moderate
Hypericum perforatum	klamathweed		CW	Moderate
Hypochaeris glabra	smooth catsear			Limited
Hypochaeris radicata	rough catsear			Moderate
Imperata brasiliensis	Brazilian satintail		Q	
Imperata brevifolia	satintail		BW	
Imperata cylindrica	cogongrass		Q	
Ipomoea aquatica	Chinese waterspinach		Q	
Iris douglasiana	Douglas iris		CW	
Iris missouriensis	western blue flag		CW	
Iris pseudacorus	yellowflag iris			Limited
Isatis tinctoria	dyer's woad		BW	
Ischaemum rugosum	murain-grass		Q	
Iva axillaris	povertyweed		CW	
Kochia scoparia	kochia			Moderate

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Lactuca serriola	prickly lettuce			Eval-No List
Lagarosiphon major	oxygen weed		Q	
Lepidium latifolium	perennial peppercress	B	BW	High
Leptochloa chinensis	Asian sprangletop		Q	
Leucanthemum vulgare	ox-eye daisy			Moderate
Limnobium spongia	spongeplant		QW	
Limnophila indica	ambulia		QW	
Limnophila sessiliflora	ambulia		Q	
Linaria genistifolia ssp. dalmatica	Dalmatian toadflax	A	AW	Moderate
Linaria vulgaris	yellow toadflax			Moderate
Lobularia maritima	sweet alyssum			Limited
Lolium multiflorum	Italian ryegrass			Moderate
Lotus corniculatus	birdsfoot trefoil			Eval-No List
Ludwigia hexapetala	Uruguay water-primrose			High
Ludwigia peploides ssp. montevidensis	creeping water-primrose			High
Lycium ferrocissimum	African boxthorn		Q	
Lythrum hyssopifolium	hyssop loosestrife			Limited
Lythrum salicaria	purple loosestrife		BW	High
Malephora crocea	coppery mesembryanthemum			Eval-No List
Malvella leprosa	alkali mallow		CW	
Marrubium vulgare				Limited
Medico polymorpha	California burclover			Limited
Melaleuca quinquenervia	melaleuca		Q	
Melastoma malabathricum			Q	
Melilotus officinalis	yellow sweetclover			Eval-No List
Mentha pulegium	pennyroyal			Moderate
Messembryanthemum crystallinum	crstalline iceplant			Moderate
Mikania cordata	mile-a-minute		Q	
Mikania micrantha	mile-a-minute		Q	
Mimosa	giant sensitive plant		Q	
Mimosa	catclaw mimosa		Q	
Monochoria hastata	monochoria		Q	
Monochoria vaginalis	pickerel weed		Q	
Muhlenbergia schreberi	nimblewill		BW	
Myoporum laetum	myoporum			Moderate
Myostis latifolia	common forget-me-not			Limited
Myriophylllum aquaticum	parrotfeather			High
Nassella trichotoma	serrated tussock		Q	
Nerium oleander	oleander			
Nicotiana glauca	tree tobacco			Moderate
Nicotiana trigonophylla				
Nothoscordum gracile	false garlic			Eval-No List
Nothoscordum inodorum	false garlic		BW	
Nymphaea mexicana	banana waterlily		BW	Eval-No List
Olea europaea	olive			Limited
Ononis alopecuroides	foxtail restharrow		QW	
Onopordum acanthium	Scotch thistle	A	AW	

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Onorpordum illyricum	Illyrian thistle	A	AW	
Onopordum tauricum	Taurian thistle	A	AW	
Opuntia aurantiaca	jointed prickly pear		Q	
Orobanch	broomrape		Q	
Orobanche cooperi	Cooper's broomrape		AW	
Orobanche ramosa	branched broomrape		AW	
Oryza longistaminata	red rice		Q	
Oryza punctata	red rice		Q	
Oryza rufipogon	perennial wild red rice, red rice		BW, Q	
Ottelia alismoides	duck-lettuce		Q	
Oxalis corniculata	creeping woodsorrel			Eval-No List
Oxalis pes-caprae	Bermuda buttercup			Moderate
Panicum antidotale	blue panicgrass		BW	
Parentucellia viscosa	yellow glandweed			Limited
Parkinsonia aculeata	Mexican Palo Verde			Eval-No List
Paspalum scrobiculatum	Kodo-millet		Q	
Peganum harmala	harmel	A	AW	
Pennisetum clandestinum	kikuyugrass		CW, Q	Limited
Pennisetum macrourum	African feathergrass		Q	
Pennisetum pedicellatum	kyasuma-grass		Q	
Pennisetum polystachyon	missiongrass		Q	
Pennisetum setaceum	crimson fountaingrass			Moderate
Phalaris aquatica	hardinggrass			Moderate
Phoenix canariensis	Canary Island date palm			Limited
Phragmites australis	common reed			Native
Physalis longifolia	long-leaf groundcherry		AW	
Physalis viscosa	grape groundcherry		BW	
Phytolacca americana	common pokeweed			Limited
Picris echioides	bristly oxtongue			Limited
Piptatherum miliaceum	smilograss			Limited
Pistia stratiotes	water lettuce		BW	
Plantago coronopus	cutleaf plantain			Eval-No List
Plantago lanceolata	buckhorn plantain			Limited
Poa pratensis	Kentucky bluegrass			Limited
Polygonum amphibium var. emersum	kelp		CW	
Polygonum cuspidatum	Japanese knotweed		BW	
Polygonum polystachyum	Himalayan knotweed		BW	
Polygonum sachalinense	giant knotweed		BW	
Polypogon monspeliensis	annual beardgrass			Limited
Potamogeton crispus	curlyleaf pondweed			Moderate
Prosopis alpataco	mesquite		Q	
Prosopis argentina	mesquite		Q	
Prosopis burkartii	mesquite		Q	
Prosopis caldenia	mesquite		Q	
Prosopis calingastana	mesquite		Q	
Prosopis campestris	mesquite		Q	
Prosopis castellanosii	mesquite		Q	

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Prosopis denudans	mesquite		Q	
Prosopis elata	mesquite		Q	
Prosopis farcta	Syrian mesquite		Q	
Prosopis ferox	mesquite		Q	
Prosopis fiebrigii	mesquite		Q	
Prosopis hassleri	mesquite		Q	
Prosopis humilis	mesquite		Q	
Prosopis kuntzei Harms ex Hassler	mesquite		Q	
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe		Q	
Prosopis palmeri S. Watson	mesquite		Q	
Prosopis reptans Benth.	tornillo		Q	
Prosopis rojasiana Burkart	mesquite		Q	
Prosopis ruizlealii Burkart	mesquite		Q	
Prosopis ruscifolia Griseb.	mesquite		Q	
Prosopis sericantha	mesquite		Q	
Prosopis strombulifera	Argentine screwbean		AW, Q	
Prosopis torquata	mesquite		Q	
Prosopis	velvet mesquite		Q	
Prunus	cherry plum			Limited
Pyracant	firethorn			Limited
Ranuncul	creeping buttercup			Limited
Raphanu	radish			Limited
Retama	bridal broom			Moderate
Ricinus	castorbean			Limited
Robinia	black locust			Limited
Rorippa austriaca	Austrian field cress		BW	
Rorippa sylvestris	creeping yellow field cress		QW	
Rottboellia cochinchinensis	itchgrass		Q	
Rubus armeniacus	Himalaya blackberry			High
Rubus fruticosus	wild blackberry complex		Q	
Rubus moluccanus	wild blackberry		Q	
Rumex acetosella	red shorrel			Moderate
Rumex crispus	curly dock			Limited
Saccharum spontaneum	wild sugarcane		Q	
Sagittaria sagittifolia	arrowhead		Q	
Salsola collina	spineless Russianthistle		QW	
Salsola paulsenii	barbwire Russianthistle		CW	Limited
Salsola tragus	common Russianthistle	C	CW	Limited
Salsola vermiculata	wormleaf salsola, wormleaf saltwort	A	AW, Q	
Salvia aethiopis	Mediterranean sage		BW	
Salvia virgata	southern meadow sage		AW	
Salvinia auriculata	giant salvinia, salvinia		Q, QW	
Salvinia biloba	giant salvinia		Q	
Salvinia herzogii	giant salvinia		Q	
Salvinia molesta	giant salvinia		Q	
Saponaria officinalis	bouncingbet			Limited
Schinus molle	Peruvian peppertree			Limited

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Schinus terebinthifolius	Brazilian peppertree			Limited
Schismus arabicus	Mediterranean grass			Limited
Schismus barbatus	Mediterranean grass			Limited
Scolymus hispanicus	golden thistle	A	AW	
Senecio jacobaea	tansy ragwort		BW	Limited
Senecio squalidus	Oxford ragwort		BW	
Sesbania punicea	scarlet wisteria			High
Setaria faberi	giant foxtail		BW	
Setaria	cattail grass		Q	
Silybum	blessed milkthistle			Limited
Sinapis	wild mustard			Limited
Sisymbriu	London rocket			Moderate
Solanum cardiophyllum	heartleaf nightshade		AW	
Solanum carolinense	Carolina horsenettle		BW	
Solanum dimidiatum	Torrey's nightshade		AW	
Solanum elaeagnifolium	white horsenettle		BW	Eval-No List
Solanum lanceolatum	lanceleaf nightshade		BW	
Solanum marginatum	white-margined nightshade		BW	
Solanum tampicense	wetland nightshade		Q	
Solanum torvum	turkeyberry		Q	
Solanum viarum	tropical soda apple		Q	
Sonchus arvensis	perennial sowthistle	A	AW	
Sonchus asper	spiny sowthistle			Eval-No List
Sorghum halepense	johnsongrass		CW	
Sparganium erectum	exotic bur-reed		Q	
Spartium junceum	Spanish broom			High
Spermacoce alata	borreria		Q	
Sphaerophysa salsula	Austrian peaweed		AW	
Striga	witchweed		Q	
Striga asiatica	witchweed		AW	
Symphytum asperum	rough comfrey		BW	
Taeniatherum caput-medusae	medusahead		CW	High
Tagetes minuta	wild marigold		AW	
Tamarix aphylla	Athel tamarisk	B		Limited
Tamarix parviflora	smallflower tamarisk	B		High
Tamarix ramosissima	salt cedar	C		High
Taraxacum officinale	common dandelion			Eval-No List
Torilis arvensis	hedge parsely			Moderate
Tragopogon dubius	yellow salsify			Eval-No List
Tribulus terrestris	puncturevine	C	CW	
Tridax procumbens	coat buttons		Q	
Trifolium hirtum	rose clover			Moderate
Ulex europaeus	gorse		BW	
Undaria pinnatifida	wakame			Limited
Urochloa panicoides	liverseed grass		Q	
Verbascum thapsus	common mullein			Limited
Vicia villosa	hairy vetch			Eval-No List

RSPP Attachment DR-BIO-69-A: List of Non-Native and Noxious Weeds Potentially Occurring Onsite

Scientific Name	Common Name	CDFA Rating	USDA CA Rating	Cal-IPC Rating
Vinca major	big periwinkle			Moderate
Viscum album	European mistletoe		BW	
Vulpia bromoides	squirretail fescue			Eval-No List
Vulpia myuros	rattail fescue			Moderate
Washingtonia robusta	Mexican fan palm			Moderate
Zantedeschia aethiopica	calla lily			Limited
Zygophyllum fabago	Syrian beancaper		AW	

Definitions:

CDFA Rating

A- Either not known to be established in California or it is present in a limited distribution that allows for the possibility or eradication or containment. Eradication, containment, rejection, or other holding action at the state-county level.
Quarantine interceptions to be rejected or treated at any point in the state.

B- More wide spread. Eradication, containment, control or other holding action at the discretion of the commissioner. State endorsed holding action and eradication only when found in a nursery.

C- Generally widespread throughout the state. Action to retard spread outside of nurseries at the discretion of the commissioner. Reject only when found in a crop seed for planting or at the discretion of the commissioner.

USDA CA Rating

†Code	Weed Status
AW	A list (noxious weeds)
BW	B list (noxious weeds)
CW	C list (noxious weeds)
NAW	Noxious aquatic weed
PN	Public nuisance
Q	Quarantine
QW	Q list (temporary "A" list noxious weed, pending final determination)

CAL-IPC 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.

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, although establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

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

ATTACHMENT DR-BIO-69-B

EXAMPLE BLM PESTICIDE USE PROPOSAL

Example California BLM Pesticide Use Proposal

Proposal Number:_____

Reference Number:_____

FIELD OFFICE:_____**COUNTY:**_____

LOCATION:_____**DURATION OF PROPOSAL:**_____

I. PESTICIDE APPLICATION (including mixtures and surfactants):

	Trade Names	Common Names	EPA Registration No.	Manufacturer	Formulations (Liquid or Granular)	Method of Application
1						
2						
3						

MAXIMUM RATE OF APPLICATION:	
USE UNIT ON LABEL:	**POUNDS ACID EQUIVALENT/ACRE:**
1.	1.
2.	2.

INTENDED RATE OF APPLICATION:_____

_____

APPLICATION DATES:_____

_____

NUMBER OF APPLICATIONS:_____

_____

II. PEST (List specific pest(s) and reason(s) for application):

_____

_____

III. MAJOR DESIRED PLANT SPECIES PRESENT:_____

_____

_____

IV. TREATMENT SITE: (Describe land type or use, size, stage of growth of target species, slope and soil type).

_____

_____

ESTIMATED ACRES:_____

V. SENSITIVE ASPECTS AND PRECAUTIONS: (Describe sensitive areas [e.g., marsh, endangered, threatened, candidate and sensitive species habitat] and distance to treatment site. List measures taken to avoid impact to sensitive areas).

_____

_____

VI. NON-TARGET VEGETATION: (Describe the impacts, cumulative impacts, and mitigations to non-target vegetation that will be lost as a result of this chemical application).

_____

_____

VII. INTEGRATED PEST MANAGEMENT: (Describe how this chemical application fits into your overall integrated pest management program for the treatment area.)

_____

_____

Originator: _____ **Date:**_____

Company Name:_____ **Phone:**_____

Certified Pesticide Applicator:_____ **Date:**_____
(Signature)

Field Office Pesticide/
Noxious Weed Coordinator:_____ **Date:**_____
(Signature)

APPROVALS:

BLM Assistant **Date:**_____
Field Manager
Renewable Resources:_____
(Signature)

APPROVALS (State Office Use Only):

BLM State Pesticide Coordinator:_____ **Date:**_____

(Signature)

Deputy State Director
Natural Resources,
Lands and Planning:_____ **Date:**_____
(Signature)

_____CONCUR OR APPROVED

_____NOT CONCUR OR DISAPPROVED

_____CONCUR OR APPROVED WITH MODIFICATIONS

ATTACHMENT DR-BIO-69-C

EXAMPLE BLM PESTICIDE APPLICATION RECORDS FORM

Example California BLM Pesticide Application Records Form

1. **General Information**
   a. Project Name:_____
   b. Operator:_____
   c. Pesticide Use Proposal Number:_____
   d. Reference Number:_____

2. **Name of Applicator or Employee(s) Applying the Pesticide:**_____

_____

3. **Date(s) of Application:**_____ _____ _____
   MONTH DAY YEAR

4. **Time Frame of Application:**_____

5. **Location of Application:**_____ _____ _____ _____
   Township Range Section County

6. **Type of Equipment Used:**_____

_____

7. **Pesticide(s) Used:**

Company or Manufacturer's Name:_____

Trade Name:_____

Type of Formulation: Liquid ____ Granular ____

8. **Rate of Application Used:**
   a. Active Ingredient per Acre:_____
   b. Volume of Formulation per Acre:_____

9. **Treatment Area**

a. Actual Area Treated:_____

b. Total Project Area:_____

10. **Primary Pest(s) Involved**:_____

11. **Stage of Pest Development:**_____

12. **Site Treated:** Native Vegetation_____Seeded Vegetation_____Other_____

13. **Weather Conditions:** Wind velocity: _____Wind direction_____ Temperature_____

14. **Monitoring Record** (IF INSUFFICIENT SPACE-CONTINUE ON BACK)

Attachment DR-BIO-70

Draft American Badger Relocation/Translocation Plan

DRAFT
RIDGECREST SOLAR POWER PROJECT
AMERICAN BADGER
RELOCATION/TRANSLOCATION PLAN

© Gerald and Buff Corsi

Prepared for:
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Prepared by:
AECOM
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January 2010

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I. INTRODUCTION

Ridgecrest Solar I, LLC (hereafter referred to as the Applicant), proposes to construct, own, and operate the Ridgecrest Solar Power Project (RSPP or Project). The Project would have a nominal output of 250 megawatts (MW) and consist of a single power plant utilizing two solar fields.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, California, about five miles southwest of the City of Ridgecrest, California (Figure DR-BIO-70-1). The Project right-of-way (ROW), for which the Applicant has applied to the Bureau of Land Management (BLM), includes approximately 3,995 acres of public lands owned by the Federal government. The Project facilities would occupy approximately 1,448 acres of the 3,995-acre site, and the total disturbance area is estimated at 1,944 acres plus an additional 16.3 acres resulting from construction of the water pipeline off site.

During Project wildlife surveys conducted in 2009, a single American badger den was detected 1,000 feet to the north of the Project disturbance area. American badger is designated as a California Species of Special Concern. While no badgers or active badger dens were detected within the Project disturbance area, most of the 1,960-acre Project disturbance area is suitable for this species. If American badgers occupy the RSPP site during Project construction, the loss of active dens and injury or mortality of individuals could occur.

This American Badger Relocation/Translocation Plan has been prepared on behalf of the Applicant, and outlines the methods that would be utilized to transport any badgers out of harm's way prior to the onset of construction activities. This would be accomplished by moving the badgers a short distance to another part of their home range (relocation) either through passive or active measures. While the Applicant does not propose moving badgers outside their home range to designated off-site areas (translocation), that process is also described in this plan solely to be responsive to the CEC data request. If it is necessary to physically move badgers out of harm's way, relocation would be the preferred method as it is more likely to be successful.

To reduce impacts on sensitive biological resources, the Project site plan was reconfigured to minimize impacts to the El Paso Wash. The Project description, including acreage calculations, presented below are based on the reconfigured site plan. However, survey results presented in this report are based on survey conducted in 2009, prior to the reconfiguration. Additional biological surveys will be conducted after the site plan has been finalized in spring 2010 to ensure that all sensitive biological resources in the new Project footprint have been accurately identified and quantified. Following completion of spring 2010 surveys, impacts to sensitive biological resources will be updated and environmental compliance documents will be revised as appropriate. The Project mitigation will be developed based on the revised impact calculations.

II. BACKGROUND

A. Project Description

The proposed Project site is entirely on Federal land, BLM ROW # CACA 49016, in Township 28 South, Range 39 East and Township 27 South, Range 39 East. Access to the northern portion of the Project site would be provided by a new 24-foot wide paved access road from Brown Road, approximately 1.6 miles west of the intersection of Brown Road with U.S. Highway 395. This access road runs about 450 feet from Brown Road to the location of the new office building and continues for approximately another 3,000 feet to the entrance of the power block. Access to the southern portion of the Project site would also be provided by a new 24-foot wide paved access road from Brown Road, approximately 2.25 miles west of the intersection of Brown Road with U.S. Highway 395. This access road would run about 600 feet from Brown Road to the security gate for the south solar field.

The Applicant has applied for a ROW grant for approximately 3,955 acres of land owned by the Federal government and managed by BLM. The Project site is composed of undeveloped desert with naturally vegetated areas. There are no existing structures that would need to be demolished, but existing 115- and 230-kilovolt (kV) Southern California Edison (SCE) transmission lines that traverse the southwestern portion of the site will require relocation. Construction and operation of the RSPP would disturb a total of approximately 1,944 acres. This total includes areas outside the fence line of the Project facilities themselves, primarily rerouted drainage channels that avoid Project facilities, a water line, and access roads.

The Applicant proposes to develop a 250-MW solar energy facility on approximately 1,448 acres (Plant Site). The Project will utilize solar parabolic trough technology to generate electricity. Arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. Heat transfer fluid (HTF) is heated to high temperatures (750 degrees Fahrenheit) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced. The power plant will have two solar fields. The north solar field would be 894 acres and the south field would be 554 acres. The northern solar field would be located north of Brown Road and the southern solar field would be located south of Brown Road.

The power block would be located north of Brown Road, immediately southwest of the northern solar field. The power block would be composed of its own administration, control, warehouse, maintenance, and lab buildings; the HTF pumping and freeze protection system; solar steam generator; a propane-fired auxiliary boiler; one steam turbine generator; an air-cooled condenser; generator step-up transformer, transmission lines and related electrical system; potable and treated water tanks; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

In addition to the main power generating facility, the site would include a main office building and parking lot, a main warehouse with laydown area, on-site access roads, a tie-in switchyard, and a land treatment unit for bioremediation or land farming of HTF-contaminated soil.

The Project would generate electric power solely via solar energy. Propane will be used to fire an auxiliary boiler overnight to support startup operations until the HTF system is up to operating temperature, at which time the generation of electricity can commence. A second fired heater will be used as needed, mostly during the winter, to prevent freezing of the HTF. A new, approximately 5-mile-long water pipeline would be installed within the Brown Road and China Lake Boulevard ROWs to connect the Project with the Indian Wells Valley Water District supply. (The diameter of the pipe could be 12" diameter or smaller depending on the Water District's determination.) A new 230- kV transmission line from the turbine generator to a new nearby switchyard will interconnect with SCE's existing 230-kV and 150-kV InyoKern/Kramer Junction transmission line located west of the Project site.

B. American Badger Occurrence on the RSPP Site

The American badger is a resident of open areas in grasslands, agricultural areas, and open shrub habitats. Badgers dig large burrows in dry, friable soils and feed mainly on fossorial mammals, including ground squirrels, gophers, rats, and mice. Badgers are active primarily during the day, but may become more nocturnal where they occur in proximity to humans. The home range of badgers has been estimated to be between 395 and 2,100 acres, with males typically having larger home ranges than females, especially during the summer breeding season. In California, mean home range across all seasons for females (n=5) was estimated at 480 acres while mean home range across all seasons for males (n=4) was estimated at 2,775 acres (Quinn 2008).

General wildlife surveys were conducted concurrently with protocol wildlife surveys (e.g., desert tortoise [*Gopherus agassizii*] and western burrowing owl [*Athene cunicularia*] surveys) and vegetation mapping was created to document all wildlife species observed on site and to assess the suitability of the RPSPP site to support special-status wildlife species. General wildlife surveys were conducted from February to June 2009. Wildlife sign and sightings were recorded and special-status species were mapped using GPS units. The Project disturbance area and buffer is dominated by Mojave creosote bush scrub but also includes Mojave Desert wash scrub, non-vegetated ephemeral dry washes, and developed land. Although most of the 1,944-acre Project disturbance area is suitable for this species, no American badgers or their sign were detected in the Project disturbance area. One American badger burrow was detected approximately 1,000 feet north of the Project disturbance area (Figure DR-BIO-70-2).

III. PLAN PURPOSE

The primary purpose of this Plan is to provide an effective and feasible strategy that would ensure the protection of American badger, a California Species of Special Concern, from the construction and operational impacts of Project development. Once this plan is approved by the California Department of Fish and Game (CDFG) and California Energy Commission (CEC), the elements described herein would become part of the Project conditions of certification, with which compliance is required.

IV. PLAN GOALS

The goals of the relocation/translocation efforts are to:

- Identify any occupied badger dens in the Project area.
- Provide a relocation/translocation strategy and protect any and all American badgers during Project implementation.
- Relocate any and all badgers detected within the Project disturbance area to another part of their home range, outside of the Project disturbance area.
- If necessary, translocate any badgers that cannot be successfully relocated to an off-site location with an adequate amount of suitable habitat.
- Minimize impacts to resident badgers and other sensitive species within any translocation site.
- Minimize stress, disturbance, and injuries to relocated/translocated badgers.

V. RELOCATION/TRANSLOCATION PLAN

This section discusses management strategies for the relocation or translocation of American badger for the RSPP. A multi-tiered approach is proposed to prevent or reduce impacts during the construction activities and operation of the Project. While mitigation often focuses on protecting animals in situ by making adjustments to construction activities near occupied burrows, moving individuals out of harm's way either a short distance to another part of their home range (relocation), or moving individuals outside their home range to designated off-site areas (translocation) is sometimes the best alternative depending on potential limitations on Project redesign and/or construction scheduling. While the Applicant does not propose moving the badgers outside their home range to designated off-site areas (translocation), that process is described in this plan solely to be responsive to the CEC data request. Relocation of badgers detected within the Project disturbance area would be the preferred option due to the increased likelihood of success.

Although no American badgers were detected within the Project disturbance area during the 2009 surveys, a badger burrow was detected within the vicinity of the Project area, and American badger are a resident to the area. Therefore, it may be necessary to move individuals out of harm's way if any are encountered within the Project disturbance area during construction. The management strategy describes:

- Pre-activity surveys, and
- Relocation and translocation strategies.

The multi-tiered approach requires pre-activity surveys to determine if American badgers are present within the Project disturbance area, relocation and translocation strategies, and monitoring for American badger activity within the Project disturbance area during construction activities. The Applicant is not proposing post release monitoring of relocated and/or

translocated individuals at this time; however , the Applicant will engage CDFG in consultation to determine if it is necessary. The schedule for relocating/translocating badgers would be outside the known cub rearing season and in advance of the anticipated construction start date to minimize the likelihood of individuals returning to the site. The following sections describe the recommended relocation/translocation methods and incorporate measures to minimize the likelihood of this species returning to the capture site.

A. Pre-activity Surveys

A pre-activity survey of the Project disturbance area would be conducted outside of the cub-rearing season (March and April) prior to construction to locate and identify active American badger burrows. Surveys would be conducted in conjunction with pre-activity surveys for western burrowing owl (WBO) and desert tortoise (DT) (see Attachment DR-56 Ridgecrest Solar Power Project Draft Burrowing Owl Relocation/Translocation Plan and the Attachment DR-54 Desert Tortoise Relocation and Translocation Plan [AECOM 2010 a and b]) and would cover the entire Project disturbance area. Burrows detected during the WBO and DT surveys will simultaneously be assessed for potential use by badgers based on their size and presence of badger sign (i.e., badger claw marks and scat). Burrows identified as having potential badger use will be marked using a GPS unit and monitored to determine badger activity. The results of the pre-activity survey and recommended protection measures based on the location of any identified American badger burrow would be provided to CDFG. Pre-activity surveys would be conducted no more than 30 days prior to construction with a follow-up pre-construction survey conducted within three to five days of construction initiation.

Potential badger dens would be monitored using remote cameras for three full days to determine if the den is occupied. Only if the den is determined to be unoccupied will it be excavated under direction of a qualified biologist (see Qualifications for Authorized Handlers below). If den activity is observed within the monitoring period, the den will be monitored for an additional five full days. A qualified biologist, in coordination with CDFG, will determine the ideal time period to excavate the den based on recommended protection measures.

If, during preconstruction surveys, American badger activity is detected at a burrow, every attempt would be made to avoid disturbance to the burrow by modifying either the placement or the timing of work activity. If construction activity cannot be moved or rescheduled, then passive relocation or translocation techniques may be implemented with permission from CDFG as long as the badger does not have juveniles that are incapable of independent survival (typically March through June).

All unoccupied but potentially suitable badger burrows located on site during the initial surveys and still present during the 30-day pre-activity survey would be carefully excavated and filled in under the supervision of a qualified biologist, prior to site grading, to ensure that badgers are not occupying on-site burrows within the disturbance footprint at the time of construction.

B. Relocation and Translocation Strategy

Methods for transporting badgers that may be found within the Project disturbance area out of harm's way may involve either relocation or translocation of individuals. Relocation would involve moving badgers a short distance to another part of their home range. Translocation

would involve moving individuals outside of their home range to a designated off-site location. Several factors would determine whether relocation or translocation of American badgers found to be actively occupying burrows on the Project site would be implemented. These factors may include the specific location of occupied badger burrows found within the Project disturbance area during pre-construction surveys and the availability of potential burrows outside of the Project disturbance area, but within the badgers' home range. The decision to proceed with relocation or translocation would be made in consultation with the CDFG and the CEC.

Passive relocation of American badgers present in the disturbance area will be attempted prior to physically moving individuals. American badgers are known to use several dens in a wide area, frequently moving between dens. American badger dens present in the disturbance area will have a one-way trap door installed to passively exclude the badger from the den and encourage them to move off site. After 48 hours post-installation, the den will be excavated and collapsed, following the same protocol as with WBO burrows. These dens will be collapsed prior to construction of the DT fence to allow badgers the opportunity to move off site without impediment. Alternatively, a qualified biologist shall trap badgers and physically relocate or translocate the individuals, dependent on which is the appropriate course of action.

There are no agency-approved protocols for relocating or translocating American badgers. Therefore, trapping, handling, and transport methods will be developed in consultation with CDFG and the CEC. In addition, site preparation, which may involve placement of artificial dens or other enhancements, and release protocols will also be developed in consultation with CDFG and the CEC.

Site Considerations and Options for Relocation and Translocation

If practical, badgers detected during pre-construction surveys would be relocated to an area within their home range, outside of the Project disturbance area on adjacent Federal property. Due to the low amount of badger sign detected within the Project disturbance area, the need for future off-site areas where badger may be translocated is considered unlikely.

The specific selection of relocation and translocation site(s) will be determined prior to the initiation of construction activities in consultation with CDFG. Once candidate areas are identified, these areas would be surveyed prior to implementing relocation or translocation activities, to determine habitat suitability and estimate existing population densities and the distribution of resident badgers. Surveys would be conducted using State and Federal guidelines. The results of these surveys would be used to determine whether the area meets the requirement of having ample suitable habitat to support relocated/translocated badgers, considering the resident badger population.

D. Qualifications of Authorized Handlers

The qualified biologist will have previous experience in live animal trapping and handling and possess the appropriate state permits. Handling of all badgers would be conducted in accordance with State trapping guidelines (excluding seasonal limits). In addition the biologist will have experience in construction monitoring, and be familiar with the sensitive resources of this project and the specific project area and habitat.

D. Reporting

An annual report would be submitted to the CEC and CDFG each fall for two years post-relocation/translocation. These reports would include, but not be limited to, the following data:

- Project name, locations, and all pertinent information pertaining to the origin site.
- Dates and locations of American badgers encountered on the Project site.
- Observations made during monitoring of active badger dens.
- Dates and success of passive relocation efforts.
- Dates of capture for active relocation/translocation efforts.
- Location and habitat information for release site.

Additional, interim reporting on the relocation/translocation efforts would be provided to CDFG and CEC via electronic mail and would include the date trapping efforts began, the date of burrow excavations, findings, and initiation of activities. Additionally, any badger injuries, mortality, or other unforeseen circumstances would be reported to all resource agencies within 24 hours.

VI. REFERENCES

AECOM

2010a Ridgecrest Solar Power Project Draft Burrowing Owl Relocation/Translocation Plan. January.

2010b Ridgecrest Solar Power Project Desert Tortoise Relocation/Translocation Plan. January.

Quinn, J.H.

2008. The ecology of the American badger (*Taxidea taxus*) in California: assessing conservation status on multiple scales. Ph.D. Dissertation. University of California, Davis, Davis, California. 200 pp.

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Ridgecrest Solar Power Project Responses to 12/22/09 Data Requests

Figure DR-BIO-70-1 Regional Map

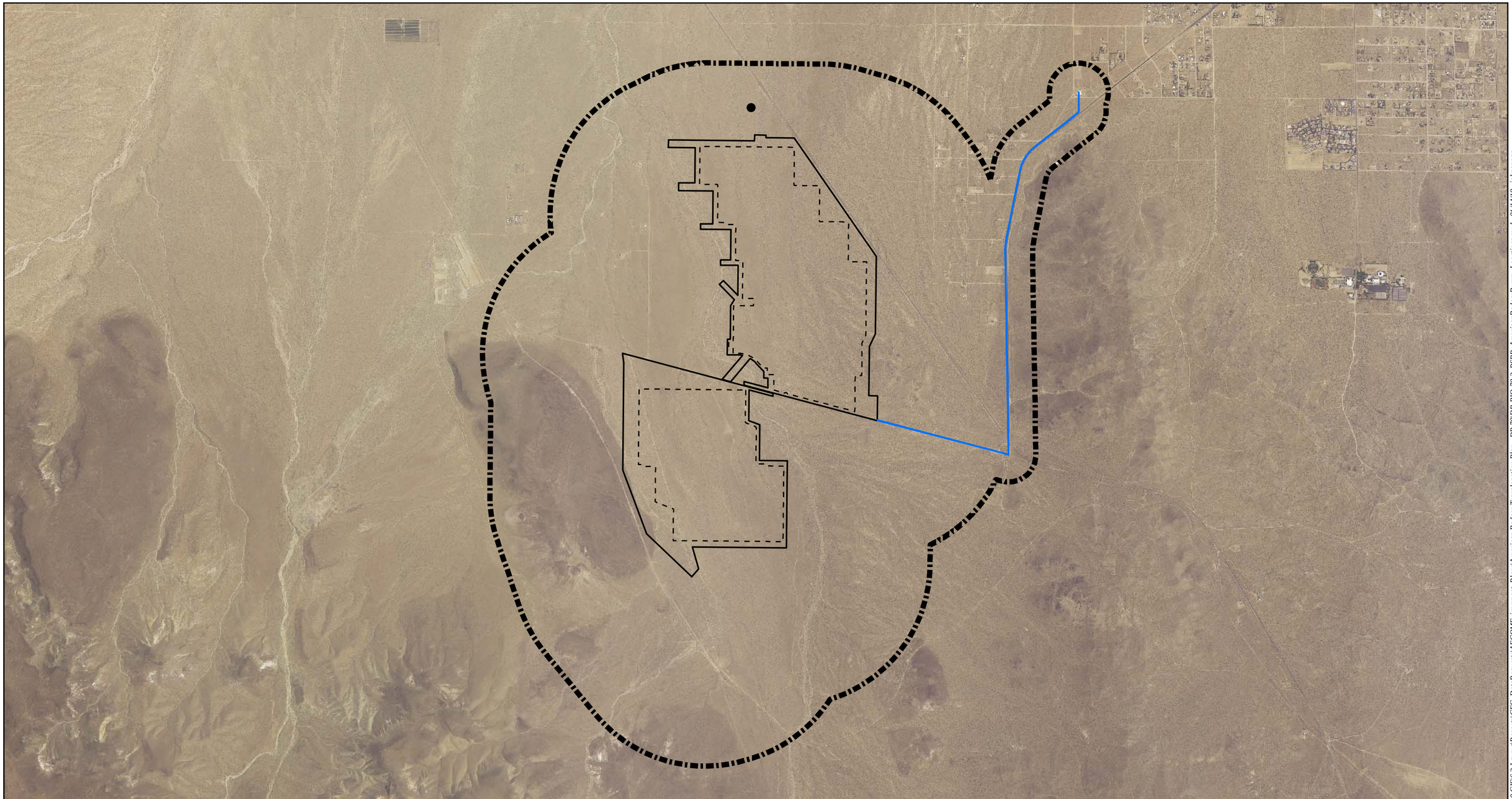
Source: ESRI; AECOM 2009

Solar Millennium

AECOM

Date: January 2010

Path: P:\2009\09080080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\American Badger Translocation Plan - DR 70\DR-BIO-70-1_RSPP_RegionalLocation.mxd, 01/14/10, johnsonaa



Map Location

Legend

- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Biological Resources Survey Area (BRSA)
- American Badger Burrow with Claw Marks

Source: NAIP 2005; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-70-2
American Badger Burrow Location

Solar Millennium

AECOM

Date: January 2010

Path: P:\20090908080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\CEC_DataRequests\AECOMEvironment_Plans\American Badger Translocation Plan - DR 70\DR-BIO-70-2_RSPP_AmericanBadgerBurrowLocations.mxd, 01/14/10, johnsonda

Attachment DR-BIO-76

Draft Avian Mortality Monitoring Plan

RIDGECREST SOLAR POWER PROJECT
DRAFT
AVIAN MORTALITY MONITORING PLAN

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January 2010

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ATTACHMENT:

DR-BIO-76-A Site Figures

DR-BIO-76-1 Regional Map

I. INTRODUCTION

Ridgecrest Solar I, LLC (Applicant) proposes to construct, own, and operate the Ridgecrest Solar Power Project (RSPP or Project). The Project would have a nominal output of 250 megawatts (MW) and consist of a single power plant utilizing two solar fields.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, California, about 5 miles southwest of the City of Ridgecrest, California (Figure DR-BIO-56-1). The Project right-of-way (ROW), for which the Applicant has applied to the Bureau of Land Management (BLM), includes approximately 3,995 acres of public lands owned by the Federal government. The Project facilities would occupy approximately 1,448 acres of the 3,995-acre site, and the total disturbance area is estimated at 1,944 acres plus an additional 16.3 acres resulting from construction of the water pipeline off site.

During general wildlife and point count surveys conducted in 2009, 33 species of resident and nonresident (migratory) bird species were detected on the Project site, including three species of special concern: Swainson's hawk, Western burrowing owl, and loggerhead shrike. Avian diversity was generally low across the site. This result was expected given that the primary habitat type is creosote bush scrub, a habitat type that is dominant over vast regions of the deserts of eastern California and that is known for low avian diversity. No endangered or threatened species reside on the site (AECOM 2009a).

Although there will be no native habitat remaining within the facility fence line during operations, the California Energy Commission (CEC) is concerned about possible avian mortality resulting from solar facilities. Avian mortality risk at solar power plant facilities is not well documented. Currently, only one study has been prepared, and it was prepared in 1986. More recent studies are needed to better understand this risk. Nonetheless, the 1986 study did reveal some evidence of bird mortality resulting from collisions with solar facility structures and burning from stand by points at Solar One, a large-scale solar facility located in the Mojave Desert, California. This study estimated approximately 1.9-2.2 bird deaths per week (McCrary et. al. 1986). The impact of this mortality on the local bird population was considered minimal by the authors, but, as noted, further studies are needed.

In addition to the potential risk for birds colliding with or being burned from Project facilities, birds also have the potential to collide with the transmission lines associated with the Project. The Project will relocate existing 115- and 230-kilovolt (kV) Southern California Edison (SCE) transmission lines that traverse the southwestern portion of the site (AECOM 2009a), and add 3,900 feet of new transmission line to the area. However, the relocation and addition of these transmission lines is not expected to substantially increase bird mortality beyond any current level present on the site due to the small scale of the modifications.

No State or Federal guidelines are currently in place for the construction of solar power plants with regard to minimizing avian mortality caused by large-scale solar facilities (namely, bird collisions with plant structures and burning). In contrast, there is a growing library of information

and associated guidelines regarding the impact of wind turbines on bird populations. Many states are drafting voluntary guidelines for the construction and operation of wind turbines with an emphasis on reducing bird and bat mortality, such as the 2007 *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* (Wind Guidelines), which are based on the U.S. Fish and Wildlife Service's (USFWS) 2003 *Service Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines*.

Despite the absence of reliable, complete information demonstrating that large-scale solar power projects meaningfully contribute to avian mortality, this Avian Mortality Monitoring Plan (Plan) has been prepared on behalf of the Applicant to outline the methods that would be implemented to monitor the Project's potential impacts on birds. The Plan is based on guidelines for avian mortality studies presented in the aforementioned documents pertaining to wind energy, and includes a searcher efficiency study to correct any bias. This study will be finalized and adaptively managed in consultation with the USFWS and the California Department of Fish and Game (CDFG).

To reduce impacts on sensitive biological resources, the Project site plan was reconfigured to minimize impacts to the El Paso Wash. The Project description, including acreage calculations, presented below are based on the reconfigured site plan. However, survey results presented in this report are based on a survey conducted in 2009, prior to site redesign. Additional biological surveys will be conducted after the site plan has been finalized in spring 2010 to ensure that all sensitive biological resources in the new Project footprint have been accurately identified and quantified. Following completion of spring 2010 surveys, impacts to sensitive biological resources will be updated and environmental compliance documents will be revised as appropriate. The Project mitigation will be developed based on the revised impact calculations.

II. PROJECT DESCRIPTION

The proposed Project site is entirely on Federal land, BLM ROW # CACA 49016, in Township 28 South, Range 39 East and Township 27 South, Range 39 East. Access to the northern portion of the Project site would be provided by a new 24-foot wide paved access road from Brown Road, approximately 1.6 miles west of the intersection of Brown Road with U.S. Highway 395. This access road runs about 450 feet from Brown Road to the location of the new office building and continues for approximately another 3,000 feet to the entrance of the power block. Access to the southern portion of the Project site would also be provided by a new 24-foot wide paved access road from Brown Road, approximately 2.25 miles west of the intersection of Brown Road with U.S. Highway 395. This access road would run about 600 feet from Brown Road to the security gate for the south solar field.

The Applicant has applied for a ROW grant for approximately 3,995 acres of land owned by the Federal government and managed by BLM. The Project site is composed of undeveloped desert with naturally vegetated areas. There are no existing structures that would need to be demolished, but existing 115- and 230-kV SCE transmission lines that traverse the southwestern portion of the

site will require relocation. Construction and operation of the RSPP would disturb a total of approximately 1,944 acres. This total includes areas outside the fence line of the Project facilities themselves, primarily rerouted drainage channels that avoid Project facilities, and access roads. An additional 16.3 acres will be disturbed off site within existing road ROW.

The Applicant proposes to develop a 250-MW solar energy facility on approximately 1,448 acres (Plant Site). The Project will utilize solar parabolic trough technology to generate electricity. Arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. Heat transfer fluid (HTF) is heated to high temperatures (750 degrees Fahrenheit) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced. The power plant will have two solar fields. The north solar field would be 894acres and the south field would be 554 acres. The northern solar field would be located north of Brown Road and the southern solar field would be located south of Brown Road.

The power block would be located north of Brown Road, immediately southwest of the northern solar field. The power block would be composed of its own administration, control, warehouse, maintenance, and lab buildings; the HTF pumping and freeze protection system; solar steam generator; a propane-fired auxiliary boiler; one steam turbine generator; an air-cooled condenser; generator step-up transformer, transmission lines and related electrical system; potable and treated water tanks; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

In addition to the main power generating facility, the site would include a main office building and parking lot, a main warehouse with laydown area, on-site access roads, a tie-in switchyard, and a land treatment unit for bioremediation or land farming of HTF-contaminated soil.

The Project would generate electric power solely via solar energy. Propane would be used to fire an auxiliary boiler overnight to support startup operations until the HTF system is up to operating temperature, at which time the generation of electricity can commence. A second fired heater would be used as needed, mostly during the winter, to prevent freezing of the HTF. A new, approximately 5-mile-long water pipeline would be installed within the Brown Road and China Lake Boulevard ROWs to connect the Project with the Indian Wells Valley Water District supply. (The diameter of the pipe could be 12-inch diameter or smaller depending on the Water District's determination.) A new 230-kV transmission line from the turbine generator to a new nearby switchyard will interconnect with SCE's existing 230- and 150-kV InyoKern/Kramer Junction transmission line located west of the Project site.

III. PLAN PURPOSE

The purpose of this Plan is to develop and implement a methodology to estimate the number of avian mortalities that may result from facility operation. The data resulting from this mortality survey will provide an estimate of the number of bird deaths attributable to collisions or other

interactions with Project facilities. The Plan would be developed in coordination with the CDFG and the USFWS. The information collected through this monitoring plan will be incorporated into an adaptive management strategy to determine the need for further monitoring on the Project site.

IV. PLAN GOALS

The goals of this Plan are to:

A. Estimate the number of avian mortalities resulting from facility operation.

B. Determine continued need for avian mortality trials based on adaptive management approach developed in coordination with the relevant agencies.

V. SURVEY METHODS

As no guidelines have been established for assessing avian mortality at solar power facilities, specifics of survey methodology will be developed in coordination with the CDFG and USFWS. Based on the guidelines created to assess avian mortality at wind development projects, a general outline of the avian mortality plan will be outlined here. This Plan includes methods for conducting carcass searches and estimating bias due to searcher efficiency. As requested by the CEC, the avian mortality study would be conducted on the Project site for up to two years and would contain and adaptive management element. The level of impact on avian populations in the Project area due to facility operation will be assessed in conjunction with CDFG and USFWS staff after one year, to determine if there is a need to continue monitoring for a second year. If through consultation with the agencies it is determined that a second year of monitoring is warranted, another assessment will be conducted at the end of the second year to determine the need for continued monitoring into the future.

Due to the lack of solar power plant avian mortality studies, it is not known where avian mortality is likely to occur. As a result, pilot searches will be designed in coordination with CDFG and USFWS and will be conducted prior to study implementation to assist in setting the appropriate level of search effort for the Project site. Once the pilot searches are completed, search plots will be established on the Project site where it has been determined bird collisions are to most likely occur, again through consultation with CDFG and USFWS. Within the search plots, specific locations of avian search plots will be randomly selected. The appropriate size of search plots will be determined based on the pilot searches and/or incidental observations of bird carcasses outside plot boundaries. Every effort will be made to include at least 80 percent of bird fatalities per search plot. If search plot size must be adjusted during the course of the study, the result will be adjusted to correctly quantify the final mortality estimates.

The Applicant will use trained and tested searchers who will walk each search plot in linear transects. The Wind Guidelines recommend a standard transect of 20 feet long and 20 feet wide (10 feet on either side of the centerline) to be utilized at search plots. The applicability of this

standard on the Project site will need to be determined during the pilot searches and may need to be adjusted. However, because of the lack of vegetation and the relatively level landscape within the operational Project area, the standard transect will most likely not require modification to compensate for searcher error in dense vegetation or complex topography.

All carcasses will be recorded and collected in the search areas (unless they are being used as part of a scavenging trial, discussed below). Cause of death will be determined, if possible. Where cause of death cannot be determined, it will be assumed that death resulted from Project structures given the relatively few non-Project related structures near the Project area. Carcass condition will be recorded in one of the following categories, created by Anderson et al. (1999) and recommended by the Wind Guidelines:

- **Intact** – a carcass that is not badly decomposed and shows no sign of having been fed upon by a predator or scavenger, although it may show signs of traumatic injury such as amputation from collision (and in this study, singed body parts from burning).
- **Scavenged** – an entire carcass that shows signs of having been fed upon by a predator or scavenger or a partial carcass that has been scavenged, with portions of it (for example, wings, skeletal remains, legs, pieces of skin) found in more than one location.
- **Feather Spot** – 10 or more feathers at one location, indicating predation or scavenging.

Searchers handling bird carcasses will be trained in safety procedures and permitted through all necessary State and Federal agencies. Required permits will include a Scientific Collecting Permit under the Migratory Bird Treaty Act (50 Code of Federal Regulations §21.28) and a State of California Scientific Collecting Permit under the Fish and Game Code (Section 1002 and Title 14, Sections 650 and 670.7). These permits include specific reporting requirements that will be fulfilled by the permit holders.

Data collected during each carcass search will include: a unique carcass identification number, search plot number, date, observer, species, sex, age, and when possible, time, condition (intact, scavenged, or feather spot), description of injuries, identification of and distance to nearby structures or location recorded with GPS, and distance to nearest project structure. A description of the characteristics of the carcass indicating the cause of death and other pertinent information and a photograph of the carcass will also be included. “Incidental finds,” those carcasses found by personnel outside established search times and/or search area perimeters, will be noted as such and removed from the Project area. Incidental finds will not be included in final calculations.

Searches will occur throughout the year at a frequency to be determined after the pilot searches are completed, but could occur as often as once per week. However, since bird point counts indicated higher numbers of smaller species, and small birds may decompose more quickly than large birds, more frequent searches may be warranted to improve the probability of quickly decomposing carcasses being detected.

A. Bias Correction

Researchers have noted numerous sources of bias in the carcass count that can make the extrapolated estimate of bird fatalities too high or too low. Therefore, estimates of fatalities based on plot sampling must incorporate corrections based on searcher efficiency. In general, season, topography, and vegetation influence searcher efficiency. However, it is anticipated that these factors will not heavily influence searcher efficiency due to the lack of vegetation and the relative uniformity of season and topography in the operational Project area. It is assumed that individual searcher experience will be the prime factor in searcher efficiency bias.

B. Searcher Efficiency

Searchers will vary in their ability to detect dead birds in the field because of inherent individual differences (e.g., visual acuity, experience, and training) and differences in field conditions (weather, vegetation density, and height). Morrison (2002) found that the number of carcasses that searchers found varied considerably depending on observer training, vegetation type, and size of the bird. However, due to the lack of vegetation and relatively level landscape it is not anticipated that vegetation type and other field conditions will influence the search efficiency within the operational area. Individual differences, like observer training and experience, which also affect the individual searcher's ability to detect birds of various size, will influence searcher efficiency bias.

Corrections for searcher efficiency will be based on bird size, as differences in vegetation type will not be a factor on the Project site. To correct for variation in searcher efficiency, on-site trials will be conducted to test each searcher using fresh carcasses of species likely to occur in the Project area. Observer detection rates may change as carcasses decompose; however this survey will be designed and adaptively managed to tally bird deaths as soon as possible and before identification of the carcass is too difficult to determine. Searchers will not know when trials are being conducted because awareness of the trial makes searchers more vigilant and generally improves search results. Trials will be conducted at regular intervals throughout the study and will address changes in bird size. The bird carcasses placed in the Project area for the searcher trials will be geo-referenced with a GPS and marked in a fashion that is not detectable to the searchers. The carcasses will be spread in a large area so that searchers are less likely to suspect or recognize that a trial is in progress. Trials will be conducted for all search personnel and for new searchers added to the team.

VI. REPORTING

An annual report would be submitted each winter following the fall migration season to report the results of the previous year's avian mortality surveys.

Annual reports would be submitted for at least two consecutive years to the CEC, CDFG, and USFWS. The agencies would review the reports, determine the Project's impacts on avian populations, and assess the need for continued monitoring. Reports would include, but not be limited to the following data:

- Project name and locations of all search plots surveyed;
- Dates of all avian mortality surveys conducted throughout the year;
- Total number of carcasses located, species, and cause of death (if it was determined);
- Dates and results of searcher efficiency trials;
- Pertinent information on incidental carcasses detected; and
- Estimated avian mortality

VII. CONTINGENCY PLANNING

To address any unforeseen circumstances, the Applicant is committed to implementing an adaptive management program that would adjust avian monitoring as necessary and within the constraints of Project permits and approvals. Adaptive management decisions will be made with the input from pertinent regulatory agency staff in a timely manner so that mid-course corrections can be made to ensure the avian mortality surveys are being conducted in an appropriate manner.

In the event that unforeseen circumstances arise relative to this Avian Mortality Plan, or any CEC Condition of Certification, the CEC's Compliance Project Manager for this Project, the CEC's Project Manager or the CEC Siting Office Manager will be notified by the survey lead, to resolve the issue or determine a corrective course of action.

VIII. REFERENCES

AECOM

2009a. Ridgecrest Solar Power Project Avian Technical Report. Prepared for Ridgecrest Solar I, LLC. September.

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2009c. Ridgecrest Raven Control and Monitoring Plan, Biological Data Request Response #3. Prepared for Ridgecrest Solar I, LLC. December.

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Morrison, M. 2002. *Searcher Bias and Scanvenger Rates in Bird/Wind Energy Studies.* National Research Energy Laboratory. Golden, CO. NREL/SR-500-30876. Available at: http://www.nrel.gov/wind/pdfs/30876.pdf

Map Location

1 inch = 40 miles

0 40 80 Miles

Ridgecrest Solar Power Project Responses to 12/22/09 Data Requests

Figure DR-BIO-76-1 Regional Map

Source: ESRI; AECOM 2009

Solar Millennium

AECOM

Date: January 2010

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Attachment DR-BIO-77

Draft Desert Kit Fox Relocation/Translocation Plan

RIDGECREST SOLAR POWER PROJECT
DRAFT
DESERT KIT FOX
RELOCATION/TRANSLOCATION PLAN

Prepared for:
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January 2010

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DR-BIO-77-A Site Figures

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DR-BIO-77-3 Desert Kit Fox Observations

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I. INTRODUCTION

Ridgecrest Solar I, LLC (hereafter referred to as the Applicant), proposes to construct, own, and operate the Ridgecrest Solar Power Project (RSPP or Project). The Project would have a nominal output of 250 megawatts (MW) and consist of a single power plant utilizing two solar fields.

The RSPP site (Project site) is located in the high northern Mojave Desert in northeastern Kern County, California, about 5 miles southwest of the City of Ridgecrest, California (Figure DR-BIO-77-1). The Project right-of-way (ROW), for which the Applicant has applied to the Bureau of Land Management (BLM), includes approximately 3,995 acres of public lands owned by the Federal government and managed by BLM. The Project facilities would occupy approximately 1,448 acres of the 3,995-acre site, and the total disturbance area is estimated at 1,944 acres plus an additional 16.3 acres resulting from construction of the water pipeline off site.

During spring 2009, Project biologists completed the following surveys in the Project site: vegetation mapping; focused rare plant surveys; jurisdictional delineation of waters; general wildlife surveys; protocol Desert Tortoise surveys; protocol Western Burrowing Owl surveys; Mohave Ground Squirrel habitat suitability assessment; and avian point count surveys. Comprehensive biological resource survey methodologies were designed to meet all applicable United States Fish and Wildlife Service, BLM, California Department of Fish and Game (CDFG), and California Energy Commission (CEC) requirements. Surveys for the desert kit fox (*Vulpes macrotis arsipus*) were conducted as part of general wildlife surveys. A total of 75 desert kit fox burrows and burrow complexes, including four active complexes (three with pups confirmed), were recorded in the disturbance area. An additional 44 kit fox complexes, including four active complexes, were located in the Project site buffer.

Mitigation measures identified in the Application for Certification (AFC) (AECOM 2009a) and the Preliminary Habitat Mitigation and Monitoring Plan (AECOM 2009b) prepared for the RSPP recommend passive relocation of kit foxes to ensure avoidance of impacts from Project development. However, kit fox passive relocation may not be the most effective avoidance strategy in all instances. Attempts to relocate kit foxes via passive methods provide no guarantee that individuals would move to burrows that are not located within active construction zones. Therefore, it has been requested by the CEC that a more active avoidance strategy involving translocation of kit foxes from the RSPP to a location outside the Project disturbance area be included in this Plan. This Plan includes both passive relocation and active translocation procedures as well as a management component. However, passive relocation rather than translocation of kit fox is the preferred method due to its higher rate of success.

This Plan has been prepared on behalf of the Applicant and outlines the methods that would be implemented to protect kit foxes within Project disturbance areas and relocate kit foxes to suitable areas outside of the Project disturbance area or translocate kit foxes to suitable conservation areas away from the Project.

To reduce impacts on sensitive biological resources, the Project site plan was reconfigured to minimize impacts to the El Paso Wash. The Project description, including acreage calculations, presented below are based on the reconfigured site plan. However, survey results presented in this report are based on survey conducted in 2009, prior to the reconfiguration. Additional biological surveys would be conducted in spring 2010, after the site plan has been finalized, to ensure that all sensitive biological resources in the new Project footprint have been accurately identified and quantified. Following completion of spring 2010 surveys, impacts to sensitive biological resources would be updated and environmental compliance documents would be revised as appropriate. The Project mitigation would be developed based on the revised impact calculations.

II. BACKGROUND

A. Project Description

The proposed Project site is entirely on Federal land, BLM ROW # CACA 49016, in Township 28 South, Range 39 East and Township 27 South, Range 39 East. Access to the northern portion of the Project site would be provided by a new 24-foot wide paved access road from Brown Road, approximately 1.6 miles west of the intersection of Brown Road with U.S. Highway 395. This access road runs about 450 feet from Brown Road to the location of the new office building and continues for approximately another 3,000 feet to the entrance of the power block. Access to the southern portion of the Project site would also be provided by a new 24-foot wide paved access road from Brown Road, approximately 2.25 miles west of the intersection of Brown Road with U.S. Highway 395. This access road would run about 600 feet from Brown Road to the security gate for the south solar field.

The Applicant has applied for a ROW grant for approximately 3,995 acres of land owned by the Federal government and managed by BLM. The Project site is composed of undeveloped desert with naturally vegetated areas. There are no existing structures that would need to be demolished, but existing 115- and 230-kilovolt (kV) Southern California Edison (SCE) transmission lines that traverse the southwestern portion of the site will require relocation. Construction and operation of the RSPP would disturb a total of approximately 1,944 acres on-site plus an additional 16.3 acres resulting from construction of the water line off site. This total includes areas outside the fence line of the Project facilities themselves, primarily rerouted drainage channels that avoid Project facilities, a water line, and access roads.

The Applicant proposes to develop a 250-MW solar energy facility on approximately 1,448 acres (Plant Site). The Project will utilize solar parabolic trough technology to generate electricity. Arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. Heat transfer fluid (HTF) is heated to high temperatures (750 degrees Fahrenheit) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced.

The power plant will have two solar fields. The north solar field would be 894 acres and the south field would be 554 acres. The northern solar field would be located north of Brown Road and the southern solar field would be located south of Brown Road.

The power block would be located north of Brown Road, immediately southwest of the northern solar field. The power block would be composed of its own administration, control, warehouse, maintenance, and lab buildings; the HTF pumping and freeze protection system; solar steam generator; a propane-fired auxiliary boiler; one steam turbine generator; an air-cooled condenser; generator step-up transformer, transmission lines and related electrical system; potable and treated water tanks; and auxiliary equipment (i.e., water treatment system, diesel-powered emergency generator, and firewater system).

In addition to the main power generating facility, the site would include a main office building and parking lot, a main warehouse with laydown area, on-site access roads, a tie-in switchyard, and a land treatment unit for bioremediation or land farming of HTF-contaminated soil.

The Project would generate electric power solely via solar energy. Propane would be used to fire an auxiliary boiler overnight to support startup operations until the HTF system is up to operating temperature, at which time the generation of electricity can commence. A second fired heater would be used as needed, mostly during the winter, to prevent freezing of the HTF. A new, approximately 5-mile-long water pipeline would be installed within the Brown Road and China Lake Boulevard ROWs to connect the Project with the Indian Wells Valley Water District supply. (The diameter of the pipe could be 12 inch diameter or smaller depending on the Water District's determination.) A new 230- kV transmission line from the turbine generator to a new nearby switchyard will interconnect with SCE's existing 230- and 150-kV InyoKern/Kramer Junction transmission line located west of the Project site.

B. 2009 Desert Kit Fox Survey Results

Desert kit fox surveys were conducted concurrently with general and protocol wildlife surveys and vegetation mapping (Figure DR-BIO-77-2) to document all wildlife species observed on site and to assess the suitability of the RSPP to support special-status wildlife species. General wildlife surveys were conducted from February to June 2009.

Figure DR-BIO-77-3 depicts the locations of kit fox burrows, burrow complexes, and active burrow complexes observed during surveys. A total of 75 desert kit fox burrows and burrow complexes, including four active complexes (three with pups confirmed), were recorded in the disturbance area. An additional 44 kit fox complexes, including four active complexes, were located in the Project site buffer.

III. PLAN PURPOSE

The primary purpose of this Plan is to provide an effective and feasible strategy that would reduce impacts to the desert kit fox from the construction and operational impacts of Project

development. This Plan also fulfills the Project mitigation measures identified in the AFC document (AECOM 2009a). Once this plan is approved by the CDFG and CEC, the elements described herein would become part of the Project conditions of certification, with which compliance is required.

IV. PLAN GOALS

The goals of this Plan are to:

- Provide a relocation or translocation strategy to reduce impacts to desert kit foxes during Project implementation.
- Relocate or translocate all kit foxes within the Project disturbance area to a nearby area that provides suitable denning and foraging habitat.
- Relocate rather than translocate desert kit foxes whenever feasible.
- Minimize stress, disturbance, and injuries to relocated/translocated kit foxes.
- Minimize impacts to resident kit fox and other sensitive species within any translocation site.

V. DESERT KIT FOX RELOCATION/TRANSLOCATION PLAN

This section discusses generally strategies for the relocation or translocation of kit foxes for the RSPP. The Applicant will consult with CDFG and Dr. Brian Cypher, a recognized kit fox expert with the California State University, Stanislaus, Endangered Species Recovery Program, to identify specific measures to be incorporated into the final plan. The determination of whether to capture and translocate kit foxes or use passive relocation techniques will be based on the recommendations of CDFG and Dr. Cypher.

A multi-tiered approach is proposed to reduce impacts during the construction activities and operation of the Project. While mitigation often focuses on protecting animals in situ by making adjustments to construction activities near occupied burrows, moving individuals out of harm's way to off-site locations is sometimes the best alternative when limitations on Project redesign or construction scheduling exist. Because kit foxes are resident within the Project area, it may be necessary to move individuals out of harm's way when they are within the Project disturbance area scheduled for construction.

The schedule for relocating/translocating individual foxes would be outside the breeding season. The Applicants will consult with Dr. Cypher and CDFG to determine the optimal relocation/translocation period to minimize adverse impacts to the foxes. The following sections describe the recommended relocation/translocation methods and incorporate measures to minimize the likelihood of this species returning to the capture site.

A. Pre-Activity Surveys

A pre-activity survey of the Project disturbance area would be conducted prior to the beginning of ground disturbance and/or construction activities or any project activity likely to impact the desert kit fox. The timing of the survey would be dependent upon Project schedule and consultation with Dr. Cypher and CDFG. Surveys would generally be conducted in accordance with the *U.S. Fish and Wildlife Service San Joaquin Kit Fox Survey Protocol for the Northern Range* (1999). Surveys would identify kit fox habitat features on the Project site, evaluate use by kit fox and, if possible, assess the potential impacts to the kit fox by the proposed activity. The status of all dens would be determined and mapped. Written results of preconstruction/preactivity surveys would be submitted to CDFG within 5 days of survey completion. Relocation/Translocation methods would be implemented immediately upon authorization by CDFG.

B. Passive Relocation Strategy

Passive relocation would involve monitoring all kit fox dens identified during the pre-activity survey for three days with tracking medium or an infra-red beam camera to determine the current use. If no kit fox activity is observed during this period, the den would be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den would be monitored for at least five consecutive days from the time of the observation to allow any resident animal to move to another den outside of the Project disturbance area during its normal activity. Use of the den can be discouraged during this period by partially plugging its entrances(s) with soil in such a manner that any resident animal can escape easily. Only when the den is determined to be unoccupied may the den be excavated under the direction of a qualified biologist familiar with mammal tracking and kit fox ecology. If the animal is still present after five or more consecutive days of plugging and monitoring, the den may have to be excavated when, in the judgment of a biologist, it is temporarily vacant, for example during the animal's normal foraging activities. Hand excavation is preferred; however, soil conditions may necessitate the use of excavating equipment.

Destruction of the den would be accomplished by careful excavation until it is certain that no kit foxes are inside. The den should be fully excavated, filled with dirt, and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If at any point during excavation a kit fox is discovered inside the den, the excavation activity would cease immediately and monitoring of the den as described above should be resumed. Destruction of the den may be completed when, in the judgement of the biologist, the animal has escaped from the partially destroyed den. Active natal and pupping dens would not be destroyed until the pups and adults have vacated the den and then only after consultation with CDFG.

C. Translocation Strategy

As described previously, relocation is the preferred option for moving kit foxes out of harm's way because it is more successful. However in order to be responsive to the CEC data request, we have included this discussion of translocation procedures.

A translocation site would be selected that is suitable for and can accommodate all species to be actively translocated from the site of the RSPP, including desert tortoise, Mohave ground squirrel, burrowing owl, desert kit fox, and American badger. Since the translocation site has not yet been selected, it is not possible at this time to describe habitat suitability or any desert kit fox population that may exist on the site. The process of selecting a suitable site is described below.

There is no agency-approved protocol for translocating desert kit fox in California; however, the following translocation procedures have been developed using strategies employed by the Endangered Species Recovery Program in relocating the federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*). Prior to any translocation activities, permission would be obtained from the CDFG to relocate desert kit foxes from the site. Translocation involves the capture of individual kit foxes and moving them to a location away from the Project site with suitable habitat for the species. The translocation procedures involve translocation site selection, site management and preparation, pre-construction surveys, trapping, care of kit foxes while captured, and kit fox release. The Applicant is not proposing post release monitoring of translocated individuals at this time, however the Applicant will engage CDFG in consultation to determine if it is necessary.

Translocation Site Selection

Translocation sites could be just outside the Project disturbance area or can include areas that are farther away from the Project site. Site attributes that must be considered include habitat type, terrain, prey abundance, competitor and predator abundance, available escape cover, available acreage, land ownership and use, linkage or the ability to create linkage to other areas of habitat, and potential human disturbance. Additionally, the current status of kit foxes on a site must be considered. Since translocation sites would be considered for multiple species, there is a possibility that requirements for all species may not be met. Therefore, if kit foxes currently are not present at a given site, then the reasons for their absence need to identified, and if not done so already, these limiting factors need to be mitigated. The more optimal the site attributes at a translocation site, the higher the probability of successfully introducing kit foxes from the Project site. Sites with existing or likely future conservation status (e.g., lands acquired specifically to mitigate for Project impacts) would also be considered priority sites since conservation status is likely to ensure minimal disturbance and reduce risks from anthropogenic activities.

Translocation Site Management

Private lands acquired for kit fox translocation would be managed in perpetuity for kit fox viability and habitat suitability per a site-specific management plan to be approved by the CDFG. An appropriate monetary endowment for translocation site management would also be secured to

ensure the management plan components are implemented. A property title transfer to CDFG may also be required where private lands are acquired for translocation purposes.

Completion of a public land lease per BLM realty provisions and/or development of a Memorandum of Understanding with a local BLM field office would be necessary to utilize public lands managed by BLM for translocation. Public land status under the recently adopted Land Tenure Adjustment Plan (BLM 2005), i.e., lands identified for retention or disposal, as well as their Multiple Use Classification (Limited, Moderate or Unclassified), would be primary considerations in such an endeavor. Approval by BLM's California State Office is also required for any public land wildlife translocation.

Site-specific National Environmental Policy Act (NEPA) documentation likely would be required for any considered translocation action involving federal public lands. The BLM's multiple-use mandate would be applicable and potential translocation site management needs would need to be considered and implemented to ensure compliance with that mandate.

Translocation Site Preparation

Once an appropriate translocation site(s) has/have been identified, surveys for resident kit foxes would be conducted to characterize the existing or potential use of the translocation site by kit foxes and to determine habitat management potential.

Capture, Transportation, and Release Methods

Methods successfully employed by the Endangered Species Recovery Program for capturing, transporting and caring for San Joaquin kit foxes are recommended for the translocation of desert kit foxes (Bremner-Harrison and Cypher 2007). Those methods involve live-trapping and handling with a bag. Wire-mesh box traps (measuring 38 x 38 x 107 centimeters [cm]) would be baited with meat products. To reduce tooth injuries, each trap would contain two rope chew toys, with one attached to each end of the trap. In addition, the traps would be covered with a heavy-duty tarpaulin that provides shelter from inclement weather and shade from the sun

During the handling procedure, foxes are coaxed from the trap into a denim handling bag that is approximately 75 x 75 cm. Using this method, the animal is manually restrained, which precludes the need for chemical immobilization (and associated risks). The handling bag not only restrains the fox, but also covers its eyes and affords it a sense of security, and most foxes are generally calm while in the bag.

Foxes can be transported from capture sites to release sites in hard-plastic portable pet carriers. A carrier sized to transport a cat or small-medium dog would be sufficient for transporting kit foxes. All attempts would be made to release kit foxes within a few hours of their capture in order to avoid unnecessary stress that may result from captivity. However, if foxes are going to be retained in the carrier for more than approximately eight hours, a carrier that is sufficiently large to allow foxes to stand and move around should be used. The carriers would contain water to avoid possible dehydration resulting from the stress of capture, handling, and transportation.

Also, if foxes would be retained in carriers overnight, food would be offered. Carriers containing foxes should be placed somewhere protected, quiet, and shaded.

Foxes would be transported in a vehicle that to the extent practical maximizes their comfort and minimizes stress. Foxes would not be subjected to excessive sun, wind, noise, or vibration. Enclosed, but sufficiently-ventilated, trucks or vans would work well. Carriers would be secured such that they do not slide or tip over.

Dr. Cypher would manage the translocation program, which would include the capture, transportation, and release of all translocated kit foxes.

D. Reporting

A report would be submitted following the relocation/translocation season (August through October) in those years when kit fox relocation or translocation was implemented (primarily during years of construction). The reports would be submitted to CDFG and the CEC. These reports would include, but not be limited to the following data:

- Project name, locations, and all pertinent information pertaining to the origin site.
- Dates and locations of kit foxes detected on the Project site.
- Observations made during monitoring of active kit fox dens.
- Dates and success of passive relocation efforts.
- Dates of capture for translocation efforts.
- Date, location and habitat information for kit fox releases.

Additional, interim reporting on the relocation/translocation efforts would be provided to CDFG via electronic mail and would include the date trapping efforts began, the date of burrow excavations, findings, and initiation of activities. Any kit fox injuries, mortality, or other unforeseen circumstances would be reported to all resource agencies within 24 hours.

VI. REFERENCES

AECOM

2009a Ridgecrest Solar Power Project Application for Certification. Prepared for Solar Millennium. August.

2009b Preliminary Habitat Mitigation and Monitoring Plan, Ridgecrest Solar Power Project. Prepared for Solar Millennium. December.

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ATTACHMENT DR-BIO-77-A

SITE FIGURES

DR-BIO-77-1 Regional Map
DR-BIO-77-2 Vegetation Communities
DR-BIO-77-3 Desert Kit Fox Observations

Ridgecrest Solar Power Project Responses to 12/22/09 Data Requests

Figure DR-BIO-77-1 Regional Map

Source: ESRI; AECOM 2009

Solar Millennium

AECOM

Date: January 2010

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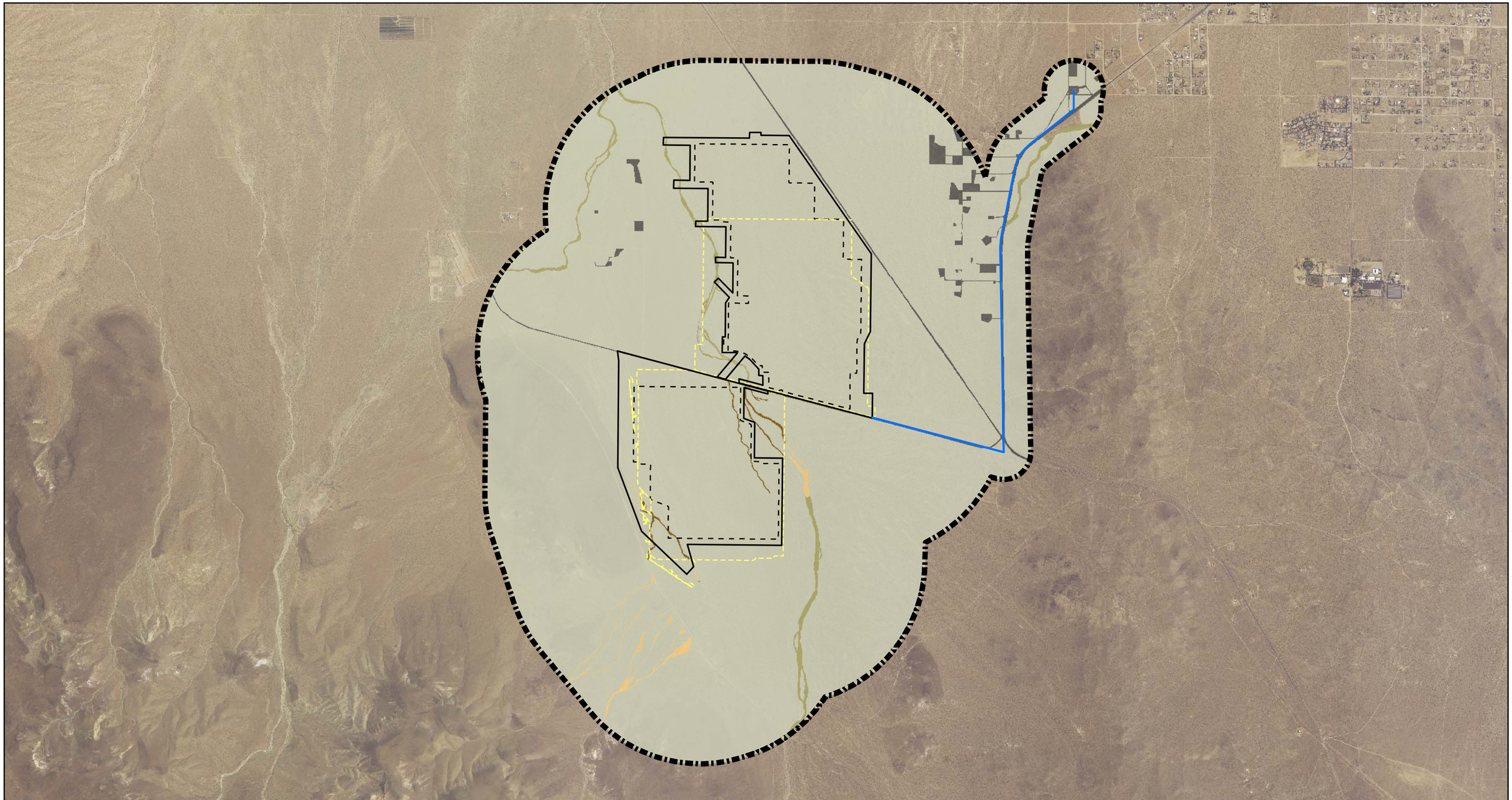

Map Location

Legend

- Surveyed Biological Resources Survey Area (BRSA)
- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Vegetation Communities

Riparian

- Mojave Desert Wash Scrub
- Unvegetated Ephemeral Dry Wash
- Unvegetated Ephemeral Dry Wash (Presumed) [1]

Upland

- Mojave Creosote Bush Scrub

Other

- Developed

[1] NOTE: Due to minimum mapping unit within buffer (1.0 mile), these areas are presumed to be unvegetated

Source: NAIP 2005; CNDDB 2009; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-77-2
Vegetation Communities

Solar Millennium

AECOM

Date: January 2010

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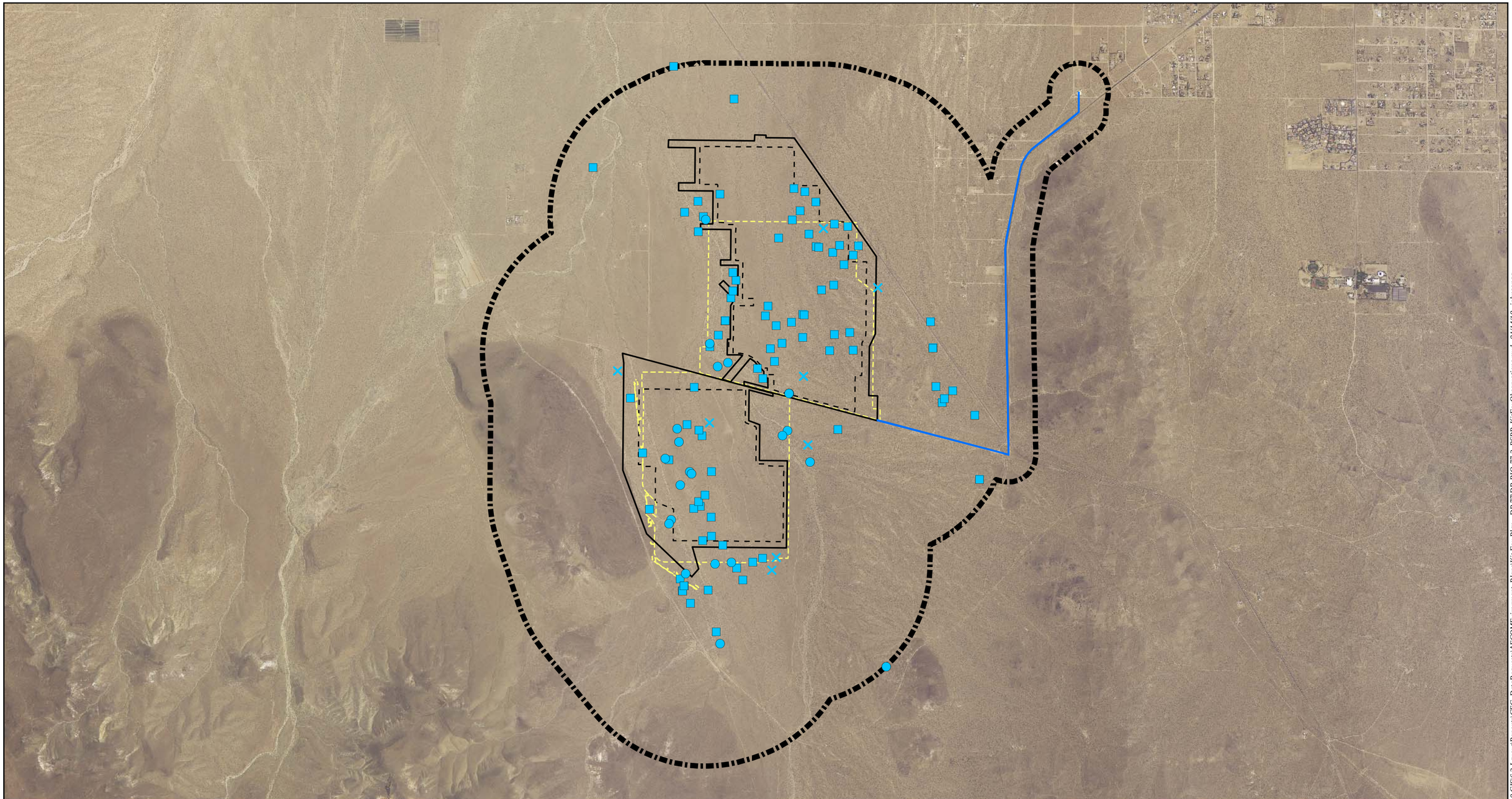

Map Location

Legend

- Biological Resources Survey Area (BRSA)
- Facility Footprint
- Reconfigured Disturbance Area
- Water Line Disturbance Area
- Surveyed Disturbance Area

Resident Special-Status Wildlife Species Observations

- Active Kit Fox Burrow Complex
- Kit Fox Burrow
- Kit Fox Burrow Complex

Source: NAIP 2005; AECOM 2009; EDAW 2009

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

Figure DR-BIO-77-3
Desert Kit Fox Observations

Solar Millennium

AECOM

Date: January 2010

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In a letter dated December 1, 2009, the staff of the California Energy Commission (CEC) provided guidance to Ridgecrest Solar I, LLC (the Applicant) concerning the review of cultural resources under Federal (National Environmental Policy Act [NEPA] and Section 106 of the National Historic Preservation Act [NHPA]) and State (California Environmental Quality Act [CEQA]) law. The letter outlined three approaches, each of which requires an equally thorough review of cultural resources under the law by the CEC and the Bureau of Land Management (BLM).

The first approach is typically used for projects with a relatively small number (≤75) of cultural resources. Under this approach, Applicants would complete all investigations necessary to identify, evaluate the significance of, and assess the reasonably foreseeable impacts to cultural resources in the Project area before the CEC's Staff Assessment.

The second approach is commonly used for projects with a larger number (>75) of cultural resources. Under this approach, the CEC and the BLM would draft their joint CEQA and NEPA analysis on the basis of an assessment of a large sample (≥25 stage) of the cultural resources identified during inventory. On the basis of the inventory and sample, a Programmatic Agreement (PA) concerning the disposition of cultural resources would be executed as part of the NHPA section 106 process. All further cultural resources compliance work would be subject to the provisions of the PA.

The third approach was developed by the CEC and BLM staff to facilitate the review of certain solar thermal projects with compressed review schedules, including the RSPP. Under this approach, all inventoried cultural resources would be assumed to be historically significant for the purposes of the joint CEQA and NEPA analysis. Those cultural resources that staff could determine to be not historically significant on the basis of extant inventory information, or those that would not be affected by the project, could be excluded from further assessment work. Thorough consideration and treatment of cultural resources in the Project area would be ensured through the use of a phased treatment plan as specified in a Memorandum of Agreement pursuant to the NHPA Section 106 process. This treatment plan would be executed after the issuance of the CEC's Staff Assessment but before the onset of construction.

Subsequent to the receipt of the December 1, 2009 letter, the Applicant received the CEC's Data Requests for Cultural Resources as part of the combined RSPP Data Requests Set 1, dated December 22, 2009. In those requests, staff indicated which data requests for cultural resources must be answered under each of the three specified approaches. Under Approach 1, responses to all of the data requests for cultural resources are required. Under Approach 2, responses to all but Data Request (DR) 105 are required. Under Approach 3, responses are required to only DRs 89, 94-96, 99-116. The Applicant has chosen Approach 3 for the assessment, treatment, and disposition of cultural resources affected by the RSPP. Therefore, responses are provided only in the following pages for those DRs specified by CEC staff as required under Approach 3.

DR-CUL-79

Information Required:

> In a table, please list all linear facilities that entail trenching or the excavation of holes for footings, and provide, for both the on- and off-site segments of each, the total length of each facility, and the trench dimensions (width and depth of excavation) required to install each.

Response:

No response required under Approach 3.

DR-CUL-80

Information Required:

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

Response:

No response required under Approach 3.

DR-CUL-81

Information Required:

In a table, please list all buildings and structures the project would erect and provide the height of each.

Response:

No response required under Approach 3.

DR-CUL-82

Information Required:

Please provide, for both solar fields, the maximum elevation range and the finished grade elevation.

Response:

No response required under Approach 3.

DR-CUL-83

Information Required:

Please provide, for both solar fields, a description of any terracing required for the installation of the collectors, including any necessary stormwater drainage system.

Response:

No response required under Approach 3.

DR-CUL-84

Information Required:

Please provide Figure 2-4 revised as a series of color figures at a larger scale (suggested: 1"=500 feet) and using colored line types to show linear facility routes and other project features such as fences and roads of various types.

Response:

No response required under Approach 3.

DR-CUL-85

Information Required:

Please include in the revised Figure 2-4 series, in addition to components already depicted, the following additional project components:

a) on-site transmission lines
b) off-site transmission lines, new and re-routed
c) on-site fiber optic system, overhead and/or underground, on- and off-site
d) on-site steam lines
e) on-site and off-site water pipelines
f) on-site firewater system pipelines
g) septic tanks and leach fields
h) drainage diversion channels
i) all project-constructed roads, on- and off-site
j) culverts
k) land treatment unit

Response:

No response required under Approach 3.

DR-CUL-86

Information Required:

Please provide a discussion of the dimensions and depth of ground disturbance that would result from removal of the supports for the two lines.

Response:

No response required under Approach 3.

DR-CUL-87

Information Required:

If the Inyokern-Kramer 230-kV transmission line is older than 45 years:

a) Please have a qualified architectural historian provide a discussion, supported by documentation, of the line's potential eligibility for the NRHP and the CRHR.

b) Please have the qualified architectural historian provide a discussion, supported by documentation, on all seven aspects of integrity for the Inyokern-Kramer 230-kV transmission line.

c) Please have the architectural historian complete for submission to staff the DPR 523b (Building, Structure, and Object) and DPR 523e (Linear Structure) forms for the Inyokern-Kramer 230-kV transmission line.

Response:

No response required under Approach 3.

DR-CUL-88

Information Required:

If the area into which the two SCE lines would be re-located has not previously been surveyed for cultural resources:

a) Please have a qualified archaeologist survey these sites and record on Department of Parks and Recreation (DPR) 523 forms any cultural resources that are identified; and

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

Response:

No response required under Approach 3.

DR-CUL-89

Information Required:

Please submit for staff review and approval a research plan to locate and identify the configuration of the Gold Hill #1, Gold Hill #2, and Jumbo mines in section 35, T27S R39E (or, alternatively, in section 35, T27S R40E), and to recommend whether nearby historic-period archaeological sites are associated with these mines (and, if so, which ones), and whether the sites together possibly constitute an archaeological district. The research plan should include:

a) Having a qualified historian search for and copy records of the mines in the Kern County Recorder's and Assessor's Offices. The name of the mine owner was Frank A. Huntington of 21 Fremont Street, San Francisco, California. Staff will provide notes on the mines and a copy of the relevant portion of the 1904 "Bureau of Mines Map and Register of Mines and Minerals of Kern County." Gold Hill #1 is shown in the NE ¼ of section 35, Gold Hill #2 in the SE ¼ and Jumbo is depicted slightly west of the midpoint of the section;

b) Conducting a field verification of the mines, if located, recording and mapping them on Department of Parks and Recreation (DPR) 523 forms, and using geophysical methods, such as Ground Penetrating Radar, to identify and map unfilled subsurface tunnels, shafts, and drifts, etc.;

c) Having a qualified historical archaeologist review the collected information on early twentieth-century historic-period archaeological sites in section 35, discuss all pertinent data supporting or discounting the presence of an archaeological district based on a mining theme, and make a recommendation on the eligibility of such a district for the NRHP and/or the CRHR. In addition to the mines themselves and any roads or trails in section 35, the following sites, at a minimum, should be considered as potential contributors to the district—

   i. Sites having blasting powder cans (RS-162/163, RS-728/731, RS-739, and RS-7520);

   ii. Sites dating to the early twentieth century (RS-325, RS-607, RS-614, RS-726, RS -742, RS-746, RS-750, and RS-757).

Response:

A research plan to identify and locate the configuration of the Gold Hill #1, Gold Hill #2, and Jumbo mines, and addressing map research and archaeological site information as requested, will be submitted to the CEC by 2/26/2010. Field verification including ground penetrating radar will be submitted to the CEC by 3/31/2010.

DR-CUL-90

Information Required:

Please submit to staff a research report including the results of the archival research and the geophysical testing, the discussion and eligibility recommendation regarding an archaeological district in section 35, copies of all county records, and DPR 523 forms for the three mines.

Response:

No response required under Approach 3.

DR-CUL-91

Information Required:

Please provide to staff any information on Native American concerns about the proposed project received by the applicant since August, 2009.

Response:

No response required under Approach 3.

DR-CUL-92

Information Required:

Please provide the dimensions and depth into the ground of the hole excavated for the Land Treatment Unit.

Response:

No response required under Approach 3.

DR-CUL-93

Information Required:

Please provide a description of the process of constructing the Land Treatment Unit.

Response:

No response required under Approach 3.

DR-CUL-94

Information Required:

Please indicate whether the proposed project may use any non-licensed, non-commercial soil borrow or disposal sites. If so:

- Please have a qualified archaeologist survey these sites and record on Department of Parks and Recreation (DPR) 523 forms any cultural resources that are identified; and
- Please submit to staff, under confidential cover, a report on the methods and results of these surveys, with recommendations for the treatment of any cultural resources identified in the surveys.

Response:

RSPP will not use any non-licensed, non-commercial soil borrow or disposal sites because there are no proposed fill disposal or fill procurement sites. The earthwork on site is balanced.

DR-CUL-95

Information Required:

Please have a qualified archaeologist survey these sites and record on Department of Parks and Recreation (DPR) 523 forms any cultural resources that are identified.

Response:

The RSPP will not use any non-licensed, non-commercial soil borrow or disposal sites because there are no proposed fill disposal or fill procurement sites.

DR-CUL-96

Information Required:

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

Response:

The RSPP will not use any non-licensed, non-commercial soil borrow or disposal sites because there are no proposed fill disposal or fill procurement sites.

DR-CUL-97

Information Required:

Please provide the length, width, and depth of each off-site surface water diversion channel, of the on-site detention pond, and of each on-site swale.

Response:

No response required under Approach 3.

DR-CUL-98

Information Required:

Please provide a map, or series of maps, at a scale of 1”=500’ showing all of the off- and on-site drainage features, labeled for easy reference to the above dimension data.

Response:

No response required under Approach 3.

DR-CUL-99

Information Required:

Please provide a copy of the geotechnical report for the proposed project when it becomes available.

Response:

A copy of the preliminary geotechnical report was provided as Appendix B to the Application for Certification, submitted to the CEC on September 1, 2009. A final geotechnical report will be likely provided to the CEC in late spring/early summer of 2010.

DR-CUL-100

Information Required:

Please obtain the services of a professional in geoarchaeology: a person who, at a minimum, meets the U.S. Secretary of the Interior's Professional Qualifications Standards for prehistoric archaeology, as published in Title 36, Code of Federal Regulations, part 61, and has completed graduate-level coursework in geoarchaeology, physical geography, geomorphology, or Quaternary science, or who has education and experience acceptable to staff. Please submit the resume of the proposed geoarchaeologist for staff review and approval.

Response:

Please see the resume for Matthew Steinkamp, geoarchaeologist, provided as Attachment DR-CR-100.

DR-CUL-101

Information Required:

Please have the approved geoarchaeologist provide a discussion, based on the available Quaternary science and geoarchaeological literature, of the historical geomorphology of the proposed project's APE, including:

a) A description of the development of the landforms, with dates, focused on the character of the depositional regime of each landform from the Late Pleistocene epoch to the present;

b) Data on the geomorphology, sedimentology, pedology, hydrology, and stratigraphy of the APE, and the near vicinity; and

c) The relationship of landform development to the potential in the APE for buried archaeological deposits.

Response:

Please see Geoarchaeology Monitoring Report provided as Attachment DR-CR-101 and submitted under confidential cover as requested by the CEC.

DR-CUL-102

Information Required:

Please have the approved geoarchaeologist produce a map or maps of the landforms present in the project area at a scale of not less than 1:24,000; the data sources for the maps may be any combination of published maps and/or satellite or aerial imagery that has been subject to field verification, and/or the result of field mapping efforts; the maps should overlay the project APE on the landform data. Please also provide the metadata for each overlay used.

Response:

Please see Geoarchaeology Monitoring Report provided as Attachment DR-CR-101 and submitted under confidential cover as requested by the CEC.

DR-CUL-103

Information Required:

Absent sufficient technical literature pertinent to the reconstruction of the historical geomorphology of the project APE, and absent sufficient field data to elucidate landform relationships, please have the approved geoarchaeologist design a primary geoarchaeological field study of the project APE, submit a research plan for staff approval, and conduct the approved research. The purpose of the study is to facilitate staff's assessment of the likelihood of the presence of subsurface components for previously known or found surface archaeological deposits and of buried archaeological deposits in the project's APE. The primary study should, at a minimum, include the following elements:

a) A subsurface sampling strategy to document the landform stratigraphy not revealed in natural exposures;

b) Data collection necessary for determinations of the physical character, the ages, and the depositional rates of the various sedimentary deposits and paleosols that may be beneath the surface of the landforms in the project APE, to the proposed maximum depth of ground disturbance. Data collection at each sampling locale should include a measured profile drawing and a profile photograph (with a metric scale), and the screening of a small sample (three 5-gallon buckets) of sediment from the major sedimentary units in each profile through ¼- inch mesh hardware cloth. Data collection should also include the collection and assaying of enough soil humate or other organic samples to reliably radiocarbon date a master stratigraphic column for each sampled landform; and

c) An analysis of the collected field data and an assessment, based on those data, of the likelihood of the presence of subsurface components for previously known or found surface archaeological deposits and of buried archaeological deposits in the project APE, and, to the extent possible, the likely age and character of such deposits.

d) Use any natural exposures that reveal aspects of the stratigraphy of the portions of the landforms in the project APE;

Response:

Please see Geoarchaeology Monitoring Report, provided as Attachment DR-CR-101 and submitted under confidential cover as requested by the CEC.

DR-CUL-104

Information Required:

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

Response:

Please see Geoarchaeology Monitoring Report, provided as Attachment DR-CR-101 and submitted under confidential cover as requested by the CEC.

DR-CUL-105

Information Required:

Please provide to staff a series of scaled and dimensioned plan-and-profile views of the proposed project's (and alternative locations') impact blocks.

Response:

The response to this Data Request will be submitted to the CEC by February 20, 2010.

DR-CUL-106

Information Required:

Please explicitly discuss the efficacy of modeling the potential archaeological characteristics and spatial distribution of at-this-time unknown Native American traditional use areas on the basis of available ethnographic information and theoretical principles of ethnogeography.

Response:

The response to this Data Request will be submitted by February 10, 2010.

DR-CUL-107

Information Required:

If reasonably practicable, please develop such a model and submit for staff review and approval a research plan for the field verification in the APE of the model's predictions and recordation of identified traditional use areas.

Response:

The response to this Data Request will be submitted to the CEC by February 20, 2010.

DR-CUL-108

Information Required:

Please implement the staff-approved plan and provide to staff a report on the results and a comprehensive discussion of the traditional use areas in and adjacent to the project APE that may be subject to the visual impact of the construction, operation, and maintenance of the proposed project (e. g., landforms in sight of the APE on which sacred or other traditional activities took place). Please include any additional DPR 523 site forms in an appendix.

Response:

The response to this Data Request will be submitted to the CEC by February 20, 2010.

DR-CUL-109

Information Required:

Please provide a simulation (three-dimensional view) of the proposed power plant in the surrounding landscape, as seen from the following UTM locations in the El Paso Mountains:

Note: the locations below are not known locations of features sacred to Native Americans, but were chosen by staff as possible vantage points from which the plant site would be visible from the mountains.

a) Zone 11 E430160/N3933940
b) Zone 11 E430714/N3934268
c) Zone 11 E428660/N3931024
d) Zone 11 E427744/N3931690
e) Zone 11 E428488/N3930238
f) Zone 11 E430083/N3926845

Response:

The response to this Data Request will be submitted to the CEC by February 10, 2010.

DR-CUL-110

Information Required:

Please conduct a Bureau of Land Management (BLM) class III pedestrian archaeological survey and a built-environment survey of the entire BLM-authorized ROW north of Brown Road.

Response:

Class III archaeological surveys and built environment surveys of the entire BLM-authorized right of way (ROW) north of Brown Road are expected to begin in early February 2010, with results to be provided under confidential cover to staff and BLM in June 2010.

DR-CUL-111

Information Required:

Please complete DPR 523 forms for additional identified sites and make a recommendation on the NRHP and CRHR eligibility of each additional site.

Response:

Class III archaeological surveys and built environment surveys of the entire BLM-authorized ROW north of Brown Road are expected to begin in early February 2010, with results, including DPR 523 forms, to be provided under confidential cover to staff and BLM in June 2010.

DR-CUL-112

Information Required:

Please provide to staff a survey report for the additionally surveyed area and copies of the additional DPR 523 forms.

Response:

Class III archaeological surveys and built environment surveys the entire BLM-authorized ROW north of Brown Road are expected to begin in early February 2010, with results in a survey report of copies of DPR 523 forms to be provided under confidential cover to staff and BLM in June 2010.

DR-CUL-113

Information Required:

For any alternative site locations not on BLM lands (to be identified at a later date by staff), please provide to staff, under confidential cover, the following:

a) Copies of county records of any mines located on the alternative site locations;

b) Copies of DPR 523 site forms for all previously known cultural resources from California Historical Resources Information System (CHRIS) record searches, for the alternative locations, out to 1.0 mile beyond the sites' and associated linear facility corridors' boundaries;

c) Copies of CHRIS reports of previous archaeological excavations and architectural surveys conducted within the boundaries of the alternative sites and their linear facility corridors;

d) A copy of the results of the Native American Heritage Commission's (NAHC) sacred lands database search for each alternative location;

e) Copies of all letters sent to and received from Native Americans identified by the NAHC as interested in development at each alternative location;

f) A consultation with local historical societies and museums to establish the background history of the alternative project site locations;

g) An examination of historic maps to identify former and extant buildings and structures, including trails, roads, and other infrastructure, aged 45 years or older, for each alternative location;

h) A map at a scale of 1:24,000 depicting the locations of all previously known and map-identified cultural resources for each alternative location; and

i) A discussion of the comparative advantages and disadvantages of the proposed project and each alternative location, with respect to cultural resources.

Response:

Records searches have been completed for the Garlock Road Alternative. The results of this Class I record searches will be submitted on February 12, 2010. Letters to the Native American Heritage Commision (NAHC) have been submitted.

Material to be provided under confidential cover from the record searches include: (1) copies of DPR 523 site forms for all previously documented cultural resources from the California Historical Resources Information System (CHRIS) record searches and from any BLM records within a one-mile radius around the boundaries of the sites and associated linear facility corridors; (2) copies of reports filed with CHRIS of previous archaeological investigations and architectural surveys conducted within the boundaries of the alternative sites and their linear facility corridors; (3) a copy of the results of the NAHC's sacred lands database search for each alternative location; and (4) copies of all letters sent to and received from the NAHC and those Native Americans identified by the NAHC as potentially interested in development at each alternative location.

DR-CUL-114

Information Required:

> If the applicant has analyzed other alternatives, unique to the proposed project, please provide to staff the above requested information for each additional alternative.

Response:

No other alternatives have been analyzed for cultural resources at the level specified in DR-CR-113.

DR-CUL-115

Information Required:

Please provide a definition of the archaeological surface APE for the proposed project, identifying the areas included in it.

Response:

The archaeological surface Area of Potential Effects (APE) is defined as the extent of the reconfigured Project plant site disturbance area and disturbance areas associated with any linear features such as transmission corridors. The RSPP APE consists of the Project site disturbance area and one water line, which total approximately 1,944 acres. Note that this acreage total is without the mandated CEC survey buffers, which add an additional 350 acres. The APE includes all or part of Township 27S and Range 39E, Sections 13, 14, 23, 24, 25, 26, 27, 34, 35, and 36; and Township 27S and Range 40E, Sections 17, 18, 19, 30, and 31. These sections are located in the Inyokern and Ridgecrest South 7.5" USGS topographic quadrangle maps.

DR-CUL-116

Information Required:

Please provide a map at a scale of 1:24,000 depicting the final and definitive archaeological surface APE for the proposed project.

Response:

Please see attached non-confidential map, Figure DR CUL-116.

DR-CUL-117

Information Required:

Please conduct archaeological testing on the nine subject sites according to the following procedures:

a) Use an excavation unit 50 centimeters (cm) square, excavated using hand tools (trowels or shovel) in 10-cm arbitrary levels, unless natural stratigraphy becomes evident, to a depth of 50 cm, unless minimal or no cultural material is encountered below 30 cm, with screening of excavated material through ⅛" mesh and all objects remaining in the screen visually inspected before discarding.

b) Standard professional archaeological excavation techniques and data recordation parameters must be observed, including an adequate digital photographic record of all excavations. CARIDAP (California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatter Guidelines, February, 1988) methods and standards can be used as a base protocol for the three flake scatter sites. If problems arise during testing, then the consultant and BLM and Energy Commission cultural resources specialists will consult to resolve them and reach a consensus on how to proceed.

c) Number and placement of test excavation units are as follows:

   i. Site RS-19c is a single basalt metate with a white silicate flake located about 11 meters (m) from the milling stone. Four units will be excavated. One unit will be placed at the location of the metate, another unit will be centered on the flake, and a third unit will be subjectively placed within 5 m of the flake's location after that unit has been completed, thus using that result to guide the placement of the third unit. The fourth unit will be arbitrarily placed within a 5-m radius of the metate.

   ii. Site RS-154 is a low-density flake scatter of approximately 22 silicate flakes in a 26-m-by-18-m area. Five units will be excavated over the breadth of the site's area, with one unit placed in the center of the site and the other four in each of the cardinal directions.

   iii. Site RS-407 consists of two adjacent rock cairns that are not attributed to either prehistoric or historic-period origins. One excavation unit will be placed at each cairn, and only one quarter of the unit will be excavated, leaving three-quarters of the cairn undisturbed. To facilitate excavation, those rocks within the quarter being excavated will be moved out of the unit in the course of the excavation. A third unit will be randomly placed within a 5-m radius of the two cairns. If any unit should contain archaeological evidence, then two additional units will be subjectively placed within the 5-m radius.

iv. Site RS-409 consists of two metates, a metate fragment, and one obsidian flake located about 30 m from the other artifacts. Four units will be excavated. One unit will be placed at the location of the obsidian flake and another will be subjectively placed within a 5-m radius of it. A third unit will be placed within a 3-m radius of the two metates, with the fourth placed subjectively within a 5-m radius.

v. Site RS-410 is a low-density flake scatter of approximately seven flakes of mixed materials (obsidian, silicates, and fine-grained metavolcanics) within a 45-m-by-20-m area. Five units will be excavated over the breadth of the site's area, with one unit placed in the center of the site and the other four in each of the cardinal directions.

vi. Site RS-604 consists of a single metate with two adjacent metate fragments. Three units will be excavated. One unit will be placed within one meter of the metate, and another unit within one meter of the two fragments. The third unit will be subjectively placed within a ten meter radius of the metate. No site map has been prepared for this site, so one will be generated in the course of the work on this site.

vii. Site RS-720 was recorded as a groundstone scatter consisting of two manos and four metate fragments within a 16-m-by-12-m area. A field inspection of this site on November 4, 2009, identified a possible rock cairn and two metate fragments not previously noted by the applicant lying about 30 m southeast of the main concentration. The DPR 523 form for this site, including the site map, will be updated to include these additional features. A minimum of five units will be excavated. One will be placed within 1 m of the metate fragment cluster nearest the applicant's datum. A second unit will be within 1 m of the two metates recorded in the northeast sector of the site. The third unit will encompass a portion of the newly noted rock cairn. The fourth unit will be placed within a 3-m radius of the two newly discovered metate fragments, and a fifth unit will be placed subjectively based upon results of the previous units.

viii. Site RS-850 is a sparse flake scatter of four flakes within a 25-m-by-22-m area. Five units will be excavated over the breadth of the site's area, with one unit placed in the center of the site and the other four in each of the cardinal directions.

ix. Site RS-870 consists of groundstone artifacts with an associated flake scatter in a 14-m-by-8-m area. Four units will be excavated. One unit will be placed on the metate location, the second over the location of the silicate scraper, and the third will be placed adjacent to the recorded mano. Based on results obtained from the first three units, a fourth unit will be subjectively placed within a 5-m radius of the site center.

d) Collect and catalogue all archaeological artifacts and retain representative samples for future analysis, as appropriate, of cultural deposits such as soil, ash, charcoal, and floral and faunal remains. The resulting collection, along with a legible photocopy of any notes generated and updated DPR 523 forms, will be delivered to the Maturango Museum for permanent curation.

Response:

No response required under Approach 3.

DR-CUL-118

Information Required:

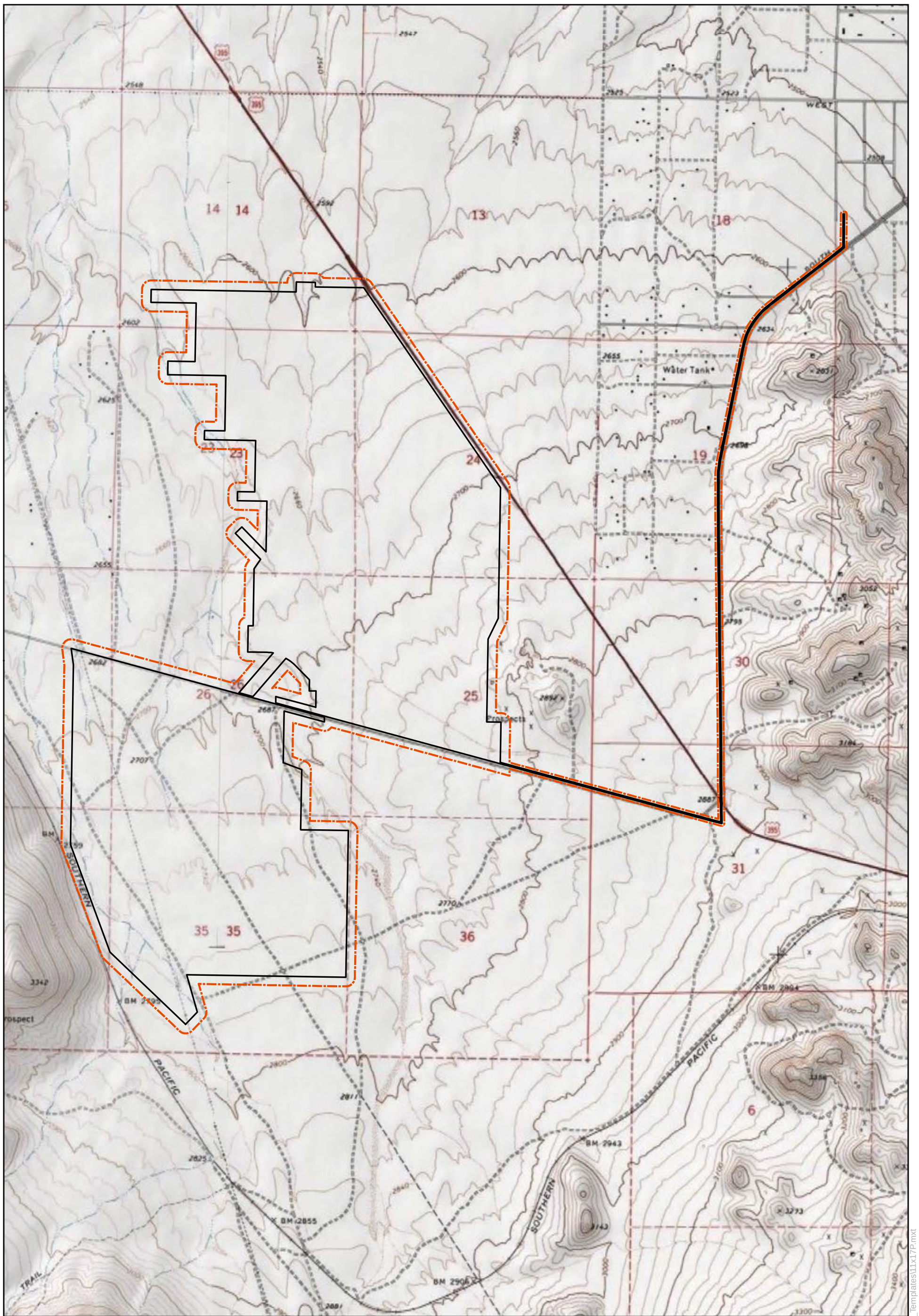
After the completion of the testing and analyses, please provide to BLM and Energy Commission cultural resources specialists for review and approval a summary report of results and eligibility recommendations, with the updated DPR 523 forms included in an appendix.

Response:

No response required under Approach 3.

Attachment

Cultural Figure



Map Location

Legend

- Archaeological Surface Area of Potential Effects (1,944 acres)
- CEC Buffers (Additional 350 acres)

Source: USGS7.5" Quadrangles Inyokern (1972) and Ridgecrest South (1973); AECOM 2009

1 inch = 2,000 feet

0 2,000 4,000 Feet

Class III Cultural Resources Report for the Ridgecrest Solar Power Project

DR-CR-116 Project Area of Potential Effects

Solar Millennium

AECOM

Date: January 2010

Y:\Projects\Solar_Millennium\Figure_Templates\11x17P.mxt

Attachment DR-CULT-100

Matthew Steinkamp Resume

SWCA
ENVIRONMENTAL CONSULTANTS

MATTHEW J. STEINKAMP, M.S.
Geoarchaeologist

Education

- M.S., Geology, Oregon State University, 2006
- B.A., Anthropology, University of Cincinnati, Ohio, 1986

Registration / Certification

- NHPA Section 106 Compliance Certification. Instructor: Dr. Thomas King, 2007
- Geologist In Training (G.I.T) Oregon Board of Geologist Examiners, 2007
- NAUI certified diver, 1991

Expertise

- Cultural resource survey design, testing, data recovery, monitoring, field methods.
- Stratigraphy and Sedimentology
- Geomorphological and geological analysis, core logging.
- Lithic analysis and raw material analysis
- Northwest, Basin and Range, Southwest, Northeast, Southeast, Midwest region prehistoric and historic archaeology.
- Micro-fossil analysis
- Underwater archaeology

Selected Projects

- Geoarchaeologist, Ridgecrest Solar Power Project (RSPP), Kern County, California
- Geoarchaeologist, Palen Solar Power Project (PSPP), Riverside County, California
- Geoarchaeologist, Blythe Solar Power Project (BSPP), Riverside County, California
- Geoarchaeologist, Stockton Generation Power Project (SGEN), Stockton, California
- Archaeologist, Archaeological Testing at the Acorn and Emerson Lake Training Areas, Marine Air Force Training Command, Twentynine Palms, California

Matthew Steinkamp is a geologist, geomorphologist, geoarchaeologist, underwater archaeologist, and cultural resources project manager with more than 20 years of prehistoric and historic archaeological and historic preservation experience in all areas of the United States, Hawaiian Islands, Micronesia and East Africa. He joined SWCA in 2007 and is a geologist, geomorphologist and geoarchaeologist. He is responsible for assessing the effects of projects on historic and prehistoric resources on land and underwater, and conducting geomorphology and geoarchaeology studies by analyzing the bedrock geology, geomorphic processes and soils to determine archaeological site formation processes, integrity of deposits and presence or absence of sealed cultural remains in deep seated sedimentary environments.

Mr. Steinkamp's work experience has allowed him to acquire extensive knowledge in all phases of prehistoric and historic archaeology. He has worked on numerous cultural resource inventory projects, testing, construction monitoring, mitigation and data-recovery on sites in the Northwest, Southwest, Great Basin, Midwest, Northeast and Southeast United States, as well and the Hawaiian Islands and islands of Micronesia. He has extensive experience in geology and geomorphology such as piston and gravity coring of Lake Tanganyika, East Africa, core logging of mechanical drilling in the Northwest, as well as analyzing ocean drilling cores from the Pacific Ocean abyssal plain to develop a chronological and intensity sequence of large earthquakes along the Cascadia Subduction Zone and San Andreas Fault for the past 10,000 years.

Mr. Steinkamp also has extensive experience in laboratory methods, lithic analysis, micro-fossil analysis of cherts, flints and lacustrine sediments utilizing microscopy, raw material analysis, mineral separation, igneous and sedimentary petrography and petrology, field mapping of geological formations, invertebrate fossil analysis and flint-knapping.

Mr. Steinkamp has conducted cultural resource surveys for various state and federal agencies and private-sector clients. His experience has introduced him to numerous types of construction effects on cultural resources including gas and water-line construction, roadways, commercial buildings, parks, dam re-licensing, canals, coal mines, nuclear facilities, and logging operations. Mr. Steinkamp has co-authored numerous cultural resource inventory, testing and data recovery reports, and his publications include *Lacustrine Micro-Fossil Assemblage from Core NP04-KH3 from the Moba-Kalya Horst Region of Lake Tanganyika, East Africa, as a Biogeochemical Proxy for Late Pleistocene and Early Holocene Climate and Lake Levels* and *Diatoms are Cool, Yet Do They Indicate Dramatic Climate Shifts in the Holocene, Or Are They Just Full of Silica*. Mr. Steinkamp has presented at the University of Dar es Salaam Annual Science Conference in Dar es Salaam, Tanzania.

Attachment DR-CULT-101

Geoarcheology Report

Geoarcheology Report provided to the CEC under confidential cover

DR-HAZ-119

Information Required:

If the applicant is considering an above-ground placement of these pipes and systems across Brown Road from the north solar field to the south power block, please provide documentation to support this alternative that includes at a minimum the following:

a. A hazard and operability analysis (HAZOP).

b. A risk assessment addressing the probability of an HTF pipe failure and the resultant consequences.

c. A security Threat Assessment, Criticality Assessment, and site Vulnerability Assessment.

Response:

The applicant is not proposing placement of the HTF pipes above Brown Road from the RSPP south solar field to and from the power block, located north of Brown Road. (See Response to DR-HAZ-120 for a conceptual description of how the HTF lines will be routed <u>underground</u>.) Because the HTF pipes will be located under Brown Road, the remaining elements (a, b, and c) of this question are not applicable.

DR-HAZ-120

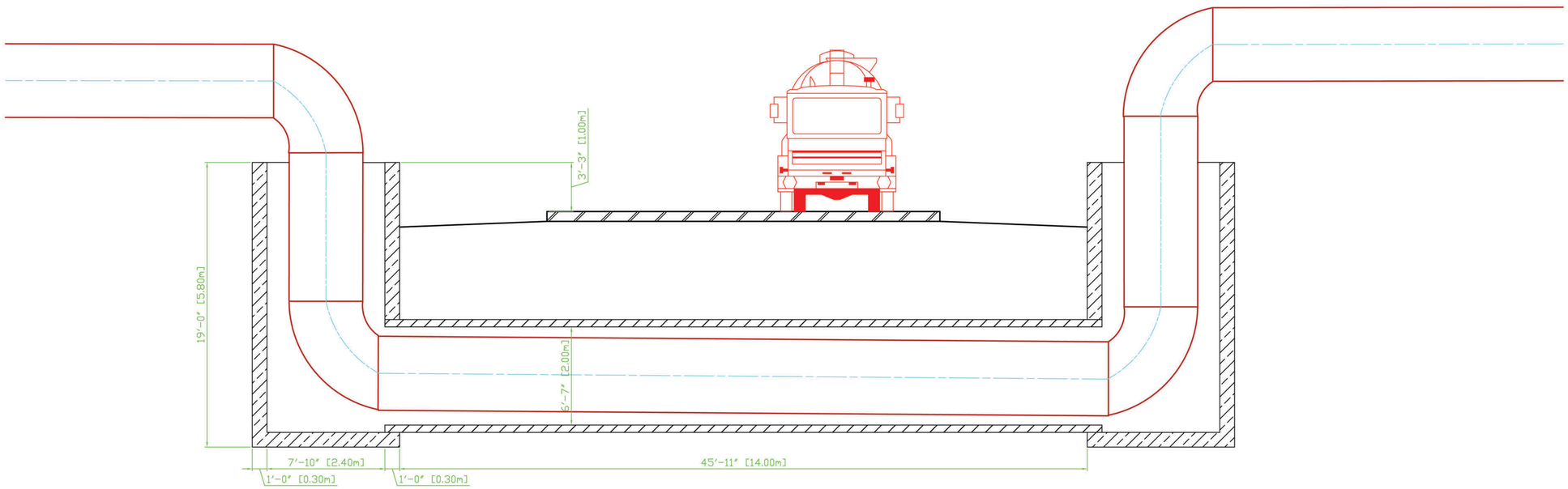
Information Required:

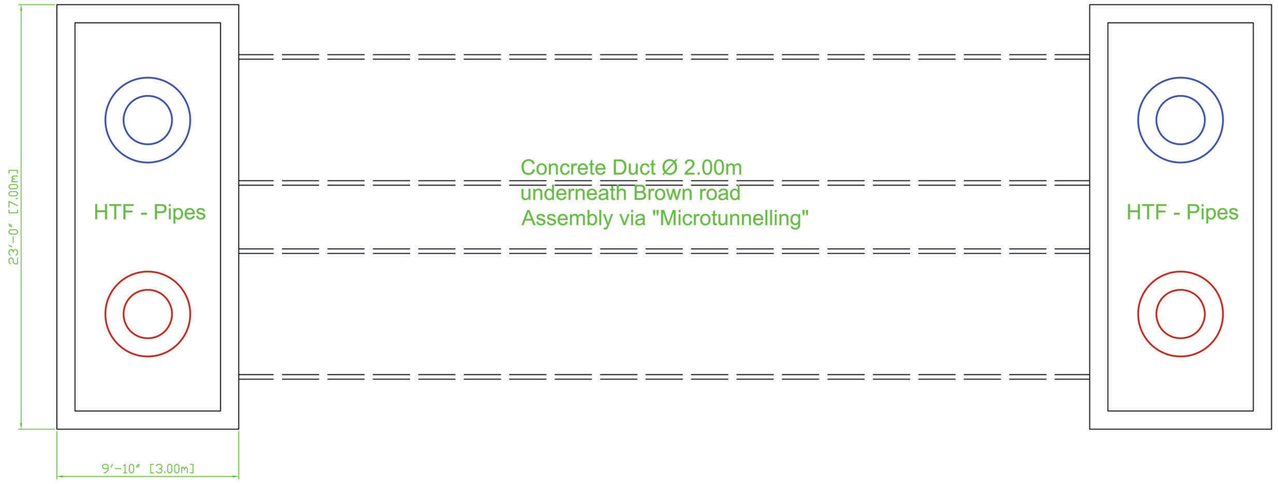
If the applicant is proposing to place these pipes and systems beneath Brown Road, please provide a description of how the undergrounding will be accomplished, that is, if it will be a filled-in trench or a tunnel large enough to service the pipes and systems by a person.

Response:

Within the north solar field and south solar field, the HTF lines will be aboveground. However, as the HTF supply and return lines approach Brown Road between the south solar field and the north solar field, they will be directed underground. It is expected that the seamless welded piping will have expansion loops aboveground on each side of Brown Road. Therefore, the piping under Brown Road can be placed in a structure such as a box culvert to hold the two insulated HTF lines. For the initial concept of the HTF pipe routing, see figure Titled “Pipe Crossing Brown Road” provided at the end of this section.

Similar to commercial oil and natural gas pipes, it is not expected that these lines under Brown Road will require maintenance as they will be properly designed and installed. In addition, the specific design of the underground crossing will be subject to review and approval by Kern County Roads Department.





-	Main Contractor	Subcontractor
Figure DR-Haz-120	Solar Millennium LLC	FLAGSOL — **FlagSol GmbH**, Agrippinawerft 22, D-50678 Köln, Tel.: +49 221 925 970 0, Fax: +49 221 925 970 99

Rev.	Description	Date	Drawn	Designed	Checked	Approved	Engineering

CAD File: RC1_SOF_PIP_ARR_011_00 | First Created: 2009-12-22 | VG | VG | HB | HK

Scale: 1:50 | Original Size: DIN A1

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Project: RIDGECREST

Location: Ridgecrest, California

Document Title: Arrangement

Pipe Crossing Brown Rd

Customer Doc - ID:

Sheet: 1 of 1

DR-LAND-121

Information Required:

Please provide Energy Commission staff a time schedule for the submittal of a California Desert Conservation Area (CDCA) Plan amendment application (request) to the BLM.

Response:

We understand that the Bureau of Land Management (BLM) has included in its Notice of Intent (NOI) to prepare an Environmental Impact Statement under the National Environmental Policy Act, the requirement that the California Desert Conservation Area (CDCA) Plan must be amended to permit the Project.

In its ROW application and Plan of Development, the Applicant formally requested that BLM amend the CDCA Plan and explained why the amendment was necessary. This request serves as the request required by the CDCA Plan. In its NOI, BLM has explained that an amendment to the CDCA Plan is under review.

DR-LAND-122

Information Required:

Please submit a CDCA Plan amendment application to the BLM and staff.

Response:

See Response to DR-LAND-121.

DR-PH-123

Information Required:

Please provide DPM emission factors from construction activities and a health risk assessment for diesel construction equipment emissions.

Response:

Emission factors for diesel particulate matter (DPM) were calculated on an equipment-specific basis using the OFFROAD2007 Model. Revised emission factors, based on statewide averages for engines meeting California Tier 3 emission standards, were applied to the specific equipment shown in Appendix E.2, Table E.2-1 of the AFC in accordance with the methodology described in DR-AIR-9. The tab-delimited output file from the OFFROAD2007 Model and revised construction emission calculation spreadsheets, including tabs with the emission factor calculations, can be found in the supporting data provided with the response to DR-AIR-9.

Total on-site particulate matter emissions from diesel construction equipment exhaust over the course of the construction project were estimated to be 13,934 pounds. These emissions will be limited to the relatively short-term period of construction, which is estimated to be less than 2 1/2 years, when compared to the long-term exposure required for evaluating health risk impacts associated with DPM emissions. Therefore, annual emissions from construction activities used in the Health Risk Assessment (HRA) were calculated by dividing the total emissions from diesel construction equipment exhaust during the construction period by the exposure period of concern (70-year resident, 40-year worker). An annual average DPM emission rate of 199 pounds per year (lb/yr) was used for the 70-year residential exposure scenario, and an annual average DPM emission rate of 348 lb/yr was used for the 40-year worker exposure scenario.

An HRA for diesel construction equipment was conducted. The HRA of the construction equipment DPM emissions included the same source release configuration used for modeling ambient air quality impacts in the AFC, including adjustments as discussed in the AIR Data Requests. The meteorological data used were also the same as that used for the AFC. Off-site receptor locations of actual exposure were evaluated for health risk impacts from construction activities, as well as identification of the point-of-maximum impact (PMI) in accordance with DR-PH-130. The PMI was identified by modeling a 100-meter spacing receptor grid starting at the fence line and extending outwards 500 meters. Emissions of DPM from construction equipment were apportioned to area air emission sources proportionally to their surface area.

The estimated incremental cancer risk as a result of DPM emissions from construction activities was 3.42 excess cancer cases per million exposed population at the PMI. This is below the Kern County Air Pollution Control District (KCAPCD) significance threshold of 10 in a million. The chronic non-cancer health index (HI) at the PMI was 0.002 which is below the KCAPCD significance threshold of 1.0. The PMI is located in a remote location that is certainly not accessed frequently if at all by the public.

DR-PH-124

Information Required:

Please provide DPM emission factors for on-site solar field and equipment maintenance activities in pounds per day and tons per year. This value can be submitted as a single number estimate of total emissions from all vehicular sources used on-site.

Response:

Total DPM emissions from on-site solar field and equipment maintenance activities are estimated to be 2.13 lb/yr. On-site solar field equipment includes trucks for mirror washing (1.7 lb/yr), weed abatement (0.07 lb/yr), soil stabilizer applications (0.25 lb/yr), and water trucks (0.06 lb/yr).

The DPM emission factor used for all diesel-fueled on-site solar field maintenance activities from mobile sources was determined to be 0.000119 pounds/mile (lb/mi), based on the EMFFAC2007 Model for heavy heavy duty diesel trucks (HHDT-DSL). As described in the response to DR-AIR-9, the emission factors were compiled by running the California Air Resources Board's OFFROAD2007 (version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.

DR-PH-125

Information Required:

Please conduct a health risk assessment for diesel emissions from vehicles involved in on-site solar field and equipment maintenance activities during plant operations.

Response:

The HRA from the AFC was revised to incorporate DPM emissions from vehicles involved in on-site solar field and equipment activities during plant operations. The revised HRA included refinements to the stack parameters for the ullage vent based on updated design data. As requested in DR-PH-130, this revised HRA also identified the PMI, using the same fence line receptor grid described in the response to DR-PH-123. Table DR-PH-125-1 presents the maximum expected cancer, chronic, and acute health impacts at the PMI, as well as the health impacts at the maximum exposed individual residential receptor (MEIR) and at the maximum exposed individual worker receptor (MEIW). As shown, all estimated health impacts are below KCAPCD significance levels. In addition, the location of the PMI is extremely remote and therefore performing a HRA that assumes continuous presence for the exposure periods presented in the table is extremely conservative.

Table DR-PH-125-1 Operational Health Risk Assessment Results

Receptor Type		**Maximum Cancer Risk (per million)**	**Maximum Acute Hazard Index**	**Maximum Chronic Hazard Index**
PMI[1]	Adult	2.55	0.035	0.0011
	Child	0.631	---	---
MEIR[2]	Adult	0.088	0.0072	0.00004
	Child	0.022	---	---
MEIW[3]		0.0053	0.0053	0.0031
Significance Criteria		**10**	**1**	**1**

1 PMI: Point of Maximum Impact at any off-site location; 70-year adult exposure scenario and 9-year child exposure

2 MEIR: Maximum exposed individual at an existing residential receptor; 70-year adult exposure scenario and 9-year child exposure scenario for cancer risk

3 MEIW: Maximum exposed individual at an existing occupational worker receptor; 40-year adult worker exposure scenario

DR-PH-126

Information Required:

Please provide a cumulative PM2.5 emissions estimate on a daily and yearly basis when fugitive dust emissions are added to the DPM emissions from the above stationary and mobile sources, assuming that all DPM from diesel engines are PM2.5.

Response:

Maximum daily and annual fugitive PM2.5 emissions from on-site solar field maintenance activities are estimated to be approximately 104 lb/day and 4,360 lb/yr, respectively. Daily and annual DPM emissions are estimated to be 0.013 lb/day and 2.2 lb/yr, respectively, which are negligible when compared to fugitive (non-exhaust) emissions.

Therefore, total daily PM2.5 emissions from fugitive dust and equipment exhaust are estimated to be 104 lb/day, with 99.9 percent of the emission mass due to fugitives. Total annual PM2.5 emissions from fugitive dust and equipment exhaust are estimated to be 4,362 lb/yr, also with 99.9 percent of the emission mass due to fugitives. Details on daily and annual mass emissions of PM2.5 can be found in the response to DR-AIR-9.

DR-PH-127

Information Required:

Please provide the Kramer Junction Solar Energy Generation facility data used in the AFC, specifically emission rates of benzene and other HTF thermal degradation products emitted.

Response:

Emission rate and speciation data for the Therminol® VP1 heat transfer fluid (HTF) provided in the AFC were developed from several sources of information, including the Kramer Junction Solar Energy Generating Station facility operations. Subsequent to filing the AFC, the Applicant's solar design engineer (Flagsol) has provided additional information related to both emission rate and speciation of the HTF degradation products.

Based on an operational mass balance developed by Flagsol for the Ullage system at the proposed solar power plants, uncontrolled volatile organic compounds (VOC) emissions are expected to be 137 pounds per megawatt (MW) per year. This compares to an uncontrolled VOC emission rate of 133 pounds per MW per year as reported in the AFC, based on comparable thermal solar projects (Beacon Solar Energy Project), and 128 pounds per MW per year for the Nevada Solar One project. Because the Flagsol data are conservatively higher than that of the comparable projects (three to six percent higher), the Applicant maintains a reasonable confidence that these figures are representative of the emission rate that could be expected from RSPP.

Speciation data were developed using information provided by the HTF manufacturer (Solutia) and information provided in the Nevada Solar One permit. Since the RSPP AFC was submitted, Flagsol has provided data that indicate toxic air contaminant emissions from the HTF system could include benzene, toluene, xylene, and phenol. Solutia indicates that the HTF breakdown products would include benzene, toluene, phenol and small amounts of naphthalene, methane, and ethane. The Nevada Solar One permit indicates that the hazardous air pollutant (HAP) emissions from a similar solar energy project would include benzene, benzenol, and biphenyl. In all cases, benzene is the chemical compound potentially emitted from the HTF system with the highest health risk factors for both cancer and non-cancer effects.

An HRA based on 137 pounds of VOC emissions per MW per year is incorporated into the public health risk impacts presented in the response to DR-PH-125, which identifies the individual contribution of HTF emissions to the total health risk posed by operation of the proposed power plant. Because benzene is the most toxic of the species reported, and the most likely compound to be emitted due to its chemistry, the operational HRA was revised assuming the increase in VOC emissions would be comprised entirely of benzene to ensure that the health risk estimates were not underestimated. A copy of the WorleyParsons e-mail, Solutia e-mail, the relevant page of the Nevada Solar One permit and the Flagsol material balance diagram and process description are provided in Attachment DR-PH-127.

DR-PH-128

Information Required:

Please provide any other information obtained specific to thermal degradation of HTF, biphenyl and diphenyl ether, and the source of that information.

Response:

As noted in the response to DR-PH-127, AECOM relied on information provided by Solutia, the Therminol® VP1 HTF manufacturer, and information provided in the Nevada Solar One permit. In an e-mail from Mr. Conrad Gamble of Solutia to WorleyParsons, Solutia claims that the HTF breakdown products would include benzene, phenol and small amounts of naphthalene, methane, ethane, and toluene. The Nevada Solar One permit indicates that the HAP emissions would include benzene, benzenol, and biphenyl. Since the RSPP AFC was submitted, Flagsol has provided data that indicate that the HAP emissions would include benzene, toluene, xylene, and phenol. Because benzene is the most toxic of the species reported, AECOM assumed that the vast majority of emissions (99 percent) would be comprised of benzene to ensure that the health risks were not underestimated.

DR-PH-129

Information Required:

Please provide water concentrations and emission rates for metals from the auxiliary wet cooling tower and conduct a health risk assessment on metals emitted.

Response:

Groundwater samples were collected from Wells 18, 33, and 34 located on the Project site in September 2009. Water samples were analyzed for petroleum hydrocarbons, volatile and semi-volatile organics, pesticides, herbicides, general minerals, metals, radionuclides (alpha) and other appropriate water quality parameters by a California-certified analytical laboratory, as documented and reported in the AFC Volume 3 Data Adequacy Supplement (DA-WATER-3) submitted October 26, 2009.

Results of the water sampling detected two metals that are considered toxic air contaminants; arsenic and vanadium. Other metals were not detected in the water sample. Groundwater concentrations and hourly and annual emission rates are provided in Table DR-PH-129-1 below.

Table DR-PH-129-1 Emission Rates Based on RSPP Water Quality Data

Pollutant	9/22/2009 Sample Results	Sample Units	Mass Fraction Pollutant in Total Dissolved Solids	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)
Arsenic	0.004	mg/L	1.38E-05	4.17E-07	1.54E-03
Vanadium	0.016	mg/L	5.52E-05	1.67E-06	6.17E-03

An HRA of metal emissions from groundwater used in cooling towers is incorporated into the health risks presented in the response to DR-PH-125. The individual contribution of the revised cooling towers emissions, which incorporate groundwater sampling data, to the total health risk posed by operation of the proposed power plant is 0.016 in one million at the PMI, or less than one percent of the total. These are considered negligible to the total health risk impact from plant operation.

DR-PH-130

Information Required:

Please provide the location(s) of the point of maximum impact predicted in the air dispersion modeling for cancer risk, chronic hazard and acute hazard due to facility operations. Please estimate risk and hazard at the PMI.

Response:

As stated in the response to DR-PH-125, the HRA was revised to identify the PMI, and to estimate the health risks at the PMI. The results of the revised HRA are presented in Table DR-PH-125-1.

DR-PH-125

Modeling Files for Revised Health Risk Assessment
(Provided on CD)

Attachment DR-PH-127

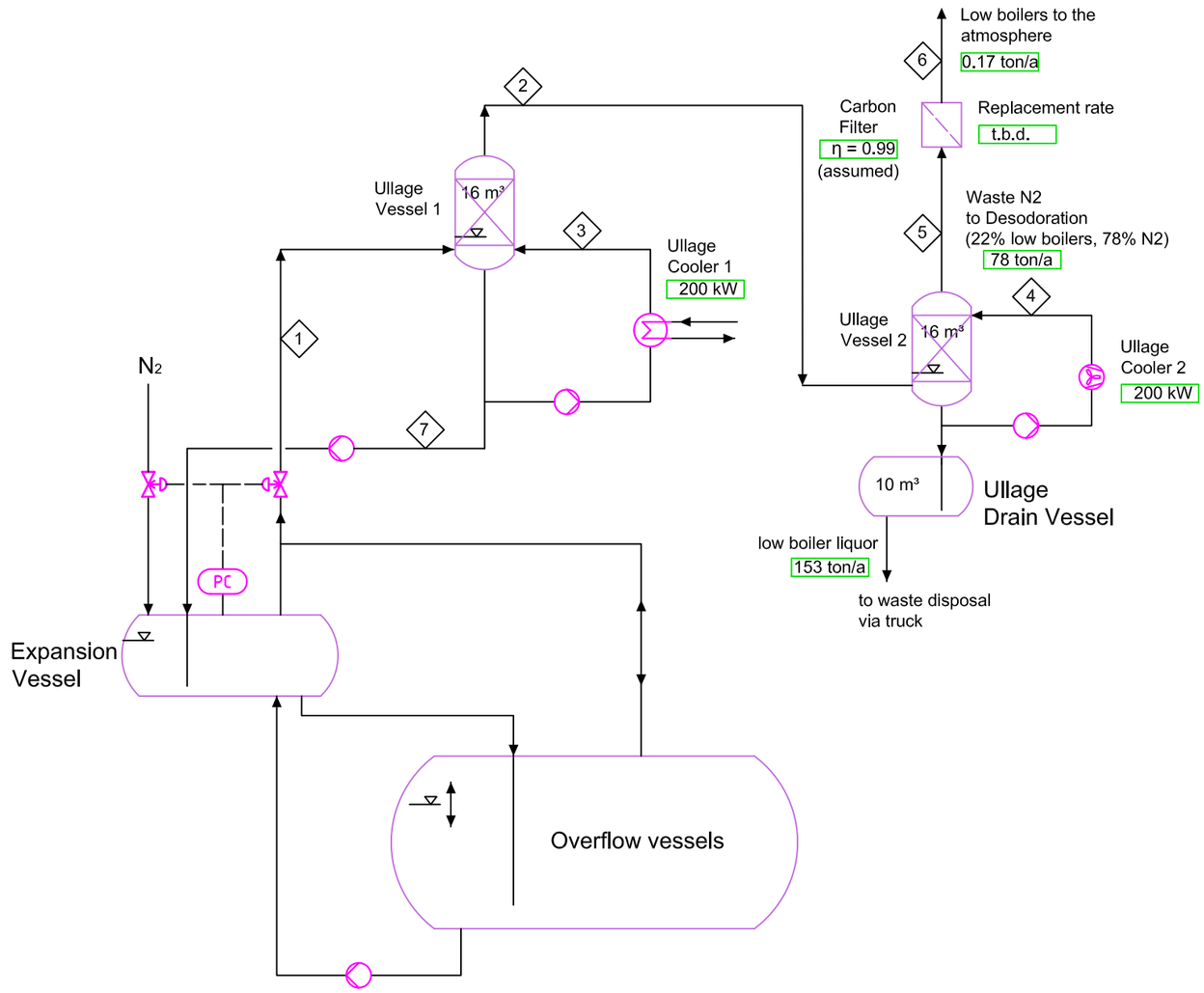
HTF Degradation Supporting Documents

Memo

To:	AECOM	Tel no:	+49 (0221) 925 970 0
From:	Flagsol (FL,DT)	Fax no:	+49 (0221) 258 111 7
Subject:	General Description Ullage System	Copy sent to:	SolarMillennium LLC

The HTF (Eutectic mixture of diphenyl oxide and diphenyl) degrades over time in low and high boiling products, which must be separated and eliminated from the cycle.
Low boiling degradation products are a mixture of benzene, toluene, xylene and phenol: the concentration of each component of the mixture can considerably differ from plant to plant and depends on many factors and is can be difficult to determine day-to-day concentrations. A high concentration of low boilers in the HTF changes the fluid properties and increase risk of cavitation for the pumps. In order to limit this effect, a mixture of nitrogen, degradation gases and HTF vapour is vented from the expansion vessel and the overflow vessels. To maintain sufficient pressure within the HTF cycle, nitrogen is introduced in the expansion vessel.
The gaseous mixture of nitrogen, low boiling products and HTF from the expansion vessel enters the ullage system via first ullage vessel, which contains a certain level of HTF at any time. HTF vapour within the mixture is condensed and is re-circulated to the HTF cycle via ullage discharge pump. The HTF content of the first ullage vessel is cooled by recirculation via ullage circulation pump 1 and ullage air cooler 1.
Leaving the first Ullage vessel, residual mixture of gaseous nitrogen and low boiling products enters the second ullage vessel. The HTF content of the second ullage vessel is also cooled (by recirculation via ullage recirculation pump 2 and ullage air cooler 2). By cooling the hydrocarbons within the gaseous mixture will condense to a certain extend. Residual gaseous components are vented to atmosphere.
Mass of collected liquid residuals and vented gas will depend upon the final operating temperature, the previous day operation and the temperature of the system overnight.
To limit the concentration of high boiling degradation products in the HTF cycle, the high boilers can be removed from HTF in the reclamation system. Therefore a small flow of hot HTF is taken from the hot (and pressurized) main pipe which is leaving the solar field and transferred to the reclamation system. The hot HTF immediately vaporizes in the un-pressurized reclamation flash vessel. The so generated HTF vapour is transferred to the first ullage vessel (see above), condensed and returned back to the HTF cycle, the residual non-vaporizing high boilers are left behind in the reclamation flash vessel and collected by gravity in the reclamation drain vessel.
Separation of high boiling products shall be started latest if 9% concentration is reached, unless otherwise noted in the analysis report. It can be up to ten years or more until separation of high boiling products becomes necessary. These are removed as liquid to proper waste recovery handling via truck transport as necessary.

No.			1	2	3	4	5	6	7
Medium			N2/HTF	N2/Low Boilers	HTF	Low Boilers	N2/Low Boilers	N2/Low Boilers	HTF
Mass Flow	100%	kg/s	0 - 0.6	0 - 0.6	0.005	0.005	0 - 0.18	0 - 0.14	0 - 0.003
Density		kg/m3			1014	1040	870	870	1014
Pressure		barg	0.6	0.6					
Temperature		°C	300	80	80	30	30	30	80



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Solar Millennium LLC

FLAGSOL

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Tel.: +49 221 925 970 0
Fax: +49 221 925 970 99

Rev.:	Description	Date	Drawn	Designed	Checked	Approved	Engineering
01	GENERAL REVISION	2009-12-03	VG	FL	FG	UH	
		2009-11-30	VG	FL	FG	UH	

CAD File: PD1_GEN_GEN_PRO_002_00 | First Created

Scale: | Original Size: DIN A2

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Project: Palen Solar Power Plant

Location: Palen Dry Lake

Document Title: Schematic Process Flow Diagram

Ullage-System

block diagram

Customer Doc - ID:

Sheet: 1 of 1

II EMISSION UNITS

A LIST OF EMISSION UNITS

TABLE II-A-1: Summary of Emission Units

EU	Description	SCC	Type[1]
A01	GTS Energy/TEI Heat Transfer Fluid Heater, M/N: NoxQLN, 60.0 MMBtu/hour	10300602	F1
A02[2]	Disturbed Surfaces	30502507	S1
B01	Cummins Backup Diesel Generator, M/N: DFLC 1250 DQGAA, 1,850 hp	20100102	CE4
B02	Diesel Fire Pump, 120 hp	20100102	DM
C01	Marley Cooling Tower; M/N: F489A-6.0-3; 50,200 gpm; 6,580 mg/l TDS; 0.001% Drift Loss	38500101	P1
D01[2]	Ullage Drain Vessel	2510010000	P1
D02[2]	Waste Oil Truck Loadout	2515030000	DM

[1]Type codes for billing: F1 = Fuel burning equipment; CE4 = Stationary IC engine ≥1,501 hp; DM = Deminimus Emission Unit and P1 = Process equipment. Refer to Section 18 of the for annual fee information.
[2]New emission unit associated with Modification One.

B EMISSION LIMITATIONS

Neither the actual nor the allowable emissions from the individual emission units nor the entire source shall exceed the calculated potential to emit (PTE) as listed in Tables II-B-1 and II-B-2.

TABLE II-B-1: Source PTE (tons per year)

EU	Rating	Conditions	PM_{10}	NO_x	CO	SO_x	VOC	HAP
A01	60.0 MMBtu/Hour	2,000 hrs/yr	0.45	1.05	2.23	0.04	0.32	0.11
A02	400 acres	8,760 hrs/yr	12.12[1]	0.00	0.00	0.00	0.00	0.00
B01	1,850 hp	200 hrs/yr	0.03	5.18	0.41	0.24	0.24	0.09
B02	120 hp	150 hrs/yr	0.02	0.28	0.06	0.02	0.02	0.01
C01	50,200 gpm, 0.001%	4,000 hrs/yr	1.56	0.00	0.00	0.00	0.00	0.00
D01	1,150 acfm	3,500 hrs/yr[2]	0.00	0.00	0.00	0.00	0.41	0.39[3]
D02	1,150 acfm	10,000 gal/yr	0.00	0.00	0.00	0.00	0.04	0.04[4]
PTE (tons/year)			**14.18**	**6.51**	**2.70**	**0.30**	**1.03**	**0.64**

[1]PM_{10} emissions are calculated with an emission factor of 1.66 lbs/acre-day and a control efficiency of 90%.
[2]Hours listed are degradation hours of the Heat Transfer Fluid (HTF).
[3]HAP is the benzene, benzenol, and biphenyl component of VOC of the vent stream from the ullage vessel.
[4]For worst case, the emissions from waste oil loadout is assumed as entirely benzene.

TABLE II-B-2: Source PTE (pounds per hour)

EU	Rating	Conditions	PM_{10}	NO_x	CO	SO_x	VOC	HAP
A01	60.0 MMBtu/Hour	14 hrs/day	0.45	1.05	2.23	0.04	0.32	0.11
A02	400 acres	24 hrs/day	2.77[1]	0.00	0.00	0.00	0.00	0.00
B01	1,850 hp	12 hrs/day	0.29	51.80	4.08	2.41	2.41	0.86
B02	120 hp	5 hrs/day	0.26	3.72	0.80	0.25	0.30	0.06
C01	50,200 gpm, 0.001%	14 hrs/day	0.78	0.00	0.00	0.00	0.00	0.00
D01	1,150 acfm	24 hrs/day	0.00	0.00	0.00	0.00	2.32	2.25[2]

From: Foster, Jared (Sacramento) [Jared.Foster@WorleyParsons.com]
Sent: Wednesday, January 23, 2008 8:22 AM
To: Kingsley, Russ
Cc: Head, Sara; Frederick Redell; Baxter, Geoffrey (Folsom)
Subject: FW: Therminol VP-1 Information

Sara/Russ/Fred,

Here is some information I received from Solutia regarding VP-1 emissions, which is generic. I made a follow-up call with the individual and he mentioned that typically the operator (end user) has more detailed emission information for the product. WorleyParsons can continue to support these activities, but the SEGS plants would be better able to provide the information since they have the most experience operating VP-1 at elevated temperatures.

Also, when I talked with Glen King regarding HTF emissions from the plants and he quoted 10 tons/year. I interpreted this to be for one 30 MW plant. After doing some research and following up with Glen King I determined that the 10 tons was for all the plants at Kramer Junction (5) totaling 150 MW. Since Beacon is a 250 MW plant we expect HTF emissions to be on the order of 17 TONS.

Let me know if you have any questions.

Thanks,

Jared Foster
916.817.3935
Worley Parsons
2330 E Bidwell, Suite 150
Folsom, CA 95630

From: Gamble, Conrad E [mailto:cegamb@solutia.com]
Sent: Thursday, January 17, 2008 10:00 AM
To: Foster, Jared (Sacramento)
Cc: Mansy, Loan N
Subject: Therminol VP-1 Information

Dear Jared,

In follow-up to our conversation last week about expected emissions from high temperature Therminol(R) VP-1 (also called DP:DPO, for diphenyl:diphenyl oxide) systems, I can provide you with the following information. The EPA has a few approved methods for estimating fugitive emissions of organics.

One of the more straight forward methods uses SOCMI (Synthetic Organic Chemicals Manufacturing Industry) emission factors. This method involves using leak factors for each component. Total emissions are estimated by multiplying the number of components times its leak factor, and then summing up the totals for all component types. This method is fully described in Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017 (link - http://www.epa.gov/ttn/chief/ap42/ch05/index.html Select "Main Document and Appendices near bottom of page). We have used information provided in section 2.3.2 Screening Ranges Approach, and leak emission factors provided in table 2-5, SOCMI Screening Range Emissions Factors (for Heavy Liquid). Please review this section for applicability of the factors. Other methods are described in this document, and you may prefer to utilize one of the other methods depending upon your needs.

Also, we had discussed degradation products of DP:DPO chemistry. As with any high temperature heat transfer fluid, DP:DPO fluids will degrade dependent on a time and temperature relationship. Generally, all systems are not exactly alike and will provide varying rates of thermal degradation. However, the degradation compounds formed should be consistent. Typical low boiling thermal degradation compounds found in thermally stressed DP:DPO fluids will include benzene, phenol, and small amounts of naphthalene, methane, ethane, and toluene. These compounds are lower boiling than the heat transfer fluid itself and will have higher vapor pressures, making them easier to separate from the heat transfer fluid during designed venting procedures. Typical benzene and phenol content in DP:DPO systems can range from 25 to 120 ppm for benzene and 100 to 500 ppm for phenol in typical heat transfer systems. It is possible to have higher concentrations in systems which aren't frequently or effectively vented. Note that venting should be accomplished in a manner to condense and collect the organics for proper disposal.

I trust this information will be helpful in your design development work. Please advise if you have additional questions.

Best regards,

Conrad Gamble, P.E.
Technical Service Principal
Solutia Inc.
Tel (256) 231-8525

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DR-REL-131

Information Required:

Please confirm that there are sufficient supplies of propane in the local area to meet the needs of the project.

Response:

AECOM contacted three local propane suppliers on December 14, 2009: Amerigas in Lake Isabella; Ferrellgas in Apple Valley, and Suburban Propane in Lake Isabella. Each vendor was asked if they could deliver an average of 13,250 gallons of propane per week to the on-site 18,000-gallon storage tank when the RSPP is fully operational in early to mid-2013.

Each vendor responded that they would be able to provide the required amount of propane. A “will serve” letter stating the interest and ability to supply the required propane from both Amerigas and Suburban Propane are provided at the end of this section.

Amerigas and Suburban Propane "Will Serve" Letters

AmeriGas®
America's Propane Company

December 16, 2009

Ms. Nicole Tenenbaum
Senior Project Manager
Solar Millennium, LLC
1625 Shattuck Ave
Berkeley, CA 94709

Re: Will serve letter for proposed facility

Dear Ms. Tenenbaum,

Thank you for contacting Amerigas regarding your propane needs for the proposed thermal solar facility in Ridgecrest, to be located approximately two miles west of the intersection of Brown Rd and Hwy 395.

We are fully capable of supplying the estimated 13,250 gallons per week, to this site. We would require thirty to forty-five days lead time to establish supply and to conduct site checks and safety inspections prior to the initial delivery.

We are also able to assist with procuring the proposed 18,000 gallon storage tank, either on a lease or a purchase basis.

Sincerely,

Leslie Stewart

Leslie Stewart,
Customer Relations Representative

4776 Lake Isabella Boulevard, PO Box 938, Lake Isabella, CA 93240-0938 (760) 379-2802

Suburban Propane™

4701 Lake Isabella Blvd. ▪ Lake Isabella, CA 93307
(760) 379-8345 ▪ (800) 474-9205 ▪ Fax: (760) 379-1224 ▪ www.suburbanpropane.com

Ms. Nicole Tenenbaum
Senior Project Manager
Solar Millennium, LLC
1625 Shattuck Ave.
Berkeley, CA 94709

RE: Propane supply:

Dear Ms. Nicole Tenenbaum

Suburban Propane can set up deliveries to the site listed below- through an outside transport company.

Transport truck supply approxiamately 9200 gallons per truck load,

This outside vendor will require a 2- 3 day notice to have propane delivered in to the Propane storage site. We can set up standing orders to keep loads set for certain days of the week and or month as your company may require.

We will need to have an account set up- Contract sign and credit information provided for billing purposes. We will then need to discuss pricing during the current market conditions at time loads are set to be delivered.

If the facility requires special clearance we must be provided with details for the drivers to gain clearance -3 months in advance to allow time for us to gather information and secure clearance for our service and out side vendor access to site.

Address given is as such, 250 MW thermal solar facility in Ridgecrest, about 2 miles west of the intersection of Brown Road and 395.

If your company requires anything further on this account please provide further details.
Sincerely,

L. Iona Muskrat
Suburban Propane
CSC Manager

DR-S&W-132

Information Required:

Please provide an assessment of changes in the groundwater basin balance and water levels, and potential impacts related to project pumping by IWVWD that would occur in single dry year and multiple dry year drought scenarios for the life of the project.

Response:

Please refer to the response to DR-S&W-133.

DR-S&W-133

Information Required:

Please provide an assessment of changes in the groundwater basin balance and water levels, and potential cumulative impacts related to groundwater pumping by IWVWD for the project and reasonably foreseeable projects. The assessment should include consideration of water supply and demand planning that may be included in Groundwater Management Plan and/or Urban Water Management Plan for the basin.

Responses:

The primary concern expressed in DR-S&W-132 and DR-S&W-133 is the impact to the groundwater basin (water level decline and storage depletion) from the project pumping under normal and dry year conditions and a future projected condition and the possibility of a basin-wide increase of pumping during the life of the project. The response to the data request was addressed utilizing the Brown and Caldwell (BC 2009) model constructed for the Indian Wells Valley Groundwater Basin for the Indian Wells Valley Water District (District). Because DR-S&W-132 and DR-S&W-133 are related, these two requests are addressed together based on the results of systematically designed model simulations.

Seven model scenarios (Runs 1, 2a, 2b, 3a, 3b, 4a and 4b) were conducted to progressively evaluate various stresses on the groundwater basin through changes in recharge (i.e., single and multi-year dry seasons) and project and regional pumping. Run 1 provides a baseline scenario in which the BC (2009) model was extended to the end of the project (year 2043). Runs 2a and 2b were designed to assess impact under dry year conditions. In Runs 3a and 3b, the basin was further stressed with increased pumping based on the District's projected water use estimate for 2010 to 2020 adding onto the dry condition assessment in Runs 2a and 2b. Finally, in Run 4a and 4b, the Project water use was added to assess the impact by comparison with previous scenarios. Below are detailed descriptions of each model scenario.

Run 1 – Baseline scenario

In the BC (2009) model, the transient calibration ends at the end of 2007. Before conducting predictive simulations, the BC model had to be extended to the beginning of 2011 (i.e., the beginning of the project). To reflect pumping conditions between 2007 and 2010, the pumping rate for proposed District supply wells #18, #33 and #34 to be used for the Project were set at 600 gallons per minute (gpm). This was the base rate prior to adding the Project pumping. This is based on the information provided by the District (Attachment DR-SW-133)

The historical pumping rates of the other wells in the model domain vary from year to year. Comparison of the pumping rate in 2007 (the last year of the BC model) and the average pumping rate of the last ten years of the BC model (1998-2007) indicates that the average pumping rate is higher than that in the last year (2007). To provide a representative baseline, the average pumping rate for the other wells within the model was used through the entire duration of the model simulation (2011 through 2043).

Run 2a – Single and multiple dry years scenario (25% of baseline inflow)

Run 2a provides a dry year scenario in which the inflow (i.e., recharge) was 25% of the baseline amount (Model Run 1). In this run, the model setup between 2008 and 2010 is identical to that in Run 1. However, from the beginning of 2011 to the end of the project (2043), three dry periods were included in the project duration. The dry periods consisted of two single dry years (2018, 2036) and one multiple dry year period (2026, 2027, 2028).

To properly place dry years in the project duration, a "dry year" had to be defined. Many methods were developed to define "dry" or drought condition; however given the available data, it is believed that use of precipitation data to approximate "dry year" is appropriate. The concept used in the modeling is that precipitation is directly related to the mountain front recharge, which, based on the BC (2009) model report, is the primary recharge to the Indian Wells Valley Groundwater Basin.

The precipitation data from the Western Regional Climate Center for both Inyo-Kern station (1940-2009) and Indian Well Canyon station (1996-2009) were reviewed. The data from the Indian Well Canyon station are of a very short duration and not sufficient for "wet-dry" cycle analysis. Therefore, only the historical precipitation data for Inyo-Kern located in the vicinity of the Inyo-Kern Airport and within the Indian Wells Valley Groundwater Basin were analyzed. The detailed steps in the analysis of wet-dry year cycles are as follows:

- Calculate the minimum, average and maximum annual precipitation and the standard deviation for the period of 1940 to 2009.
- Determine the upper limit of precipitation for the dry year (mean minus standard deviation:1.27 inches)
- Identify the dry years (i.e., all the years with precipitation at or less than 1.27 inches)
- Determine percentage of precipitation in a dry year relative to an average year using minimum precipitation divided by average precipitation (15%)
- Determine percentage of precipitation in a dry year relative to an average year using the average precipitation in dry years divided by average precipitation (25%)
- Determine the frequency of occurrence of dry year(s) (any year with precipitation less than 1.27 inches) using number of times occurred over the history (about every seven years for a single dry year and there are no consecutive years)

Based on the results of the analysis, it was determined that zero precipitation is not supported by the data and therefore it is not appropriate to consider zero inflow in the model scenarios. In addition, there are no consecutive dry years as defined above. With these analyses, Run 2a was conducted with the recharge being 25% of the baseline amount (Run 1). The occurrences of dry year(s) are based on the frequency determined and placed in 2018, 2026, 2027, 2028, 2036 based on actual project duration (Figure DR- S&W -133-1). Although there are no multiple dry years documented; but an occurrence of multiple dry years was placed in the operation as described to simulate the worst case scenario.

Run 2b – Single and multiple dry year scenario (15% of baseline inflow)

Run 2b is identical to Run 2a except for the inflow input. Run 2b provides a worse-case scenario in comparison with Run 2a because of the larger inflow reduction (15% of the baseline amount).

Run 3a – Impact from District projected water use increase (25% of baseline inflow)

Run 3a is identical to Run 2a with regard to the recharge reduction; but differs in the pumping rate of some of the wells in the model domain. To further stress the aquifer, the projected pumping rates into the future for wells operated by the District were added. Based on the projections in annual use provided by the District for the period between 2010 and 2020, the annual pumping increase from a baseline of 2007 is projected to be 721 gpm in 2011 to 950 gpm in 2020. Because it is not clear in the projection how the increase is allocated across District wells, the amount of increase was evenly distributed to proposed water supply wells #18, #33 and #34 for the project. By placing all of the projected increase in the proposed water supply wells, not across the entire District well field, it should be noted that this will bias the cone of depression in the area of the proposed Project water use.

Because the projected increase for the years 2021 to 2043 was not provided by the District the future increase to the term of the model period (2043) was based on the trend of annual increase provided for 2013 to 2020. From this period from 2013 to 2020 (0.2% to 0.3%), the amount of increase was estimated by cumulative increase of 0.3% from 2020 to 2043. The increase in the pumping rates were applied to the proposed pumping wells for the project and the pumping rates for all other wells in the model domain were not changed from the baseline condition (Run 1).

Run 3b – Impact from District projected water use increase (15% of baseline inflow)

Run 3b is identical to Run 2b except for the inflow input. Run 3b provides a worst case scenario in comparison with Run 3a because of the larger recharge reduction (15% of the baseline amount).

Run 4a – Impact assessment from proposed Project water use (25% of baseline inflow)

Run 4a is identical to Run 3a except that the Project water use was incorporated into the model by adding the pumping rate (190 gpm per well for construction and 30 gpm per well for the operation) to each of the three wells (#18, #33 and #34).

Run 4b – Impact assessment from proposed Project water use (15% of baseline inflow)

Run 4b is identical to Run 4a except for the change in recharge. Run 3b provides a worst case scenario in comparison with all other scenarios because of the incorporation of the larger inflow reduction (15% of the baseline amount), projected increased pumping from IWV and addition of the RSI project water use.

Model results and impact evaluation

The results of the modeling are shown to:

- Illustrate the difference in groundwater level drawdown between Scenario 3a/3b, which include the effects of draught conditions and projected increases in pumping and project pumping drawdown (Scenario 4a/4b) at the end of construction and at the end of the project (Figures DR-S&W-133-2 and DR-S&W-133-3), and
- Changes in the storage depletion between the no project condition (Scenario 3a/3b) and proposed project pumping (Scenario 4a/4b) (Table DR-S&W-133-1).

When groundwater pumping exceeds the natural recharge, water has to be taken out of the basin storage to balance the water budget in the model. The deficit of recharge leads to basin storage depletion. In the seven model runs, the amount of water taken out of the basin storage or storage depletion was calculated and presented in Table DR-S&W-133-1 for each of the scenarios (Runs 1 through 4b) and for five periods starting with the end of construction (2013) through a single and multiple dry years (2018, 2028, 2036) and end of the project (2043). The table shows the individual model year and the deficits between scenarios for each year (i.e., vertical column) and the cumulative model deficit for each scenario through the model period (i.e., horizontal row).

As can be observed, at the end of construction in year 2013, the storage depletion is identical for Runs 1, 2a and 2b, and between 3a and 3b, and between 4a and 4b, The changes in depletion at the end of the construction period reflect changes in the projected regional pumping (3a/3b) and adding the proposed project pumping (4a/4b). The similarity between Run 1 and 2a/2b reflects the fact that for this period there was no dry year condition. Beyond the construction period, from Run 2a/2b to Run 3a/3b, draught conditions were added (less recharge) and more pumping was applied beyond the baseline condition to simulate future changes in projected water supply as provided by the District (Table DR-S&W-133-1).

Storage depletion can also be evaluated by comparison using percentage increase between scenarios. As can be observed, occurrence of dry years (less recharge) could lead to up to 6% increase of storage depletion (change between Scenarios 1 vs. 2). The projected pumping increase through the District could lead to additional 6% increase of storage depletion (comparison between Scenarios 2 vs. 3).

The impact from the proposed Project water use can be assessed by comparison between Scenario 3 and Scenario 4. As shown in Table DR-S&W-133-1, more storage depletion occurs at the end of construction due to higher pumping rate. For all other periods of interest, increase of storage depletion by the Project is only 1% by comparison to Scenario 3a/3b.

Figures DR-S&W-133-2 and DR-S&W-133-3 show the difference in drawdown from Project induced pumping by comparison to the no project Scenario 3a/3b which includes the draught year conditions and increases in projected regional pumping through the District. The figures show the difference in the predicted drawdown for the end of construction (2013) and for the end of the project (model year 2043). As shown for Scenario 4a (25% of the baseline recharge) the Project-induced pumping adds less than 5 feet of drawdown in the area of the pumping wells, and between 0.5 and 1 foot of drawdown to the most proximal adjacent water supply wells (Figure DR-S&W-133-2). As shown for Scenario 4b (15% of the baseline recharge) the results are the same, revealing that the model is not sensitive to variations in the draught scenarios and the change in recharge at the frequency applied in the model (Figure DR-S&W-133-3).

Table DR-S&W-133-1 Basin Storage Depletion as Modeled for Dry Years and Increased Pumping Scenarios

Model Scenario		Year 2013 End of construction	Change from Previous Run	Year 2018 End of dry year	Change from Previous Run	Year 2028 End of multiple dry years	Change from previous run	Year 2036 End of dry year	Change from previous run	Year 2043 End of operation	Change from previous run
		Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet
Water taken out of basin storage to balance pumping (storage depletion)											
Run 1	Baseline[1]	55,390		195,388		431,113		612,181		749,535	
Run 2A	Single and multiple dry years at 25% of inflow[2,3]	55,390	(0)	201,371	(5984)	454,812	(23699)	641,082	(28901)	777,581	(28046)
Run 2B	Single and multiple dry years at 15% of inflow[2,3]	55,390	(0)	202,169	(6782)	457,970	(26857)	644,937	(32756)	781,328	(31793)
Run 3A	Run 2A with projected increased pumping[4]	58,202	(2,812)	212,316	(10,944)	481,054	(26,242)	679,716	(38,634)	826,001	(48,420)
Run 3B	Run 2B with projected increased pumping[4]	58,202	(2,812)	213,114	(10,944)	484,213	(26,243)	683,572	(38,636)	829,750	(48,422)
Run 4A	Run 3A with Project water use added[5]	59,619	(1,417)	214,565	(2,249)	484,712	(3,658)	684,476	(4,760)	831,611	(5,610)
Run 4B	Run 3B with Project water use added[5]	59,619	(1,417)	215,362	(2,249)	487,872	(3,659)	688,331	(4,759)	835,361	(5,611)
Percent Increase of Storage Depletion											
Run 2A vs. Run 1		0%		3%		5%		5%		4%	
Run 2B vs. Run 1		0%		3%		6%		5%		4%	
Run 3A vs. Run 2A		5%		5%		6%		6%		6%	
Run 3B vs. Run 2B		5%		5%		6%		6%		6%	
Run 4A vs. Run 3A		2%		1%		1%		1%		1%	
Run 4B vs. Run 3B		2%		1%		1%		1%		1%	

1. Baseline conditions include District Wells #18, 33, and 34 each pumping at 600 gpm and setting the pumping rate through 2043 for other wells in the modeling using the 1999 - 2007 average.
2. Single dry years were simulated for 2018 and 2036 by decreasing recharge to 15% or 25% of baseline for those years.
3. Multiple dry years were simulated by decreasing recharge to 15% or 25% of baseline for 2026, 2027, and 2028.
4. For Runs 3A and B the project increase in pumping was varied from a basinwide increase of 721 gpm in 2011 to 950 gpm in 2020 and 953 gpm in 2021 to 1,018 gpm in 2043 (distributed evenly to wells #18, 33, 34).
5. For Runs 4A and B the pumping rate for each well (#18, 33, and 34) was increased by 190 gpm for construction and 30 gpm of operation

DR-S&W-134

Information Required:

Please conduct a statistical analysis of the longest period that could occur with no runoff (i.e., the highest salt loading to soils on the site) based on historic rainfall data and estimate of the threshold precipitation rate where runoff (offsite) would occur.

Response:

Daily rainfall data from Inyokern Station (NOAA National Data Centers) from January 1959 to the present was analyzed for the duration of the interval between precipitation events at various thresholds. These durations were then compiled into a dataset. Using ProUCL 4.0, the durations were tested to see if they conformed to a normal, lognormal, or gamma distribution. Regardless of threshold, the data did not conform to a discernable distribution.

Because there was no discernable distribution to the data, the non-parametric Hall's Bootstrap method was selected and a 95% upper confidence limit was calculated for each of four magnitudes by ProUCL 4.0. The results are plotted on Figure DR-S&W-134.

DR-S&W-135

Information Required:

Please provide a discussion of potential salt loading using the longest period salt loading factor developed from the above data request. The discussion must include the impacts associated with other parameters including pH, boron, metals, radionuclides and any other constituents that may be present in the runoff water and are detrimental to flora and fauna on and adjacent to the project site.

Response:

The scenario presented in the Volume III Data Adequacy Supplement (Soil and Water DA-5), provided to the CEC October 26, 2009, considered that all brine solids deposited on the unpaved road areas of the site on an annual basis were removed from the site in an annual frequency storm event. Infiltration was intentionally neglected in an effort to be conservative. This scenario was attractive because it allowed for a quantitative and readily understood evaluation of the greatest potential impact of the practice of using brine for dust suppression.

Statistical analysis of precipitation data from Inyokern Station supports the annual basis used in the data adequacy submission. It indicates that a 0.75-inch precipitation event is 95% likely to occur within a 380 day period. Revisions of the calculations provided in the data adequacy submission reflecting this scenario are presented in Tables DR-S&W-135-1 and DR- S&W-135-2.

Even if there were no precipitation at the site, brine application (3.55 in/yr) would be expected to infiltrate into the soil. Infiltration into site soils is expected to reduce the quantity of brine salts available for runoff. Site soils have a composition of approximately 90% sand, 5% silt, and 5% clay (Soils Report).

Permeability on the compacted site roads would eventually be very low; however roads only constitute 1.9% of the solar farm total surface. Permeability of the soil over the entire solar field is expected to be relatively high (conservatively estimated at 1 in/hr). As brine is applied and rain falls on the site, brine constituents will follow that water into the soil. As evaporation removes the water from the soil surface, brine salts will be left behind. This will result initially in the formation of a salt pan just below the soil surface and, with compaction and additional deposition, lead to a nearly impervious road surface. Salts that do not contact incident rainwater cannot be dissolved by it and collection of salt below the surface and reduced permeability will both limit the available salt for potential contact with storm water.

Qualitatively, it could be expected that cations would be reduced in their mobility due to cation exchange. Sodium, potassium, calcium, and magnesium were the only cations detected in the groundwater samples collected. Neither toxic metals nor radionuclides have been detected in groundwater samples and as such, are not considered to be present in the brine. The presence of carbonate in the brine may temporarily elevate soil pH, but due to constant contact with the atmosphere it is expected to return quickly to neutral. Among the anions, sulfate is present in the greatest quantity. Chloride is the next most abundant and has the highest solubility. Nitrate, fluoride, and borate concentrations in the brine are relatively minor.

Infiltration will occur not only on the unpaved road surface (representing 1.9% of the site area), but also on the remainder of the site which is unpaved (approximately 98.1% of the site area). During precipitation events that do not produce runoff, the salts on the road surface will be transported to the adjacent down slope unpaved non-road areas. Infiltration in unpaved non-road areas is expected to store brine salts that run off the unpaved road areas. Storage will be expected to take place below the soil surface. This salt below the ground surface in the non-road areas will not be available for contact with storm water runoff.

The potential of runoff water to be “detrimental to flora and fauna on and adjacent to the Project site” is considered negligible in the context of construction and operations on the site which will remove any existing vegetation and habitat, install a fence around the site, channelize site runoff, and dilute site runoff with water from the adjacent sub-basins of the watershed.

Table S&W-135-1 Estimate of TDS Concentration in Solar Field Storm Water Runoff from Brine Water used for Dust Suppression

North and South Field Contributions to Center Outfall - Ridgecrest Solar Power Plant		**Units**	**Comments**
Unpaved Road Width	24	Feet	unpaved road width
Unpaved Road Length	61,300	Feet	unpaved road length
Brine Application Area	1,471,200	square feet	
Brine Application Area	34	Acres	
Solar Field Area	79,174,656	square feet	
Percentage Roads/Solar Field Area	1.9%	percentage inclusive of road areas	
Annual Brine Application	10	acre/feet	per AFC Solar Field Description
Brine Applied per Year	0.296	Feet	
Brine Applied per Year	3.553	Inches	annual amount of Brine applied above the unpaved roads
Volume Applied	8.384	liters applied/ year/ ft^2	
TDS Concentration	6.782	g/l TDS in RO Brine	
Annual Mass Applied	57	g/ ft^2/ yr	
Mass Applied in Period (95% UCL)	59.4	g/ ft^2/ 381 days	
Area Ratio Dilution in Solar Field	53.816	dilution factor	
Rainfall event	0.750	Inches	NOAA Atlas 14
Amount of water in Annual Rain event	1.771	liters in rain event / year/ ft2	
TDS Conc. in water -Unpaved Road	33.519	g/L	
Predicted TDS leaving Solar Field Roads	0.623	g/l TDS if all dissolves in rain event	
Percentage Solar Field Area w/o roads	98.1%	percentage Excludes road areas	
Predicted TDS from Solar Field ex. roads	0.200	g/l TDS for the storm water falling on and running off the remainder of the solar field	
Predicted TDS leaving Solar Field	0.819	g/L TDS weighted average for solar field	

Table S&W-135-2 Estimate of TDS Contribution to Storm Water Runoff in Outfalls from Brine Water usage in Solar Fields

Objective

Estimate the % contribution of the stormwater flow running off each solar field to the appropriate stormwater channel flow discharging from Project site

Procedure

From the Ridgecrest Solar Power Project Drainage Report (RSPPDR)(AECOM, August 7, 2009) find the peak flow discharge for each solar field and the total peak flow discharge at the outfall for the channel associated with each solar field

Compare the peak flow discharge for each solar field to the total peak flow discharge for the appropriate channel outfall to determine the % contribution for each field

Assumptions

This estimate assumes that the Aug version of the Drainage report will still apply in general terms to the flow from the Dec design for Ridgecrest solar plant
This estimate assumes that the peak flow from each sub-basin (includes solar field) would occur at the same time as the total peak flow for the associated channel at the outfall.
This estimate assumes that the 10-year storm event peak flows estimated are proportionally similar to a storm event with any frequency.

Site Data

Ridgecrest Solar Power Project will use the El Paso Wash for stormwater conveyance; (AECOM, 30% Concept Design Dec 18, 2009)
The contribution from areas upstream of the solar farm remain the same as calculated in the Report
The south solar unit fields will be graded so that runoff drains into ditches and mix with the El Paso Wash before the wash leaves the property
The north solar unit fields will be graded so that runoff drains into ditches and mix with the El Paso Wash before the wash leaves the property

Sub Basin ID on Map	Description	Area (mi2)	Discharges to Channel/ Outfall	10-Yr Peak Discharge (cfs)	Contribution based on 10-yr Peak event
O2c	North Field	1.49	Central, #2	209	7.9%
O2b	South Field	1.35	Central, #2	168.5	6.3%
O2	Off Site to the South	20.73			
	Total	**23.57**		**2655.6**	
	Total Contribution from Unit #2 to Total Flow at Center Outfall				**14.2%**
Predicted TDS conc. contribution from solar field to the total storm water discharged from the site via Center Outfall					
	TDS conc. in discharge avg from North & South Solar Fields .		819	mg/L TDS	14.2%
	TDS conc. contribution in the upstream source (est)		**200**	**mg/L TDS**	85.8%
	TDS weighted average for Outfall		**288**	**mg/L TDS**	

DR-S&W-136

Information Required:

Please identify alternatives for disposal of the RO reject water including offsite disposal.

Response:

One alternative disposal option for RO reject water involves solidification of residual solids through a mechanical drying process of some kind (e.g., crystallizer), with characterization of the waste and off-site transport and disposal at an appropriately permitted facility. Another approach would involve placing RO water in an appropriately designed and permitted surface impoundment or open topped above ground storage tank for evaporation. Solids remaining after evaporation would be collected and disposed off-site at an appropriately permitted facility. All of these options would add costs to the Project above the selected option, and would also require additional water to be used for dust control.

DR-S&W-137

Information Required:

Please identify whether, except for the exclusive permitting authority of the Energy Commission, the applicant would need a permit from the Regional Water Quality Control Board (RWQCB) for the discharge of high saline groundwater to land.

Response:

Richard Booth of the Lahontan RWQCB staff responded verbally to an AECOM query to this question about using RO water for dust control for the Ridgecrest site by indicating that his agency does not have the jurisdiction to require a permit; he agreed with the assessment that there would be no water quality impacts from the use of RO reject water at that site as provided in the data adequacy response to the AFC (personal communication Richard Booth, December 11, 2009). While there are significant differences in water chemistry between the two sites, the use of RO water for dust suppression appears acceptable to the Lahontan RWQCB staff.

Although the final determination regarding the need for a Report of Waste Discharge (ROWD) permit has not been made by the RWQCB, a ROWD application document has been prepared and is included as Attachment DR-WASTE-241. This application was not prepared for RO discharge, but for the Land Treatment Unit only.

DR-S&W-138

Information Required:

If a ROWD permit is necessary, please provide all the permit information necessary to the RWQCB and include the appropriate application fee. Please copy the Energy Commission with the information provided to the RWQCB.

Response:

The ROWD is provided in Attachment DR-WASTE-241.

DR-S&W-139

Information Required:

Please provide details on the sizing of the LTU and how HTF-impacted soils would be treated including information on the presence of indigenous bacteria to breakdown the HTF, breakdown products, time for achieving breakdown from the 10,000 mg/kg maximum to the 100 mg/kg reuse level.

Response:

The LTUs are sized based on data from an existing solar farm that uses an LTU to bioremediate HTF-impacted soil and the following basis:

1. HTF-impacted soil is generated at a rate consistent with existing solar farm experience. Kramer Junction is a 150 MW facility that generates an average of 500 cubic yards (cyd) of HTF-impacted soil per year (DTSC correspondence, 1995). This rate is ~ 3.3 cyd/year/MW.
2. Applying the Kramer Junction experience to the 250 MW Ridgecrest facility, the Ridgecrest facility is estimated to generate ~833 cyd/year of HTF-impacted soil.
3. HTF-impacted soil is treated in 6-inch thicknesses, so, on average, 45,000 square feet, or 1.1 acres, is needed for HTF-impacted generated per year.
4. The LTU will be used for either placement of HTF-impacted soil or treatment of HTF-impacted soil. That is at any one time the LTU is used to place material to be treated as it is generated or being used for soil treatment. HTF-impacted soil treatment is estimated to take 1 to 4 months to complete bioremediation; however the design of the LTU will allow soil placed at the beginning of the year to have up to twelve months to complete bioremediation and removal.

To address above average spill events, Kramer Junction has additional capacity in the LTU or a factor of safety for HTF-impacted soil treatment. Kramer Junction has a capacity to treat 1,944 cyd/year and generates an average of 500 cyd/year of HTF-impacted soil, so the facility has an approximate 3.9 factor of safety. Applying this factor of safety to Ridgecrest, the total area estimated for the LTU is ~175,000 square feet, or 4 acres.

DR-S&W-140

Information Required:

Explain what impact the use of RO concentrate on soils for dust suppression would have on the ability of indigenous bacteria to breakdown the HTF?

Response:

According to standard procedures for handling spills, soils contaminated with HTF will be transferred to the land treatment unit (LTU) for disposal. The use of RO concentrate on unpaved roads for dust suppression is not expected to have any impact on the ability of indigenous bacteria to break down HTF within the LTU. The LTU is designed with a minimum 2-foot berm. This berm is more than adequate to prevent runoff from the site from entering the LTU even during a 100-year storm (3.41 inches of rain in 24 hours).

Soil containing brine concentrate might be introduced into the LTU in the instance where a spill took place on soil that contained brine salts. In this case, the quantity of soil containing brine which is contaminated with HTF is expected to be small compared to the total volume of the LTU. Mixing and watering of the LTU is expected to dilute this material sufficiently that it will not reduce biodegradation rates in the LTU. If a large volume of soil containing brine was contaminated with HTF (greater than approximately 10 percent of the LTU volume), it would need to be introduced into the LTU gradually but could be biologically treated.

Outside the LTU, the unpaved road areas (less than three percent of the solar field area) routinely receive brine and would be expected to have a reduced capability to degrade spills of HTF due to osmotic pressures on indigenous soil microorganisms. This phenomenon is not however expected to have any impact on overall HTF biodegradation since spills and associated material are transferred to the LTU.

DR-S&W-141

Information Required:

Explain how runoff and/or leachate potentially generated from operation of the LTU would be managed?

Response:

Each LTU is surrounded by a 2-ft high berm. The berm will divert stormwater run-on from adjacent areas entering the LTU. Stormwater runoff and/or leachate within the berm will be collected in a sump. Each LTU is designed to drain to a sump. Stormwater runoff and/or leachate that collect in the sump will be either reused for bioremediation, discharged, or will be properly disposed. If excess storm water accumulates in the LTU, the stormwater will be inspected for the presence of a sheen. Regardless of whether a sheen is observed, the excess storm water will be runoff and/or leachate will be sampled and analyzed for HTF constituents. If the results of the water analysis are below regulatory levels for the HTF constituents, then the runoff and/or leachate will be transferred to the RO system and reused onsite. If the results of the water analysis indicate that HTF constituents are above regulatory levels, then the water will be disposed offsite at an appropriate facility.

DR-S&W-142

Information Required:

Explain potential impacts from operation of the LTU on surface and groundwater quality.

Response:

The material that will be placed in the LTU consists of soil that is impacted with Therminol VP-1™ HTF as a result of minor leaks or spills that occur during the course of daily operational or maintenance activities. At ambient temperatures, HTF is a highly viscous material that is virtually insoluble in water. Operation of an LTU is not expected to impact surface water or groundwater quality beneath the site. The LTU will be surrounded on all four sides by berms that will protect the LTU from surface water flow. Because of the viscous and insoluble nature of the HTF, it is not likely to mobilize from the soil downwards to the water table. The LTU will be constructed with a 2-ft-thick clay layer on the floor of the LTU (underlain by three-feet of native soil that has been compacted to 95 percent of optimal compaction) that will serve as a protective barrier to the downward movement of contaminants from the LTU. Moreover, should any contaminants

escape the LTU, the water table is approximately 480 feet beneath the LTU. In sum, based on the viscosity of HTF at ambient temperatures, its insolubility, the depth of the water table beneath the RSPP site, and the placement of protective berms around the LTU, it is expected that surface water and groundwater quality beneath the site will not be impacted by the LTU operation.

DR-S&W-143

Information Required:

Please provide all information necessary to file a Report of Waste Discharge discharge to a LTU with the RWQCB.

Response:

The ROWD is provided in Attachment DR-WASTE-241.

DR-S&W-144

Information Required:

Please provide all information necessary to file a Report of Waste Discharge to the RWQCB and include the appropriate application fee.

Response:

The ROWD is provided in Attachment DR-WASTE-241.

DR-S&W-145

Information Required:

Please identify how much cut and fill would occur at the site.

Response:

The amount of cut and fill for the revised site design will be provided as part of the conceptual Engineering Plans to be submitted on February 10, 2010. The total cuts and fills for the revised site plan are anticipated to be less than the previous site plan.

DR-S&W-146

Information Required:

If the cut and fill quantities are not balanced, please show how the balance differences would be resolved.

Response:

The cut and fill quantities will be balanced onsite.

DR-S&W-147

Information Required:

Please provide calculations indicating the stockpile locations are sufficient to support the volume of soil and vegetation expected to be generated.

Response:

The vegetation that is generated from clearing the site is proposed to be burned in accordance with acceptable County requirements. The soil associated with grading will not be stockpiled in any large manner inasmuch as stockpiled material is subject to additional erosion and results in a double-handling of the material. A few small stockpiles will be created in the areas of active grading on an on-going basis, and these locations will change with time and are not restricted by a fixed size location. The storage areas around the warehouse are proposed for materials associated with the construction of the mirrors, general building materials, piping, insulation, etc. Onsite gravels may be screened and stockpiled for use in areas to control dust and erosion, but these stockpiles will be located within the solar field areas and not restricted by any space limitations.

DR-S&W-148

Information Required:

Please provide plans and maps showing how sheet and channel flow into and across the project site, over roads, around the mirrors, and off the site would be managed through engineering controls.

Response:

The grading plans will depict how the sheet and channel flow occurs across the site. The engineering controls consist of providing established grades with minimum slope in the field areas to minimize any erosion and maximize infiltration, providing swales between the solar loops at predetermined locations to collect the field drainage, collection channels are located at the ends of the swales so that they collect the water from the fields, and these collection channels direct the drainage to the primary drainage channels that are located on the perimeter of the site. The grading plans can be seen as Sheets C-04 and C-05 of the Conceptual Engineering Drawings that will be provided on February 10, 2010.

DR-S&W-149

Information Required:

Please provide erosion and deposition predictions on the up-slope and down-slope sides of the project.

Response:

The potential for erosion and deposition of material associated with this Project site should be evaluated in five distinct areas of focus: 1) El Paso Wash, 2) upstream of the south field, 3) upstream of the north field, 4) off-site drainage areas, and 5) within the solar fields.

Impacts to the El Paso Wash will be largely avoided, with the exceptions of the road culvert crossing at Brown Road, the HTF pipe bridge, the new 230-kV transmission line, and 8 to 10 drainage channel tie-ins. These drainage tie-ins are proposed to aid in maintaining natural flow diverted from swale complexes within the Project footprint that would be impacted by construction activities for the RSPP. The small drainage channel connections to El Paso Wash will be made using standard Kern County or APWA details and the outwash aprons will be constructed of soil cement so that erosion is not an issue within the wash. Further details regarding the impacts associated with the reconfigured site plan are being developed and will be provided in February.

The upstream area from the south field is a relatively small area compared to the site as a whole and is generally centered in a flat ridge between El Paso Wash and a small un-named wash to the west. As such, the upstream area does not create a large flow of water to either channel, and the slopes, ground cover condition, and rocky crust in this area does not create much opportunity for sediment transport. The construction of the south field will intercept some of the drainage in a minor ephemeral wash that drains to the west, but this drainage will be allowed to meander westerly along the south boundary of the site to its prior point of connection with a drainage depression west of the solar field. This new drainage flow path is longer than the current flow path and thus flow velocities should be reduced compared to the existing small flow upstream of the south field. In addition, using the low impact drainage approach preferred by the BLM (allowing this intercepted water to migrate westerly in an overland flow condition) will not result in any discernible increase in sedimentation or erosion in this area.

The area upstream of the north field is bounded by Brown Road and thus there is no impact to erosion or sedimentation resulting from flows upstream of the north field. The flows along Brown Road will be channelized as part of the onsite drainage and incorporated into the flows within the solar fields.

The off-site drainage areas immediately east of the south field are very small and the drainage from these areas into the engineered channels on the perimeter of the site is not expected to create any erosion or sedimentation issues. These engineered channels will be created from native soil and will incorporate drop structures constructed from soil cement prior to discharge into the El Paso Wash. The flows in the channels are small, velocities in these channels will be less that scour velocity, and the drop structures along the length of these channels at 1,300-ft intervals and at the end of the channel will capture any minor amount of sediment that gets washed into these channels. The off-site drainage east of the north field is primarily a flow resulting from 1-24 inch culvert below US Highway 395. This drainage and the other isolated drainage in the area will be directed to a diversion channel on the east side of the north field. The type of soil in the area, the existing ground slope, and the vegetation appear to minimize any erosion in this area. The flow in the new engineered channels is relatively small; velocity in this channel will be less that scour velocity; and the drop structures along the length of this channel (at 1,300-ft intervals and at the end of the channel) will capture any minor amount of sediment that gets washed into this channel. There is not anticipated to be any sedimentation impact to the downstream channels as a result of the off-site flows intercepted by the engineered channels.

The onsite flows within the solar fields will be non-erosive by design. The swales between the fields are very flat (0.015%), and the drainage channels within the site will also be relatively flat throughout the length of the channel. The discharge points for these channels will require a drop structure to be placed prior to connection to the existing El Paso Wash. There will be no sediment transport originating from the site due

to the flat slopes that will exist onsite, and the drop structures at the termination of the channels will be constructed of soil cement, therefore, avoiding erosion impacts to the El Paso Wash. The outwash aprons at the end of these drainage channels will also be protected with soil cement and therefore erosion and sedimentation are not considered to be a problem as a result of the on-site drainage flows.

DR-S&W-150

Information Required:

Please provide information showing how soils would be maintained to prevent erosion during operation.

Response:

During operations, the following measures will be utilized to control erosion:

- The primary access road to the site and the roads between the administration building, warehouse, and all power blocks will be paved.
- The gravel roads on the perimeter of the solar fields will be watered to control erosion by using excess water from the water treatment plant on a regular basis.
- The 3:1 graded terrace slopes onsite will be treated on a regular basis with a bio-degradable dust palliative. These palliatives generally have a life of 6 to 15 months depending on application rates and water content.
- A 30-ft high wind fence will be constructed on the east and west faces of the Project and at intermediate locations to control the wind affect in the solar fields.
- The solar fields will remain as native material and are protected from erosion by the solar collectors. The solar collectors sit approximately 3 feet above the ground, they are approximately 20 feet across their mirror face, and are spaced at a repeating interval of 22 meters which creates an air-foil effect across the solar field. This air-foil effect precludes wind from coming down into the field and lifting the material up into the air.
- The drainage channels will be created with 3:1 side slopes to mitigate the erosion process and the channels will also be designed with very low slopes to keep water velocities non-erosive.

DR-S&W-151

Information Required:

Please provide maps and plans showing how the site soils would be returned to the original state along with long-term management of the site soils upon decommissioning of the project. (Staff's current understanding is that desert pavement and varnish can take 100s to 1000s of years to form – see USGS Bulletin 1793 - The Response of Vegetation to Disturbance in Death Valley National Monument, California).

Response:

Site reclamation/restoration activities will be conducted in accordance with a Decommissioning Plan developed in accordance with BLM regulations. Our understanding is that the California State BLM Office will be developing guidance for reclamation/restoration activities. A plan will developed in accordance with regulations promulgated by BLM at 43 CFR 3809 et seq. Potential funding associated with channel maintenance and closure activities at the RSPP site will also described in the Decommissioning Plan. Funding for channel maintenance and decommissioning will be established in accordance with regulations promulgated by BLM at 43 CFR 3809.550 et seq.

DR-S&W-152

Information Required:

Please provide a comprehensive discussion of how dust control would be achieved by mirror washing and compaction. Specifically identify:

A. How water from mirror washing would be directed to all the disturbed areas.
B. How equipment traffic will compact the soil and not break up soil crusts and/or create silt.
C. How would water be applied when mirror washing is not occurring.

Response:

1. The mirror washing process has no effect on the dust control process onsite. The water for mirror washing is applied by a water-brush and the water drips off the mirrors and infiltrates into the ground.
2. The traffic onsite will utilize the perimeter gravel roads to navigate around the site. These roads will be sprayed regularly with residual water from the water treatment plant or dust palliatives will be applied. The traffic within the site on unpaved roads will move at slow speeds so as not to create any blowing dust; as dust quickly reduces the efficiency of the mirrors. The soils onsite will be compacted naturally, in the process of constructing the site, and as such the daily operational equipment will have no further effect on the soils. A natural firm base will be established onsite over time in the area of the solar troughs, and the vehicles that may operate in these areas move at speeds less than 5 miles per hour and will have negligible effect on the soils. As previously noted, the wind effect in the solar field is mitigated by construction of wind fences and the solar arrays themselves.
3. The mirror washing process has no effect on the dust control process onsite. A water truck will be used to spray water on the site gravel roads.

DR-S&W-153

Information Required:

Please provide clarification indicating whether the project is inside or outside of the district's service boundary.

Response:

The Project is currently outside of the Indian Wells Valley Water District's service boundary. IWVWD is in the process of annexing the Project into their service boundary. A copy of the annexation map is provided as Attachment DR-S&W-153.

DR-S&W-154

Information Required:

Please provide a copy of the agreement between the applicant and the IWVWD for construction and operation water supply.

Response:

A copy of the "will serve" agreement was provided as Attachment Water-D in Volume III Data Adequacy Response, submitted to the CEC on October 26, 2009.

DR-S&W-155

Information Required:

If the project is outside the district's boundaries, please provide a copy of a proposed annexation agreement to indicate the district would annex the site to provide water services.

Response:

The Project is currently outside of the District's service boundary. The District is in the process of annexing the Project into their service boundary. As stated previously, a copy of the annexation map is provided as Attachment DR-S&W-153.

DR-S&W-156

Information Required:

If the project is outside the district's boundaries, please provide a copy of a proposed annexation agreement to indicate the district would annex the site to provide water services.

Response:

Please refer to the response to DR-Soil/Water-153.

DR-S&W-157

Information Required:

Please identify whether the groundwater basin is managed pursuant to a groundwater management plan or is adjudicated. If the basin is managed, indicate the operational parameters used for basin management.

Response:

The IWV Groundwater Basin is not an adjudicated basin. In 2006, the major water service providers and stakeholders in the IWV Groundwater Basin formed the Indian Wells Valley Cooperative Groundwater Management Group and published the Cooperative Groundwater Management Plan. Participants in the plan include the IWVWD, the China Lake Naval Air Weapons Station (NAWS), the BLM, Searles Valley Minerals, the Kern County Water Agency, and other local agencies and stakeholders. The plan outlines seven objectives with the intent to extend the useful life of the groundwater resources to meet current and foreseeable future needs. The seven objectives are as follows:

1) Limit additional large scale pumping in areas that appear to be adversely impacted. Under this objective, no signatory producing water will increase its annual production of water from the groundwater depression in the area in T26S R40E Sections 29, 30, 32, and parts of sections 31, and 33; and T27S R40E Sections 4, 5, and northern part of Section 9; and T26S R39E part of Section 25. This applies to extractions greater than 5 afy.

2) Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the IWV. Under this objective, the participants will consider developing wells in the outlying areas of the IWV.

3) Aggressively pursue the development and implementation of water conservation and education programs. Under this objective, the Signatories have collectively developed a written policy regarding water conservation (Water Conservation Public Advisory) and will continue to develop water conservation guidelines and education programs.

4) Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible. The Signatories will consider the use of non-potable water, such as treated sewage effluent or poor quality sources, for appropriate re-use applications.

5) Explore the potential for other types of water management programs that are beneficial to the IWV. Under this objective, the Signatories will consider projects such as water transfers, water banking, water importation, groundwater replenishment, and other programs that will enhance or prolong groundwater reserves in the IWV.

6) Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resources in the IWV. Under this objective, the Signatories will continue to efforts to gather data and analyze projects focusing on groundwater recharge, discharge, storage, quality, transmissivity, and storativity with respect to groundwater resources of the IWV.

7) Develop an interagency management framework to implement objectives of this Plan. This objective lists the Signatories to the Plan and provides for the further development of this cooperative agreement to define the roles, responsibilities, rights, and obligations of all participants. It also affords the opportunity to enlist new members and provides the administrative framework for implementing applicable elements of this Plan.

DR-S&W-158

Information Required:

If available please provide a copy of the groundwater management plan, urban water management plan or any other documents discussing management and governance of water supplies in the basin.

Response:

A copy of the Indian Wells Valley Cooperative Water Management Group Working Group 2010/2011 Objectives is provided as Attachment DR-S&W-158.

DR-S&W-159

Information Required:

Please provide a comprehensive discussion of the condition of the basin including basin balance, the amount of overdraft (if any), and any legal/management thresholds for total amount of water that can be extracted from the basin.

Response:

Condition of the basin– The IWV Groundwater Basin is located in the west-central portion of the South Lahonton Hydrologic Region and is bounded to the east by the Argus Range, to the south by the El Paso Mountains; to the west by the Sierra Nevada Range; and to the north by the Coso Range. Other groundwater basins that are adjacent to the IWV Groundwater Basin include the Coso Valley Groundwater Basin to the north, the Rose Valley Groundwater Basin to the northwest, the Searles Valley Groundwater Basin to the east, and the Fremont Valley Groundwater Basin to the southwest.

The IWV Groundwater Basin is virtually closed, and there is very little groundwater underflow to or from adjacent valleys. As a closed basin, surface drainage does not "exit" the basin and flow from the surrounding mountains drain toward China Lake, or other small playas in the area. Evapotranspiration (ET) from the playa areas was the primary outflow from the IWV Groundwater Basin until the about 1950s or 1960s. At this time, groundwater pumping began to exceed ET rates. Prior to this time, ET from the China Lake area (playa) was the primary outflow of groundwater from the IWV Groundwater Basin. Current groundwater pumping rates have intercepted water flowing east towards the playa, reducing the amount of ET from the IWV Groundwater Basin.

In 2009, a groundwater flow model and hydrogeologic study of the IWV Groundwater Basin was performed for the IWVWD by Brown and Caldwell. Using existing data and previous studies by the USGS, United States Bureau of Reclamation (USBR), and studies conducted for China Lake NAWS, four key hydrostratigraphic features were identified that were critical to understanding the basin-wide water budget and in developing the hydrogeologic conceptual model. These features include: a) the existence of a north-south fine-grained sediment plug in the west-central basin, b) an east-west high permeability gravel zone in the Ridgecrest-Inyokern area, c) a high groundwater gradient between the neighboring El Paso Sub-basin and the southwest area of the IWV Groundwater Basin, and d) playa ET losses and changes over time.

Basin Balance – The model calculated water budgets for model years 1953, 1985, and 2006. The 2006 transient water budget is as follows.

Inflows	Mountain Front recharge:	9,500 acre feet per year (AFY)
	Groundwater subflow	1,500 AFY
	Storage	17,346 – 21,246 AFY
	Total inflows	**28,346 – 32,346 AFY**
Outflows	Evapotranspiration	4,000 – 8,000 AFY
	Pumping wells	24,336 AFY
	Total outflows	**28,346 – 32,346 AFY**

Amount of Overdraft – The groundwater flow model led to the estimation and refinement of the water budget for the IWV Groundwater Basin that concluded that groundwater storage in the aquifer has been in overdraft condition averaging approximately 20,000 AFY and totaling about 900,000 AF since 1920. Most of the total overdraft has occurred since the 1950s.

Legal/Management Thresholds – The California Water Code allows any local public agency that provides water service whose service area includes a groundwater basin or portion thereof that is not subject to groundwater management pursuant to a judgment or other order, to adopt and implement a groundwater management plan (California Water Code Sections 10750 et. seq.) Groundwater Management Plans often require reports of pumping and some restrictions on usage. In 2006, the major water service providers and stakeholders in the IWV Groundwater Basin formed the Indian Wells Valley Cooperative Groundwater Management Group and published the Cooperative Groundwater Management Plan. Participants in the plan include the IWVWD, the China Lake Naval Air Weapons Station (NAWS), the BLM, Searles Valley Minerals, the Kern County Water Agency, and other local agencies and stakeholders. The plan outlines seven objectives with the intent to extend the useful life of the groundwater resources to meet current and foreseeable future needs. The seven objectives are as follows:

1. Limit additional large scale pumping in areas that appear to be adversely impacted. Under this objective, no signatory producing water will increase its annual production of water from the groundwater depression in the area in T26S R40E Sections 29, 30, 32, and parts of sections 31, and 33; and T27S R40E Sections 4, 5, and northern part of Section 9; and T26S R39E part of Section 25. This applies to extractions greater than 5 afy.

2. Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the IWV. Under this objective, the participants will consider developing wells in the outlying areas of the IWV.

3. Aggressively pursue the development and implementation of water conservation and education programs. Under this objective, the Signatories have collectively developed a written policy regarding water conservation (Water Conservation Public Advisory) and will continue to develop water conservation guidelines and education programs.

4. Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible. The Signatories will consider the use of non-potable water, such as treated sewage effluent or poor quality sources, for appropriate re-use applications.

5. Explore the potential for other types of water management programs that are beneficial to the IWV. Under this objective, the Signatories will consider projects such as water transfers, water banking, water importation, groundwater replenishment, and other programs that will enhance or prolong groundwater reserves in the IWV.

6. Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resources in the IWV. Under this objective, the Signatories will continue efforts to gather data and analyze projects, focusing on groundwater recharge, discharge, storage, quality, transmissivity, and storativity with respect to groundwater resources of the IWV.

7. Develop an interagency management framework to implement objectives of this Plan. This objective lists the Signatories to the Plan and provides for the further development of this cooperative agreement to define the roles, responsibilities, rights, and obligations of all participants. It also affords the opportunity to enlist new members and provides the administrative framework for implementing applicable elements of this Plan.

Negotiations have been completed with the IWVWD to secure water supply for the RSPP. An MOU has been approved by the IWVWD Board, and has been finalized that will secure a reliable source of water for the Project. Please See Response to Data Request DR-S&W-170 below for a discussion of mitigation.

DR-S&W-160

Information Required:

Please discuss in detail whether a 401 certification is required. If required, please discuss compliance with the RWQCB requirements discussed on the following RWQCB webpage: http://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/index.shtml.

Response:

It is not anticipated that a 401 Water Quality Certification will be required, since it the US Army Corps of Engineers is expected to determine that there are no federal jurisdictional waters impacted by the Project. A Jurisdictional Delineation Report (JDR) submitted to the United States Army Corps of Engineers (USACE) on October 23, 2009. However, there are “State” waters under the Porter Cologne Act that require a similar permit through the RWQCB, which is called a “dredge and fill” permit. At this time, the JDR is being revised to incorporate the reconfiguration of the Project. It is anticipated that a revised JDR will be available on March 5, 2010, at which time a “dredge and fill” permit will be prepared detailing the revised project “State” waters.

DR-S&W-161

Information Required:

Submit a jurisdictional delineation to the USACE, a section 401 water quality certification application to the RWQCB, and a Streambed Alteration Notification package to the CDFG. Provide copies of all these documents to the BLM. This response may be prepared in conjunction with the response to related Biological Resources data requests.

Response:

The jurisdictional delineation was provided to the CEC and USACE on October 23, 2009. As stated above in DR-S&W-160, the JDR is currently being revised to incorporate the reconfiguration of the Project. A copy of the revised JRD will be provided to the USACE and CDFG. The Streambed Alteration Agreement (SAA) was submitted to the CEC and CDFG on November 25, 2009.

DR-S&W-162

Information Required:

Please provide the thresholds or levels of significance that were used to evaluate the potential impacts associated with the water supply impacts. The thresholds must consider any and all regulations, management plans, agreements, court orders, and other policies that may apply to the IWV groundwater basin.

Response:

In evaluating potential significant impacts to groundwater supplies, the Appendix G, "Environmental Checklist" of the CEQA Guidelines (California Code of Regulations, Title 14, Appendix G, § VIII, subdivision (b)) was considered. Appendix G asks whether the project would *"[s]ubstantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table* level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)*."*

To assess the effect of Project pumping, impacts were evaluated using a numerical groundwater model developed by Brown and Caldwell (2009) for the Indian Wells Valley Groundwater Basin and the IWVWD and China Lake Naval Air Weapons Center. Data response 132 and 133 outline revisions to the model to incorporate draught and conditions of future pumping estimated by the District for their well field. The predicted additional drawdown induced by the proposed project water supply at the end of the construction period and end of the operational period of five feet at or more at an adjacent water supply well was considered potentially significant. Figures DR-S&W-133-2 and DR-S&W-133-3 show the differences in water levels from a no-project condition and the proposed Project pumping. As shown, by comparison to the no-project condition, the difference in the water levels in surrounding water supply wells is significantly less than five feet. This informal criterion has been used at many other projects licensed by the CEC as a measure of potential significance in the evaluation of the changes to the water level in surrounding water supply wells. Given that the predicted difference to the no-project simulation is small there is not a significant impact to surrounding water supply wells.

To evaluate if the Project would induce "substantial depletion of an aquifer or would produce a net deficit in aquifer volume", changes to the aquifer storage from the proposed Project pumping were considered. As noted in the AFC and as discussed in DR-S&W-133, the Indian Wells Valley Groundwater Basin has been in overdraft since 1920 and has shown an average water level decline of between 1 to 1.5 feet per year. An estimate of the overdraft is about 20,000 acre-feet per year. Given this condition, any additional water use, and water use proposed by the Project, would contribute to what is already substantial depletion of the aquifer. It is important to note, while the Project pumping would contribute to an already over drafted condition, the contribution from proposed construction water use amortized over the life of the Project and the operational supply amounts to about a 1 percent increase. Nevertheless, the Project is proposing offsets to its proposed water supply as noted under S&W DR-170, 171 and 172.

Consideration of applicable plans and policies was investigated as part of the assessment of criterion of thresholds of significance. The LORS provided in the AFC listed applicable ordinances that were considered in the evaluation of proposed project pumping. There is no groundwater management plan, or court orders for the Indian Wells Valley Groundwater Basin, and the basin is not listed on the State Water Resources Control Board (SWRCB)'s list of adjudicated groundwater basins.

DR-S&W-163

Information Required:

Please identify whether onsite construction water supply wells would be used to supply construction water.

a. If yes, please provide site data that indicates a viable water supply and a conceptual model of the site specific hydrogeology in sufficient detail to modify the existing Brown & Caldwell numerical model.
b. Please modify the Brown & Caldwell numerical model based onsite specific data, and calibrate and run sensitivity analysis to evaluate potential drawdown impacts.
c. Please provide an analysis demonstrating the numerical modeling was completed consistent with the techniques/requirements set forth in:
    a. ASTM D5447 - Application of a Ground-Water Flow Model to a Site-Specific Problem
    b. ASTM D5490 - Comparing Ground-Water Flow Model Simulations to Site-Specific Information
    c. ASTM D5609 - Defining Boundary Conditions in Ground-Water Flow Modeling
    d. ASTM D5610 - Defining Initial Conditions in Ground-Water Flow Modeling
    e. ASTM D5611 - Conducting a Sensitivity Analysis for a Ground-Water Flow Model Application
    f. ASTM D5981 - Calibrating a Ground-Water Flow Model Application
d. Please provide an impact analysis on water level declines along with any potential impacts to adjacent water users, overall basin storage, and changes in groundwater quality associated with extracting groundwater for construction purposes at the site.

Response:

Onsite wells will not be used for construction water. Construction water will be provided by Indian Wells Valley Water District initially by trucking and then through the water supply pipeline.

DR-S&W-164

Information Required:

For operational water supply, please include a discussion of the conceptual model used as part of the development of the Brown & Caldwell groundwater model along with a discussion of how effective the calibration was and of the sensitivity analysis of the Brown & Caldwell model. Please summarize the results of the Brown & Caldwell calibration and sensitivity analysis.

Response:

<u>Conceptual Model</u> – The conceptual model includes:

- Physical basin boundaries;
- Estimated special distributions of the alluvial aquifer material properties including hydraulic conductivity and storage parameters;
- Estimated water flow into the basin;
- Estimated water flow out of the basin; and
- A basin scale groundwater budget.

The model domain encompasses the area of the IWV Groundwater Basin (288,000 acres) to a depth of 2,000 feet bgs and is comprised of four layers, developed from the interpretation of lithostratigraphic conditions within the IWV Groundwater Basin. Layer thickness and distribution were developed from the 3-D geologic model and cross sections, and in part, interpolation of the geologic contacts through kriging managed in Surfer™. The model grid was established at a uniform cell size of 1,320 feet by 1,320 feet (1/4 mile on a side, 16 cells per square mile).

Four key hydrostratigraphic features were identified within the hydrogeologic conceptual model. These features include: 1) the existence of a north-south fine-grained sediment plug in the west-central basin, 2) an east-west high permeability gravel zone in the Ridgecrest-Inyokern area, 3) a high groundwater gradient between the neighboring El Paso Sub-basin and the southwest area of the IWV Groundwater Basin, and 4) playa ET losses and changes over time.

Feature #1 – Fine-grained Sediment Plug is a thick and regionally extensive deposit of primarily fine-grained sediments located approximately 3 to 4 miles east of the Sierra Nevada mountain-front. This feature trends north-south. Starting at a depth of approximately 340 feet bls, the deposit is as much as 1,340 feet thick. The large thickness of the fine-grained deposit suggests that a great deal of recharge from the Sierra Nevada canyons to the west, essentially from Five-Mile Canyon south to at least Grapevine Canyon, is “dammed up” behind the fine-grained plug.

Feature #2 – Gravel Zone is a west-east trending region of coarse-grained high permeability sediments. It is present from the mouth of Indian Wells Canyon to approximately the northwest portion of Ridgecrest. This region contains most of the high volume production wells.

Feature #3 – The High Gradient zone refers to a large groundwater gradient (approximately 100 feet per mile) observed across the narrows extending from the El Paso Sub-Basin into the main IWV Basin near the Southwestern Area. Under the current conceptual and numerical flow model, this feature is theorized to be caused primarily by a combination of a narrowing of the area available for flow, possibly by currently unknown shallow bedrock from the Sierra Nevada, and the influx of recharge from Freeman Canyon.

Feature #4 –ET from the playa area was the primary outflow of the groundwater from the IWV Basin until sometime in the 1950s and 1960s when the magnitude of groundwater pumping likely began to exceed it. Because no new data on ET rates was developed for this work, B&C assumed the volume of ET per year in 1920 was equal to the 1920 total estimated flow into the basin. During calibration, a maximum depth to water at which ET could occur was adjusted to a depth of 15 feet and the maximum rate of ET was set at 1.0 feet per year

The wells were simulated as 173 grid independent analytical features. The model calculated water budgets for model years 1953, 1985, and 2006. The 2006 transient water budget is as follows.

Inflows	Mountain Front recharge:	9,500 acre feet per year (AFY)
	Groundwater subflow	1,500 AFY
	Storage	17,346 – 21,246 AFY
	Total inflows	**28,346 – 32,346 AFY**
Outflows	Evapotranspiration	4,000 – 8,000 AFY
	Pumping wells	24,336 AFY
	Total outflows	**28,346 – 32,346 AFY**

Brown and Caldwell then converted the conceptual flow model into a format that could be efficiently modeled using numerical modeling software. This process involved appropriately simplifying the groundwater flow system and calibrating the model.

Calibration and sensitivity analysis. Calibration is the process of adjusting model parameters such as boundary conditions, stresses, and aquifer parameters, to achieve a good match between the simulated and observed hydraulic heads or other relevant hydrologic data such as water budget components. The observed data are called calibration targets. Initial estimates for hydrogeologic parameters are varied within an observed or estimated range of values to improve the model's ability to simulate or predict these targets.

The model was calibrated over the full model time frame (i.e., 1920 to 2006). The calibration was conducted both qualitatively and quantitatively. The qualitative review of the model-calculated flow regime was performed to assess the general groundwater flow system and to provide a subjective indication of the difference between model-calculated and field-measured heads. Quantitative analysis of the model calibration utilized both statistical measures of model residuals and direct comparisons of simulated and observed water levels.

The model was calibrated to historical groundwater elevations from 1920 to 2006. During the calibration process, aquifer physical properties, recharge, and discharge were varied to best match available groundwater elevation data. The calibration used both qualitative and quantitative methods to match historic water levels for years 1920 (assumed steady-state condition), 1953, 1985 and 2006. Calibration targets for the transient portion of the model included measurements from seven periods beginning in 1946 and ending in 2006, with targets ranging from 22 to 225 well locations. From the calibration, Brown and Caldwell concluded that the model can be employed to for future predictive simulations and planning purposes.

Results of calibration and sensitivity analysis. Sensitivity analysis is integrated with calibration. While performing calibration, the modeler determines which parameters are more sensitive to changes with regard to the final model result. By recording the changes made during calibration and evaluating the results, the model designer is performing the sensitivity analysis. During the calibration process, the aquifer parameters, recharge, subflow and ET were varied in an effort to best match available measured historical water level data. The calibrated recharge rates for the recharge areas were generally consistent with the conceptual model rates with the exception of recharge occurring within the El Paso SubBasin which was reduced by 75 percent, and recharge along the northeastern boundary of the model domain which was doubled. In general, the model results match the historical water levels better for the early years (including 1920 and 1953) than for later years (including 1985 and 2006). A review of the 2006 model residuals shows that simulated model water levels are locally overestimated in the vicinity of Ridgecrest. This is likely due to the presence of local pumping depressions. The model underestimated the water levels immediately south of the Playa. This is likely due to local perched groundwater conditions. Based on a thorough set of quantitative calibration criteria, the basin-wide distribution of model water levels deemed appropriate to use the model for future predictive simulations and planning purposes.

The model parameters that are considered well constrained are subsurface outflow from the basin, basin thickness, and groundwater pumping. Model parameters that are considered moderately constrained are mountain front recharge, specific storage and specific yield parameters, and for the saturated alluvium hydraulic conductivity (in the areas of the basin that have well and borings installed). Model inputs or parameters that are considered poorly constrained are hydraulic conductivity where there are no geologic or geophysical logs, subflow into the basin from Rose Valley and Coso Basins, and the magnitude of evapotranspiration that exits the basin over time.

DR-S&W-165

Information Required:

Explain what parameters were used to predict future water level declines in the basin including but not limited to: groundwater production estimates, artificial recharge estimates (if any), hydrologic regimes (wet vs. dry or average conditions) and any other estimates that were used to predict water level declines in the projected water supply well(s).

Response:

Water level fluctuation in a groundwater basin is a result of complicated hydrodynamics involving inflows and outflows. In general, water level rises as the inflows increase, outflows decrease or both, and vice versa. In the Indian Wells Valley Groundwater Basin, the primary inflow to the basin is through mountain front recharge and primary outflows are groundwater extraction from wells and evapo-transpiration. To predict future water level declines in the basins, two factors are considered: 1) demand of water that may increase and results in more pumping from wells; 2) dry or drought conditions that may occur and result in reduction of inflow to the basin.

Seven model simulations (Runs 1, 2a, 2b, 3a, 3b, 4a, and 4b) were conducted to assess and predict water level declines and changes in the basin storage as described under Data Response No.133 above. Details for each simulation and the change in basin storage are presented in Table DR-S&W-133-1. Changes in water levels (drawdown) by comparison to the no project conditions (Scenario 3a/3b) and project pumping (Scenario 4a/4b) are shown on Figures DR-S&W-133-2 and DR-S&W-133-3.

DR-S&W-166

Information Required:

Please clarify what would be the source of water for construction.

Response:

The source of water for construction will initially be through trucking of water from a source through the Indian Wells Valley Water District. The majority of water will be provided through the water supply line along China Lake Boulevard.

DR-S&W-167

Information Required:

Please describe the source of water that would be trucked to the site and what potential impacts would be related to project use.

Response:

The water source for the Project is groundwater provided through the IWVWD. The IWVWD source of water will be provided from the Ridgecrest Heights storage tank. Quality of water from IWVWD is given in Table DR-Soil/Water-167. No data is available for silica. No offsite backup water source is included as part of the Project.

Water received from IWVWD will meet the requirements of the California Department of Health Services for potable water supplies and will not require further treatment for this purpose. Power cycle makeup, mirror washing water, and cooling of ancillary equipment will require onsite treatment for reduction of dissolved solids, and this treatment varies according to the quality required for each of these uses. Based on the water quality of the IWVWD supply and the additional treatment of water for operations, this water supply are not considered have the potential for impacts to the Project.

Table DR-Soil/Water-167 Summary of Water Quality Data (IWVWD Supply)
(all values reported in mg/L)

Analyte	IWVWD Wells[1]	Proposed Project Supply Wells[2]		
	General Water Quality	Well 18	Well 33	Well 34
Arsenic	0.0024 – 0.025	ND	ND	0.004
Bicarbonates (HCO_3)	87 – 150	150	140	140
Boron	0.180 – 1.20	0.26	0.29	0.29
Calcium	7.5 – 68	36	36	38
Chloride	21 – 210	25	30	31
Fluoride	0.43 – 1.20	0.94	0.73	0.62
Magnesium	ND	4.8	5.1	6.3
Nitrate (N)	6.5	1.7	1.8	2
Sodium	35 - 180	41	41	49
Sulfate	ND	43	43	46
Total Hardness ($CaCO_3$)	21 - 250	110	110	120
Total Dissolved Solids (TDS)	220 – 720	290	280	290
Uranium (in pCi/L)	2.1 – 6.1	NS	NS	NS
Gross Alpha Particle Activity (in pCi/L)	0.8 – 7.8	NS	NS	NS
Vanadium	ND - .04	0.014	0.012	0.016
pH	7.2 – 9.0	7.8	7.9	7.2

Key:
mg/L – milligrams per liter
ND – not detected at the practical quantitation limit shown
NS – not sampled
1. IWVWD, 2008.
2. Data provided by the IWVWD.

DR-S&W-168

Information Required:

Please provide a discussion of alternative water supply sources. The discussion should consider but not be limited to: recycled water, brackish water and other non-potable water that could be trucked into the site.

Response:

Table DR-S&W-168 presents the possible sources of recycled or brackish water for the Indian Wells Valley Groundwater Basin. Three options: The City of Ridgecrest wastewater treatment plant, Indian Wells Valley Water District, Northwest Well Field and regional shallow aquifer within the groundwater basin are possible sources of water. These options however, have limitations in terms of:

- Distance to the source and associated environmental impacts from constructing a pipeline, in most cases approximately 12 miles to the Project site.
- Quality of the water: the wastewater treatment plant does not treat to tertiary standards and the shallow groundwater may have TDS concentrations to high to be economical for the Project.
- Availability of the water from the shallow aquifer at a rate sufficient to meet project requirements.

Table DR-S&W-168 Alternative Sources of Water

Potential Water Source	Description
Reclaimed Water from City of Ridgecrest Wastewater Plant	The City of Ridgecrest wastewater treatment plant is located approximately 16 miles from the Project site. Presently, the City produces about 2,800 acre-feet per year (afy) of reclaimed water from the treatment plant, although the City is in the process of raising plant capacity. Of this 2,800 afy output, 750 afy is committed to the U.S. Navy for the NAWS golf course. The City also provides 400 afy for irrigation of an alfalfa field, leaving 1,650 afy available. At this time, the water from the plant is not treated to tertiary standards. The wastewater treatment plant consists of: head works, primary settling tanks, facultative oxidation ponds, and evaporation/percolation ponds. The sludge removed from the wastewater stream is treated with two aerobic digesters and solar sludge drying beds. Excess water is routed to evaporation/percolation ponds that have soil cement side slopes and unlined bottoms. There are approximately 132.2-acres of evaporation/percolation ponds. The location of the existing plant is approximately 3 miles northeast of the City's downtown area and 1 mile east of the intersection of H Street and Pole Line Road. A pipeline from the plant to the project site would be about 12 miles. The new wastewater treatment plant (plant 2) will service the southern portion of the City. At this time, a specific location has not been identified. Part of the scope of work for the project as noted in the RFQ/RFP is to assess several sites. The 2008 Final Project Report presented a proposed plant location on the east side of the City of Ridgecrest, near the intersection of Richmond Road and East Upjohn Ave. The plant construction is scheduled to start in 2011 and be completed by December 31, 2012. Limited details on the new plant would suggest that it will not treat the water for tertiary supply.

Potential Water Source	Description
Brackish Water – Northwest Well Field, North of the Inyo-Kern Airport	Apart from the China Lake area, another area of brackish water is reportedly located north of the Inyo-Kern Airport in the Indian Wells Valley Water District Northwest Well Field. The well field is located on the former Neal Ranch site, on an area of fallowed agricultural land. The well field consists of four wells operated by the District and groundwater reportedly contains total dissolved solids concentrations of approximately 2,300 milligrams per liter (mg/l). The District has undertaken a pilot program to evaluate the feasibility and economics of desalting the high TDS water to augment the potable supply. According to the initial study for the pilot project one of the former agricultural wells could produce between 200 to 500 gallons per minute (gpm). Under the assumption that all four wells could produce at this rate, the well field could produce between about 1,300 and 3,200 afy. The northwest well field is about 12 miles northwest of the Project along Brown Road. The Fine-Grained Sediment Plug located approximately three to four miles east of the Sierra Nevada mountain front and trends north-south roughly aligned along Brown Road. The upper contact of this feature begins at depth of approximately 340 feet bgs and sediments may be as much as 1,340 feet in thickness. The areal extent of this deposit is not well defined due to limited borehole data, and is thought to be Pleistocene lake bed deposit and the site of a historic topographic low in the valley. Sand and gravel deposits reportedly overly the fine-grained sediments at a depth above 340 feet bgs. Reportedly, water quality in this area gets worse with depth.
Shallow Aquifer, China Lake Area	There are two aquifer units in the Indian Wells Valley Groundwater Basin, the shallow aquifer and deep aquifer. The shallow aquifer is an unconfined unit comprised of predominantly fine-grained sediments with occasional lenses of sand that extends from China Lake westward to the center of the valley and from the area south of Airport Lake southward to the community of China Lake. Sediments of the shallow aquifer are as much as 300 feet thick and generally do not yield water readily. Water quality of the shallow aquifer is characterized by high concentrations of total dissolved solids (TDS). The deep aquifer is confined or partly confined by the lacustrine sediments of the shallow aquifer. In the past, water from the shallow aquifer was used only for fire protection and maintenance of a few buildings on China Lake NAWS. Some investigations have indicated that the shallow aquifer in the area of China Lake is semiperched and not in communication with the deeper aquifer within the basin. Brown and Caldwell (2009) in their model of the groundwater basin assigned the shallow aquifer to Layer 1 with a range in hydraulic conductivity of between 20 feet per day (ft/d) to 35 ft/d. No pumping wells were included in Layer 1 of the model. The shallow aquifer is not present in the vicinity of the Project site.

Carollo Engineers. September 2008, Wastewater Treatment Plant No. 2 Final Project Report. Prepared for City of Ridgecrest, California.

City of Ridgecrest – Public Works Department, October 2009, Request for Statement of Qualifications, Consulting Services for City Advisor and Owner's Representative for The New Wastewater Treatment Plant. October 8.

Brown and Caldwell, 2009, Final Indian Wells Valley Groundwater Flow Model and Hydrogeologic Study: Prepared for the Indian Wells Valley Water District, March 27, 2009: Brown and Caldwell, Tucson, Arizona.

Indian Wells Valley Cooperative Technical Advisory Committee and Geochemical Technologies Corporation (Groundwater Management Group), 2006, Cooperative Groundwater Management Plan for the Indian Wells Valley, March. Accessed at http://www.iwvgroundwater.org/.

Krieger and Stewart, Incorporated, 2007, Indian Wells Valley Water District, Initial Study and Draft Mitigated Declaration for the Northwest Well Field Brackish Water Desalting Facilities Pilot Study Project: Krieger and Stewart, Incorporated, Engineering Consultants, Riverside, California.

Kunkel, Fred, and Chase, G.H., 1969, Geology and Ground Water in Indian Wells Valley, California, U.S. Geological Survey, Open-File Report 69-329, January 23, 1969.

DR-S&W-169

Information Required:

Please clarify whether the project water supply would be supplied by IWVWD or another source.

Response:

The Project water supply will be provided by the IWVWD.

DR-S&W-170

Information Required:

Please discuss the specific quantity of water that can be conserved using the proposed mitigation methods.

Response:

In consideration of operational and construction water use and amortizing the construction water use over the term of the Project (30 years), an estimated 215 acre-feet per year needs to be offset. As has been discussed, the groundwater basin is in overdraft and the full proposed water volume will be offset. The following are a portfolio of options that are under consideration to address the offset of the proposed construction and operational water supply:

- Replacement of grass for xeriscaping at homes within the City of Ridgecrest (i.e., cash for grass offset);
- Conversion to low-flow irrigation at City recreational and government facilities; and
- Fallowing of agricultural land within the groundwater basin.

Table DR-S&W-170-1 presents a preliminary assessment of these options and their potential return on water savings. Additional discussion with City of Ridgecrest and IWVWD (District) staff is required to verify the potential quantity of savings. For example, verification of the number of potential residential properties that are available for the program within the District boundaries is required to better understand the potential savings for the “cash for grass” program.

As shown on Table DR-S&W-170-1, depending on the quantities available and accessibility, between 400 and 500 acre-feet per year are available for offset through these options.

At this time, the Applicant has entered into discussions with both City and District staff to discuss the implementation of one or more of these options. Based on these discussions and the timely communication of the quantities available to reduce water use from the City and District, it is anticipated that the final plan can be completed by February 15, 2010.

Table DR-SW-170-1: Summary of Potential Water Offsets - Water Mitigation Options Ridgecrest Solar Power Plant, Ridgecrest Solar I, LLC

Implementing Entity	Mitigation Alternative	DESCRIPTION	Total Offset Vol. (AFY/Acre)
RIDGECREST			
Indian Wells Valley Lucinda Crosby Water District Conservation Coordinator (760) 375-5086 lscrosby@iwvwd.com	Cash for Grass Program (Xeriscaping)	Replace lawn w/ Xeriscape (low water-use landscaping):	
		-Water Savings: 56 gal per sq ft / year [1.,2.]	
		-Number of owner occupied households in Ridgecrest: 6,191 [3.]	
		-Avg # homes that voluntarily participate in Cash for Grass Programs (statewide) 5%	
		5% of 6,191 homes = 310 households in Ridgecrest	
		-Avg lawn size in Ridgecrest = 2,000 sq ft [5.]	
		2,000 sq ft x 56 gal/sq ft / yr = 112,000 gal/yr per household water savings = 0.34 AF/yr	
		310 households x 0.34 AF/yr per household = 105 AF/yr offset vol if 5% homes participate	**105**
		620 households x 0.34 /af/yr per household = 211 AF/yr offset vol if 10% homes participate	**211**
City of Ridgecrest Parks & Recreation Dept	Ridgecrest City Parks: Convert to Low-Flow Irrigation	Replace irrigation system (sprinkler heads) with low-flow irrigation system	
		Freedom Park: 19.8-acre, open turf [6.]	
		Helmers Park: 5-acre lawn & trees [6.]	
		James M. Pearson Memorial Park: 4.5-acre, playground w/basketball court, grass & trees [6.]	
		Kerr McGee Youth Sports Complex: 11.7-acres, 5 baseball fields & 1 football field [6.]	
		Leroy Jackson Park Sports Complex: 56-acres, softball fields, tennis courts, soccer fields [6.]	
		Ridgecrest Senior Center: acreage not listed; combined paved areas & lawn [6.]	
		Upjohn Park: 6-acres; combined playground, basketball court, & lawns [6.]	
		Average Landscape Irrigation Water Use: 1.66 AF/yr per acre [4.]	
		Total Acreage of City Parks: 103 acres (103 ac x 1.66 AF/y per acre) x 0.20 = 34 AF / yr offset vol	**34 [9.]**

Implementing Entity	Mitigation Alternative	DESCRIPTION	Total Offset Vol. (AFY/Acre)
City Facility Buildings	Convert Landscaped Areas to Low-Flow Irrigation	Replace irrigation system (sprinkler heads) with low-flow irrigation system	
		City Hall (landscaped area: TBD)	
		Public Schools (Sierra Sands Unified School District) - landscaped area: TBD	
		Average Landscape Irrigation Water Use: 1.66 AF/yr per acre [4.]	
		Total Acreage of Landscaped City Facilities: TBD	**TBD**
Private Growers	Fallow agricultural land	Total Alfalfa Crop Acreage (Inyokern & Phelan): 971 acres 10.	
		Average size of Alfalfa Farm (Inyo & Phelan): 110 acres	
		Alfalfa crop water use for Southern Lahontan Basin: 5.1 acre-ft per year per acre [7.]	
		Rotationally fallow 50 acres / year	
		Lease or Purchase 100 Acres Alfalfa for Fallowing (50 acres x 5.1 af/yr per acre = 255 af/yr)	**255**
Potential Offset Volume			**394-500**

Footnotes:

1 Indian Wells Valley Water District - www.iwvwd.com
2 Southern Nevada Water Authority (SNWA) - www.snwa.com
3 City of Ridgecrest Demographics (http://profiles.nationalrelocation.com/California/Ridgecrest/)
4 Addink, S. 2004, "Cash for Grass" - A Cost Effective Method to Conserve Landscape Water?, University of California - Riverside Turfgrass Research Facility (http://ucrturf.ucr.edu/)
5 Personal communication between AECOM and Tom Mulvihill (Indian Wells Valley Water District), January 2010.
6 City of Ridgecrest (http://ci.ridgecrest.ca.us/index.aspx?id=174)
7 Department of Water Resources, 1986, Bulletin 113-4: Crop Water Use in California, April.
8 California Evapotranspiration Reference Zones Map, California Irrigation Management Information System (CIMIS), 2009
9 Based on 20% in water savings when converting to low-flow irrigation for Bermuda grass (Addink, 2004).
10 Permitted Crop Boundaries from Kern County Department of Agriculture - www.co.kern.ca.us/gis/downloads.asp

Conversion Factors: 1 acre = 43,560 sq ft; 325,829 gallons = 1 acre foot;

DR-S&W-171

Information Required:

Please provide an assessment of whether the proposed mitigation methods and whether they can achieve the intended savings in the basin.

Response:

The assessment of measures to ensure that the proposed mitigation options can reliably achieve the required offset will be provided in the final plan on February 15, 2010.

DR-S&W-172

Information Required:

Please provide the specific measures that will be used to demonstrate the water conservation would be achieved during the life of the project.

Response:

For proposed mitigation measures, verification of the water savings will be done through comparison of pre-offset and post-offset water use. In the case of the "cash for grass" program, annual residential water use records for each property will be reviewed to develop an average water use prior to xeriscaping and removal of the grass. This "pre-offset" average will be used to compare to the annual property water use following xeriscaping of the property and an annual basis. On an annual basis, a summary of savings will be done by comparing to the pre-offset average against the yearly property water use will be used to determine annual offset savings by the Project.

Details of the proposed monitoring and verification methodology for the portfolio of options will be contained in the final mitigation plan that will be provided on February 15, 2010.

DR-S&W-173

Information Required:

Please provide a revised site layout that allows El Paso Wash to pass through the project with little or no disturbance, or provide a detailed justification explaining why adjustments to the existing site plan cannot be made in order to eliminate the permanent loss of over 1.5 miles of this natural watercourse.

Response:

The RSPP site plan has been redesigned to avoid impacts to the El Paso Wash and is provided as Figure DR-ALT-49-1 and -2.

DR-S&W-174

Information Required:

Please provide analysis and plans or drawings showing overall channel stability in the project area and also specifically within the context of the proposed design, such as how the potential for lateral channel migration in El Paso Wash will be mitigated to prevent impact to the facility.

Response:

The site plan has been redesigned so that impacts to El Paso Wash are minimized and so that the stability of the banks of the Wash are not impacted by scour and migration that may have resulted from Project development and removal of material within the Wash. The Project is now located outside of the floodplain and beyond the banks of the Wash.

DR-S&W-175

Information Required:

Please include in the peak discharge table values taken from the effective Flood Insurance Study (FIS) for the area as well values calculated using the appropriate USGS Regional Regression Equation for the subject area. In addition, please consult the local BLM office to obtain relevant information from previous studies related to El Paso Wash and include this data in the drainage report.

Response:

The flow rates from the FIS as well as the other calculated flow rates and the City of Ridgecrest Master Drainage Plan will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-176

Information Required:

Please provide a map showing the extents of soil types within each watershed as well as information correlating the specific soil types with the designated hydrologic soil groups.

Response:

This information will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-177

Information Required:

Please provide a detailed analysis of the depth and extent of the existing and developed floodplain using an industry accepted methodology such as HEC-RAS. This analysis should utilize recent detailed topography and should accurately model the transitions from natural floodplain to constructed channel and back to natural floodplain. This analysis should follow FEMA guidelines for mapping riverine type drainages and for providing an acceptable tie-to the existing mapped floodplain.

Response:

This information will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-178

Information Required:

> If the proposed design includes the diversion of El Paso Wash, please provide a detailed analysis using an industry accepted methodology such as HEC-RAS or HEC-6 that demonstrates similar sediment transport capacities within the natural and constructed channels for the 2- and 10-year flows. The model must demonstrate that significant erosion or deposition will not occur as a result of imbalanced sediment transport capacities.

Response:

Diversion of the El Paso Wash has been removed from the proposed Project and there will be no development within the El Paso Wash except for one new pipe bridge crossing which is approximately 100 feet wide, and some localized drainage channel connections between the Project site and the El Paso Wash.

DR-S&W-179

Information Required:

> Provide design details for the confluences of the diversion channels with the original natural channels that demonstrate how the design will achieve long term stability at these locations.

Response:

Diversion of the El Paso Wash has been removed from the proposed project and therefore there will be no confluences between the diversion channels and the natural channels.

DR-S&W-180

Information Required:

> Provide a detailed explanation of the data and assumptions used to complete the above referenced analysis as well as all associated data including digital input and output files for all hydraulic models.

Response:

This information will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-181

Information Required:

Please provide a CLOMR application, completed to FEMA standards, so the extent of modifications to the existing FEMA mapped floodplains can be reviewed.

Response:

A CLOMR is currently in process of being prepared to identify changes to the floodway and floodplain with support of calculations inasmuch as the current mapping was applied without support of hydraulic modeling or calculations. Once the CLOMR is prepared, it will be provided to the CEC, the USACE, and Kern County for review and comment. The CLOMR application with supporting materials is anticipated to be submitted for review on February 24, 2010.

DR-S&W-182

Information Required:

Please provide design details that show the proposed channels control or prevent bank erosion and headcutting due to the interception of flows by the proposed diversion channels. All bank protection and erosion control measures, including grade control structures, must be traversable (4:1 slope or flatter) and not present an entrapment hazard to wildlife. More specifically, it has been determined the project site is Desert Tortoise habitat, and as such, bank protection measures such as dumped riprap, stacked gabions, or gabion mattresses would not be acceptable. Soil cement has been identified as the most probable alternative as it would prevent headcutting due to flow over the channel banks and would provide a traversable and quasi-natural surface. The use of bio-stabilization measures and/or geotextiles are not considered viable alternatives.

Response:

All slopes associated with the drainage channels and bank protection measures are 3:1 or flatter in accordance with provisions noted by CDF&G for desert tortoises. There is no riprap, gabions, or geotextile fabrics used on the Project. All bank protection measures will be provided by using soil cement. Details associated with the application of soil cement on embankments will be provided as part of the Conceptual Engineering Plans to be submitted on February 10, 2010.

DR-S&W-183

Information Required:

Provide detailed grading plans showing the geometry of the proposed diversion channels and how they would tie into existing grade.

Response:

Engineering grading plans and details associated with the Project, specifically related to drainage will be provided as Sheets C-04 to C-08 in the Conceptual Engineering Drawings, to be provided on February 10, 2010.

DR-S&W-184

Information Required:

Provide profiles for each channel that include existing and proposed grade along both the finished flowline as well as right and left top of banks. These drawings should be at a scale of no smaller than 1"= 200'. Also, please provide cross-sections through the collector/diversion channels every 100' which show existing and proposed grade and clearly demonstrate how these channels will tie into existing grade and into the proposed facility.

Response:

The channel profiles will be provided as part of the Conceptual Engineering Drawings to be provided on February 10, 2010. Details of the connections between the channels and the existing grade will be provided as part of these plans.

DR-S&W-185

Information Required:

Please provide documentation and analysis for establishing project specific non-erosive channel velocities based onsite soils, incoming sediment load, and the calculated 10-year flow.

Response:

A new Drainage Report is being prepared and will be provided on February 24, 2010 as part of this data request. This report verifies that the velocities in the engineered channels for the calculated 10 year flow are non-erosive. The drainage channels have been provided with drop structures (protected with soil cement) and relatively flat channel slopes to create a non-erosive channel profile.

DR-S&W-186

Information Required:

If required to reduce channel slope and velocity to acceptable values, provide detailed design plans for grade control structures. The use of channels without bank protection around the periphery and through the project would require it be demonstrated there are not significant side flows entering the channel, and that 10-year flow velocities are within the acceptable range for site specific conditions. Please clearly delineate all channel reaches where no bank protection is proposed and provide specific and detailed data to demonstrate compliance with the previously stated criteria.

Response:

Detailed plans for the grade control structures/drop structures are shown on the detail sheets as part of the Conceptual Engineering Drawings that will be submitted on February 10, 2010. Detail plans will also be provided for the bank protection around the periphery and in the areas of side flow entering the channel. The grading plans will delineate the areas where no bank protection is proposed.

DR-S&W-187

Information Required:

Please provide a detailed justification of why a 100-year capacity is required in the diversion channels.

Response:

The life span for this facility is anticipated to be from 30 to 60 years. The facility is designed to have large level areas for the solar collectors with intermittent drainage swales. The site is extensively developed with support structures for the solar collectors, access roadways for daily maintenance to the solar collectors, large (12 to 60 inches) insulated HTF pipes that are placed on short support above the ground, and graded terraces between areas of the site. If a large storm event were allowed to come onto the site, the swales between the solar collectors would likely be reshaped, the terraces would be damaged, the HTF pipe supports would be affected (which could cause spills of fluid) and the site roadways would possibly be impacted. The ability to access the site with large equipment to repair this type of damage would be problematic. The extent of damage that could be caused by this type of event needs to be precluded, and protection provided by designing the channels to carry the 100-year storm is prudent.

DR-S&W-188

Information Required:

Please provide documentation that the depth/width ratios in the channels would not likely result in the incision of a low-flow thalweg within the channel given the proposed slopes or that the potentially reduced velocities would not result in significant sediment deposition. If these are potential issues please consider the use of a compound section with a pre-constructed low-flow channel to more efficiently carry flow from the more frequent events.

Response:

The peripheral offsite drainage channels associated with this site are all relatively small and as such, it is anticipated that these channels will be allowed to return to as natural a state as can be provided. Vegetation will be allowed to re-establish in the channels, but will be limited to a height of 8 inches so that drainage conveyance is not affected. As such a low flow thalweg is not precluded. The only concern associated with a low flow thalweg in this channel is the possibility that the low flows, over time will affect the side slopes. The side slopes of the channels have been designed with 3:1 side slopes or flatter to mitigate this effect and a channel maintenance plan has been established to provide continual observation of the channel. If needed, the low flow thalweg will be re-directed away from the side slopes by cutting a new section of low flow channel with small equipment if channel maintenance personnel determine that it is required. The soils onsite are not supportive of the creation of a compound channel section inasmuch as larger storm events would completely destroy this compound channel section and major maintenance and repair would be required.

DR-S&W-189

Information Required:

Please identify whether any chemical or mechanical methods would be used for soil stabilization at the site.

Response:

There are no chemical or mechanical methods that will be used for soil stabilization on the site other than the initial compaction effort during the grading operations; the use of soil cement in the channels and at locations as previously noted; and on the graded terraces on-site that are established as 2:1 slopes that will be provided with annual spray of a dust palliative.

DR-S&W-190

Information Required:

Please provide a detailed discussion of the increased potential for onsite runoff volumes due to compaction and possible soil stabilization methods to be employed at the facility.

Response:

The existing soils onsite are very compact and very dense in their natural condition. The soils report from Kleinfelder provides information related to this existing condition. The mechanical compaction that will be provided to these soils during the grading operation has relatively no effect on the potential of these soils for increased runoff, due to the fact that the soils are relatively consistent throughout the site and are at their maximum density in their pre-development condition. In fact, the density of the soils in the pre-development condition is denser than will be achieved during the site grading. The slight decrease in soil density that will occur as a result of grading will actually allow a very minor increase in the permeability of the soil, however, this increase in permeability has been ignored inasmuch as the affect is so minor. The selection of CN values associated with the drainage channels and site soils reflects this evaluation. The pre-development CN value was established as 95 and the post development CN value was established as 95. The soil stabilization methods used onsite will only be used during the construction stages and will not have a detrimental effect on the site runoff inasmuch as the dust palliatives will primarily be water based products which allow continued permeability. In addition, the soils as currently defined are nearly impermeable and the use of soil stabilizers, even oil based products will have no real effect. In the area of the power block, a small detention basin (1 acre in size) will be provided to capture water from the power block to further mitigate any perceived impact of increased flows from the post development site.

DR-S&W-191

Information Required:

Please provide detailed information on the estimated discharges at each of the onsite drainage outfall locations, as well as detailed design plans to demonstrate how these points of outfall would be protected from erosion.

Response:

A new Drainage Report is being prepared and will be provided on February 24, 2010 as part of this data request. The detailed information at the outfall locations will be documented in the drainage report. At these locations, standard connection details (Kern County or APWA) will be provided such as headwalls, storm drain pipes, protected downdrains, and/or soil cement channel aprons. The Conceptual Engineering Plans to be provided on February 10, 2010, will provide references to these details.

DR-S&W-192

Information Required:

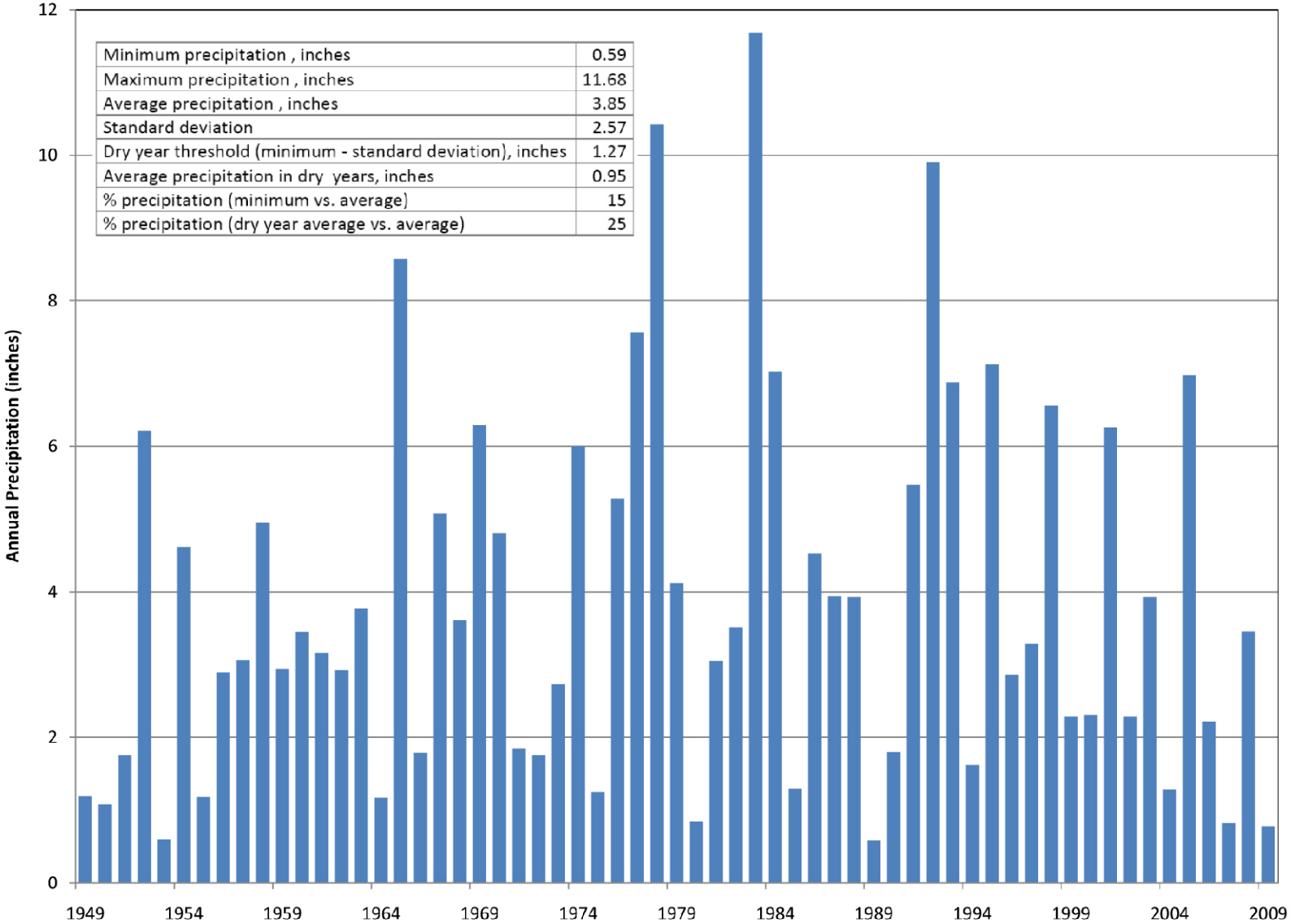
> The Drainage Report and associated hydrologic modeling must specifically address the issue of potential increases to downstream peak discharges. The hydrologic modeling must accurately represent the existing and proposed condition with respect to differences in runoff potential, floodplain routing and potential peak flood attenuation. In reference to the routing reach geometry used in the existing conditions model, Section 2.5 in the Drainage Report states "These bottom widths are conservative in that the actual channels will be wider and shallower that would lead to a slower velocity." This approach may lead to an overestimated existing peak discharge by not appropriately accounting for existing floodplain attenuation. It may also under estimate the difference between existing and developed peak discharges once the engineered channels are constructed and provide little flood peak attenuation. The analysis must demonstrate the proposed design would not increase downstream peak discharges.

Response:

A new Drainage Report is being prepared and will be provided on February 24, 2010, as part of this data request. This report provides the analysis, mapping, and discussions related to the flows adjacent to and from the Project site, the peak discharges, the floodplain depths, and the flows downstream of the site.

Attachment

Soil and Water Figures



Minimum precipitation , inches	0.59
Maximum precipitation , inches	11.68
Average precipitation , inches	3.85
Standard deviation	2.57
Dry year threshold (minimum - standard deviation), inches	1.27
Average precipitation in dry years, inches	0.95
% precipitation (minimum vs. average)	15
% precipitation (dry year average vs. average)	25

Map Location

Ridgecrest Solar Power Project

Figure DR-S&W-133-1
Inyo-Kern Station
Annual Precipitation
1949 - 2009

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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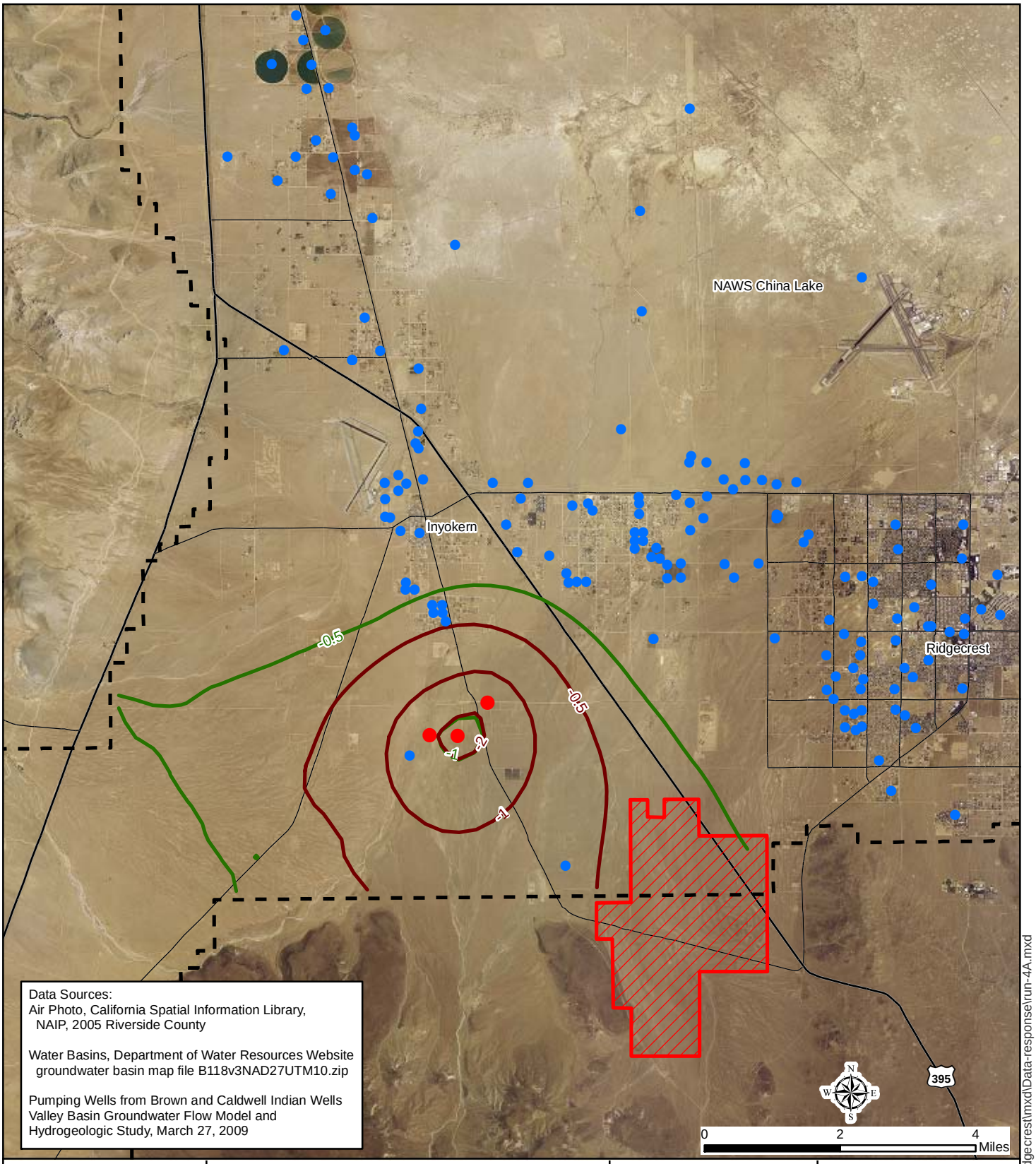

Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2005 Riverside County

Water Basins, Department of Water Resources Website groundwater basin map file B118v3NAD27UTM10.zip

Pumping Wells from Brown and Caldwell Indian Wells Valley Basin Groundwater Flow Model and Hydrogeologic Study, March 27, 2009

Map Location

Legend

- Project Right-of-Way
- Model Boundary
- Pumping Well Locations based on Brown and Caldwell Pumping Well Database
- Pumping Wells used in the Simulation (Well No. 18, 33 & 34)

Water Level Difference in Feet

- 2013
- 2043

Simulation with Dry Years at 25% of Recharge

Ridgecrest Solar Power Plant

Figure DR-S&W-133-2 Predicted Water Difference 2013 and 2043 Scenario(3a) and Project (4a)

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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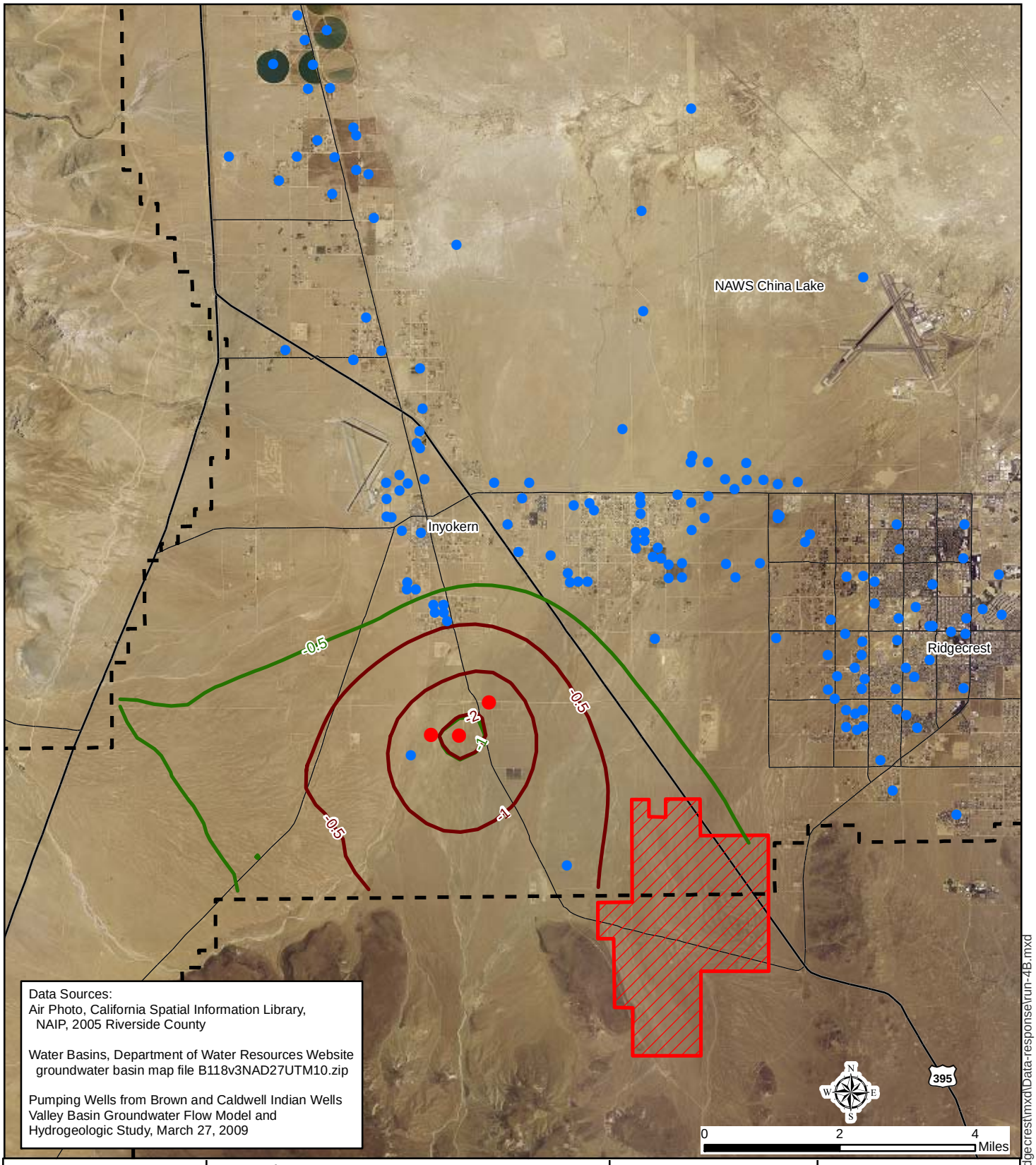

Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2005 Riverside County

Water Basins, Department of Water Resources Website groundwater basin map file B118v3NAD27UTM10.zip

Pumping Wells from Brown and Caldwell Indian Wells Valley Basin Groundwater Flow Model and Hydrogeologic Study, March 27, 2009

Map Location

Legend

- Project Right-of-Way
- Model Boundary
- Pumping Well Locations based on Brown and Caldwell Pumping Well Database
- Pumping Wells used in the Simulation (Well No. 18, 33 & 34)

Water Level Difference in Feet

- 2013
- 2043

Simulation with Dry Years at 15% of Recharge

Ridgecrest Solar Power Plant

Figure DR-S&W-133-3 Predicted Water Difference 2013 and 2043 Scenario(3b) and Project (4b)

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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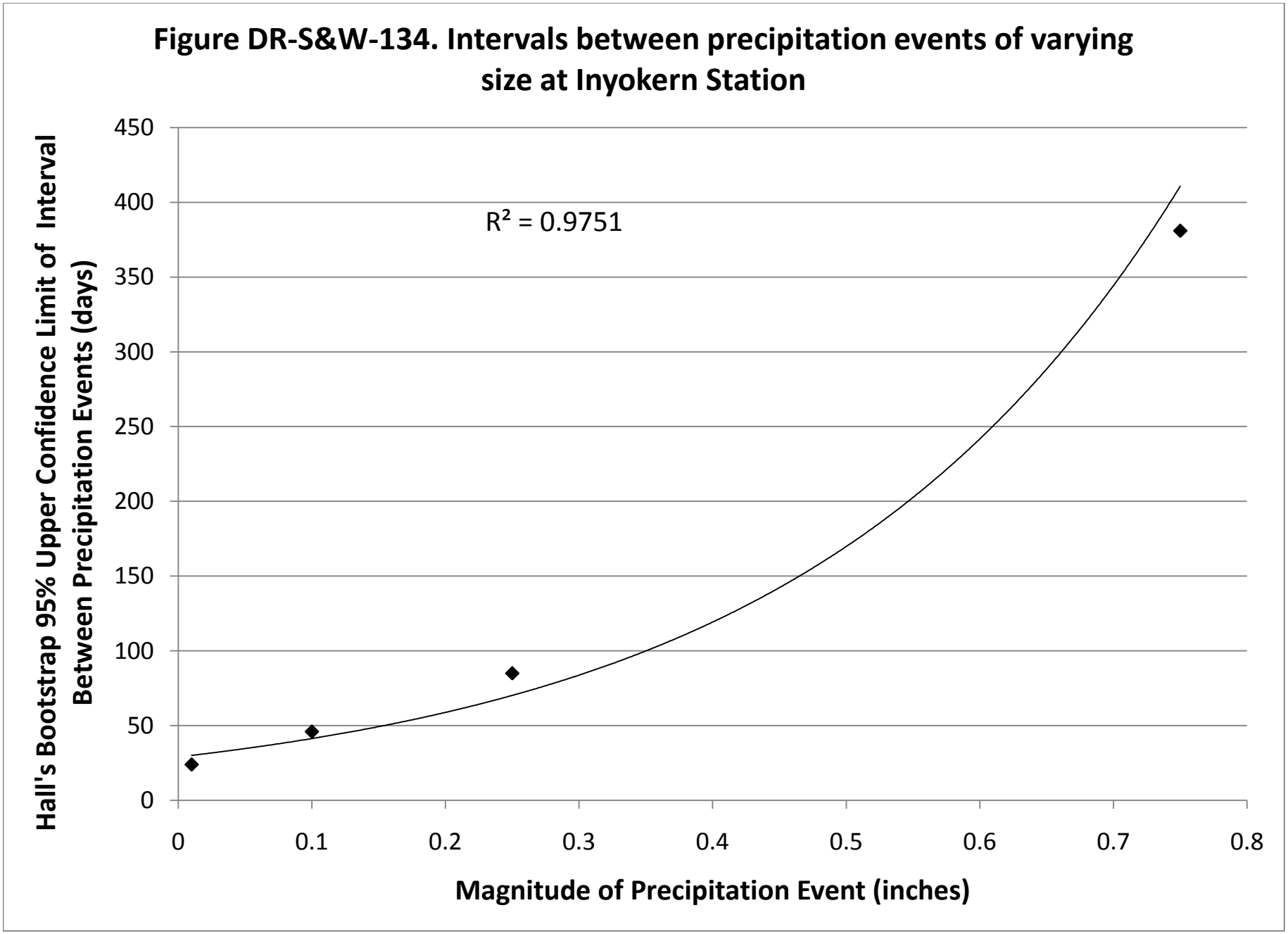


Figure DR-S&W-134. Intervals between precipitation events of varying size at Inyokern Station
Hall's Bootstrap 95% Upper Confidence Limit of Interval Between Precipitation Events (days)
450
400
350
300
250
200
150
100
50
0
R² = 0.9751
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Magnitude of Precipitation Event (inches)

Attachment DR-SW-133

Indian Wells Valley Water District
Domestic Water System
Production Demands and Production Capacity

Attachment DR - S&W - 133

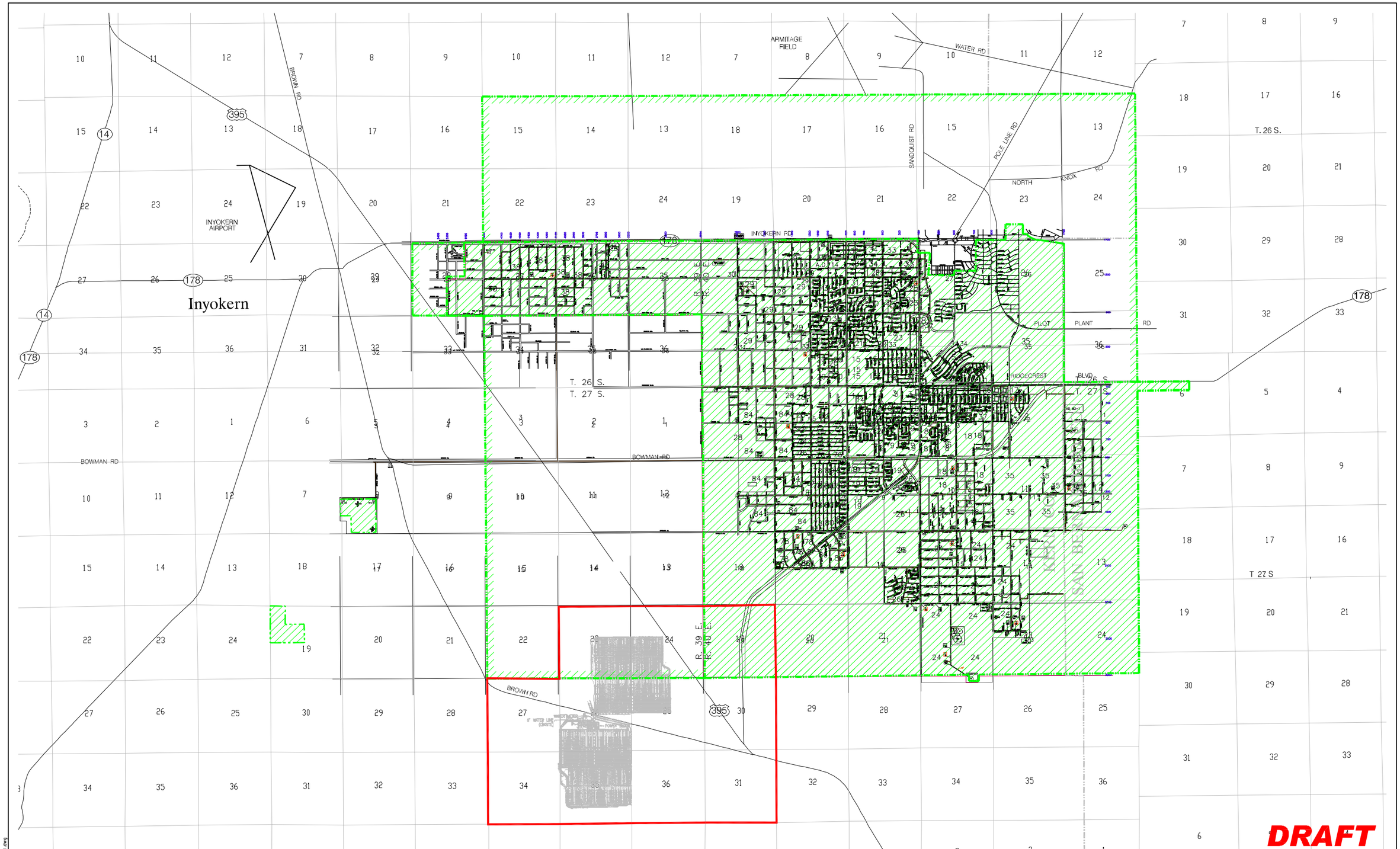
INDIAN WELLS VALLEY WATER DISTRICT
DOMESTIC WATER SYSTEM
PRODUCTION DEMANDS AND PRODUCTION CAPACITY

YEAR	Historical Production Demand Acre-Feet	Projected Base Demand By Least Squares Acre-Feet (1)	Navy Connections		Navy Connections with 1.7 Service Multiplier		Navy Non-BRAC Demand Acre-Feet	BRAC Demand Acre-Feet	Average Annual Demand	
			Non-BRAC	BRAC	Non-BRAC	BRAC			w/o BRAC Acre-Feet	w/BRAC Acre-Feet
1997	8336								8336	8336
1998	8699								8699	8699
1999	8154								8154	8154
2000	8331								8331	8331
2001	8447								8447	8447
2002	8865								8865	8865
2003	8605								8605	8605
2004	8992								8992	8992
2005	8543								8543	8543
2006	8865								8865	8865
2007	9077								9077	9077
2008	8496								8496	8496
2009	8413 (2)								8413	8413
2010		8800	100	500	170	850	120	590	8920	9510
2011		8820	100	500	170	850	240	1180	9060	10240
2012		8850	100		170		360	1180	9210	10390
2013		8880					360	1180	9240	10420
2014		8910					360	1180	9270	10450
2015		8940					360	1180	9300	10480
2016		8960					360	1180	9320	10500
2017		8990					360	1180	9350	10530
2018		9020					360	1180	9380	10560
2019		9050					360	1180	9410	10590
2020		9070					360	1180	9430	10610
TOTALS					510	1700				

NOTES
(1) Slope = 27.815, Intercept=-47112
(2) Production for December 2009 based on average of December production from 2006 – 2008

Attachment DR-S&W-153

Potential Annexation Map



LEGEND

IWVWD BOUNDARY

IWVWD SPHERE OF INFLUENCE LIMITS

POTENTIAL ANNEXATION FOR SOLAR MILLENNIUM

SCALE: 1"=3000'

KRIEGER & STEWART INCORPORATED
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

INDIAN WELLS VALLEY WATER DISTRICT

DISTRICT BOUNDARY
POTENTIAL ANNEXATION FOR SOLAR MILLENNIUM

FIGURE 1 OF 1

SCALE: 1"=3000' | DATE: 01/13/10 | DRAWN BY: SPK/ERB | CHECKED BY: CAK | W.O. 78-1.32

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Attachment DR-S&W-158

Indian Wells Valley
Cooperative Water Management Group Working Group
2010/2011 Objectives

INDIAN WELLS VALLEY

COOPERATIVE WATER MANAGEMENT GROUP

WORKING GROUP 2010/2011 OBJECTIVES

Planning Objective No. 1
Limit additional large scale pumping in areas that appear to be adversely impacted.

- Continue to measure water quality and level changes throughout the basin and produce an annual summary document that can be used as a tool for future planning.

Planning Objective No. 2
Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the Valley.

- Collect baseline data for new pumping areas and continue monitoring for changes.
- TAC will be available to assist major producers in the location of new wells.

Planning Objective No. 3
Aggressively pursue the development and implementation of water conservation policy and education programs.

- Continue development and support of the Cooperative Groundwater Management Group's website.
- Conservation tips and new information pertaining to water resources in the Indian Wells Valley will continue to be part of the Working Group's website.
- Continue annual support of the SEEP Program.
- Encourage the use of drip irrigation systems.
- Publicize and distribute resources including the booklet on Xeriscape landscaping, the Working Group's water conservation policy, and the pamphlet on re-use of gray water.
- The Indian Wells Valley Water District (Water District) will:
    - Hold Xeriscape workshops.
    - Continue the Xeric Ambassador program for educational outreach.
    - Participate in public events such as the Home and Leisure Show to distribute water saving devices (shower heads, hose nozzles, and faucet aerators) and conservation information.
    - Recognize xeriscape landscapes.
    - Publish a quarterly newsletter with conservation page for its customers.
    - Provide assistance for water use and leak detection.
    - Evaluate SmartSet timers for large area applications that will adjust landscape watering based on weather conditions.
- The Navy will:
    - Continue to implement their Water Conservation Policy (revised in 2008).
    - Continue to replace older irrigation systems with SmartSet timers that adjust to local weather conditions.

- Continue to educate the NAWS-China Lake community and residents with water conservation information and newletters/articles.
- Continue to support the Cooperative Groundwater Management Group's website with water conservation tips and information.
- Continue its leak detection and storage reservoir rehabilitation program.
- Recognize Xeriscape landscape and replace turf with low-water use, drought-tolerant plants where practical.
- Support the Indian Wells Valley Water District Xeriscape workshops.
- Continue to submit quarterly reports to NAVFAC in support of the Environmental Management System (Significant Aspect-Natural Resource Consumption (potable water)).

- Searles Valley Minerals will:
  - Replace a significant portion of their Westend system potable water production line between China Lake Boulevard and their storage tank east of Ridgecrest along Highway 178. This portion of the system has been prone to frequent failure due to the age of the pipeline.
  - Review their metering system for potable water production and use and update the weekly production and use report to improve accountability for water use.
- The Water District and the City of Ridgecrest, with the involvement of Kern County, will develop a landscape ordinance for new development that meets or exceeds State requirements.
- Recognize and target State mandates for water conservation.

Planning Objective No. 4
Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible.

- Explore the feasibility of transferring water from the treatment facility operated by the City of Ridgecrest for beneficial use within the Indian Wells Valley or at Searles Valley Minerals' facilities in Searles Valley to possibly offset existing production.
- The Naval Air Weapons Station (NAWS) continues to use reclaimed water from the wastewater treatment facility to water the golf course.
- NAWS will continue to explore projects to re-use additional water from the wastewater treatment facility.
- Develop a plan to comply with SBX7-7 regarding water conservation.

Planning Objective No. 5
Explore the potential for other types of water management programs that are beneficial to the Valley.

- The Water District is exploring an aquifer storage and recovery project.
- Continue to pursue funding for a Watershed Coordinator.
- Continue participation in and support for development of the Integrated Regional Water Management Plan.

Planning Objective No. 6

Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resource in the Indian Wells Valley.

- With completion of the second AB303 Grant, pursue implementation of recommendations for future potential grant proposals for acquisition of drilling sites, installation of monitoring wells in the major canyons, chemical and isotope analysis of canyon groundwater systems, development of representative chemical/isotope flow paths in the canyon groundwater systems, development of a lithologic model for the entire basin, regular chemical samples of water wells and increased groundwater level monitoring.
- Work toward standardization of data reporting that will facilitate establishing and maintaining a basin-wide database.
- Continue aquifer data collection to support further refinement of the groundwater flow model for the basin developed in 2009.
- Continue support of Remote Automated Weather Stations (RAWS) to collect weather/climate data and evaluate installation and support for additional sites.
- Continue to compile annual production information.
- Develop a map with well locations to indicate production areas and intensity of pumping.
- Continue to evaluate water quality and level changes throughout the Valley as resources allow.
- Formalize the groundwater monitoring program to comply with SBX7-6.

Planning Objective No. 7
Develop an inter-agency management framework to implement and enforce the objectives of this Plan.

- This objective was achieved with the drafting and acceptance of the Steering Committee Operating Guidelines in January 1997.

DR-TRAFFIC-193

Information Required:

Please provide the anticipated distribution of workers traveling from the various possible employment centers within 2-hours driving distance from the project site, especially SR-14.

Response:

Please refer to Figure DR-TRAFFIC-193, which is provided at the end of this section. This has been updated to expand the distribution of the construction workforce to surrounding areas and include possible residential areas or sources of workers within 2 hours driving distance.

DR-TRAFFIC-194

Information Required:

Please provide the base information for SR-14 as shown in Table 5.13-5 (and subsequent appropriate tables) for the other routes or provide an explanation as to why SR-14 is not included.

Response:

Below is the revised Table 5.13-5, which now includes information for SR-14 near Randsburg and SR-178. These sections of roadway currently operate at a level of service (LOS) A during peak periods and are forecast to continue to do so during periods of peak project construction.

Table 5.13-5 Baseline Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service (Without the Project)

Roadway/ Segment	Existing Conditions[1]				Year 2011 Base Conditions[2]			
	Travel Lanes	Volume	Capacity[3]	LOS	Travel Lanes	Volume	Capacity[3]	LOS
SR 14 - Randsburg	2	740	2,000	A	2	765	2,000	A
SR 14 South of SR 178 East	2	570	2,000	A	2	620	2,000	A
U.S. Highway 395 North of Brown Road	2	410[1]	2,000	A	2	508	2,000	A
U.S. Highway 395 South of Brown Road	2	660[1]	2,000	A	2	818	2,000	A
SR-178 West of U.S. Highway 395	4	750[1]	6,800	A	4	774	6,800	A
SR-178 East of U.S. Highway 395	4	820[1]	6,800	A	4	846	6,800	A
Brown Road West of U.S. Highway 395	2	14[4]	2,000	A	2	15[5]	2,000	A
China Lake Boulevard East of U.S. Highway 395	2	212[4]	2,000	A	2	219[5]	2,000	A

1. Caltrans, 2009
2. Year 2007 traffic volumes expanded to Year 2011 (estimated point of peak construction activity) at historical rates of Year 2000 to 2007 (0.8 to 6.0 percent/year dependent upon location).
3. Approximate two-way capacity in vehicles per hour

DR-TRAFFIC-195

Information Required:

Please provide discussion pertaining to known traffic problems, congestion (non-peak) and accidents for these routes.

Response:

Accident records for the above locations were requested from the California Highway Patrol in December and then again in January 2010. Our understanding from communication with the agency is that the information is forthcoming. We expect to have it shortly, and once received, we will summarize the data in response to this comment. The data will be utilized in the evaluation of the intersection of U.S. Highway 395 and Brown Road/China Lake Boulevard. We estimate a submittal date of February 10, 2010.

DR-TRAFFIC-196

Information Required:

Please provide the base information for the following intersections as shown in Table 5.13-6 (and subsequent appropriate tables) for the other intersections or provide an explanation as to why these intersections were not included:

- SR-178 and Brown Road;
- SR-14 and SR-178; and
- US-395 and SR-178

Response:

Figure DR-Traffic-196, provided at the end of this section, summarizes existing peak hour traffic counts (Year 2009) at the intersections of SR-178 with SR 14, Brown Road, and the north and southbound ramps of U.S. Highway 395. The results of a LOS analysis of the intersections assuming existing and future (with Project) traffic volumes are summarized in the tables below. The intersections currently operate at a LOS A through LOS C, depending on movement during the morning and evening peak periods (Table DR-TRAFFIC-196-1). All highway segments are forecast to continue operating at an acceptable LOS C or better during construction and future operation in 2014 (without a significant impact). Similarly, all Kern County roadway segments approaches are forecast to continue operating acceptably or at a LOS D or better during periods of peak Project construction traffic in 2011 (Table DR-TRAFFIC-196-2). All approaches of all intersections are forecast to operate at a LOS C or better when the Project becomes operational in 2014 (Table DR-TRAFFIC-196-3).

Table DR-TRAFFIC-196-1 Existing and Baseline Peak Hour Intersection Levels of Service (Without the Project)

	Existing Conditions[1]				Year 2011 Base Conditions[2]			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**
SR 178/ SR 14								
Southbound SR 14 Left	7.4	A	7.4	A	7.4	A	7.4	A
Westbound SR 178	9.5	A	10.5	A	9.5	A	10.6	B
SR 178/ Brown Road								
Northbound Brown	9.2	A	12.2	B	9.3	A	12.3	B
Southbound Brown	13.2	B	15.7	C	13.5	B	16.2	C
SR 178/ SB U.S. Highway 395 Ramps								
Westbound SR 178 Left	8.0	A	7.7	A	8.0	A	7.7	A
Southbound Off Ramp	13.1	B	14.4	B	13.3	B	14.3	B
SR 178/ NB U.S. Highway 395 Ramps								
Eastbound SR 178 Left	7.7	A	8.1	A	7.7	A	8.1	A
Northbound Off Ramp	12.8	B	13.5	B	12.9	B	13.8	B

1. Wilson Engineering, December 2009.
2. Year 2009 traffic volumes expanded to Year 2011 (estimated point of peak construction activity) at historical rates Year 2000 to 2007.
3. Average Vehicle Delay in seconds.

Table DR-TRAFFIC-196-2 Peak Hour Baseline without and with Construction Traffic Intersection Levels of Service

	Year 2014 Baseline[1]				Year 2014 with Plant Operations Workforce[2]			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**
SR 178/ SR 14								
Southbound SR 14 Left	7.4	A	7.4	A	7.4	A	7.4	A
Westbound SR 178	9.5	A	10.6	B	9.5	A	11.5	B
SR 178/ Brown Road								
Northbound Brown	9.3	A	12.3	B	9.7	A	25.2	D
Southbound Brown	13.5	B	16.2	C	27.6	D	19.7	C
SR 178/ SB U.S. Highway 395 Ramps								
Westbound SR 178 Left	8.0	A	7.7	A	8.0	A	7.8	A
Southbound Off Ramp	13.3	B	14.3	B	13.6	B	15.1	B
SR 178/ NB U.S. Highway 395 Ramps								
Eastbound SR 178 Left	7.7	A	8.1	A	7.8	A	8.1	A
Northbound Off Ramp	12.9	B	13.8	B	13.1	B	14.0	B

1. Year 2009 traffic volumes expanded to Year 2011 (estimated point of beginning plant operations).
2. Year 2011 with peak construction traffic.
3. Average Vehicle Delay in seconds.

Table DR-TRAFFIC-196-3 Year 2014 Baseline Peak Hour without and with Plant Operations Traffic Levels of Service

	Year 2014 Baseline[1]				Year 2014 with Plant Operations Workforce[2]			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**	**Delay[3]**	**LOS**
SR 178/ SR 14								
Southbound SR 14 Left	7.4	A	7.4	A	7.4	A	7.4	A
Westbound SR 178	9.5	A	10.6	B	9.5	A	11.5	B
SR 178/ Brown Road								
Northbound Brown	9.3	A	12.3	B	9.7	A	25.2	D
Southbound Brown	13.5	B	16.2	C	27.6	D	19.7	C
SR 178/ SB U.S. Highway 395 Ramps								
Westbound SR 178 Left	8.0	A	7.7	A	8.0	A	7.8	A
Southbound Off Ramp	13.3	B	14.3	B	13.6	B	15.1	B
SR 178/ NB U.S. Highway 395 Ramps								
Eastbound SR 178 Left	7.7	A	8.1	A	7.8	A	8.1	A
Northbound Off Ramp	12.9	B	13.8	B	13.1	B	14.0	B

1. Year 2009 traffic volumes expanded to Year 2011 (estimated point of beginning plant operations).
2. Year 2011 with peak construction traffic.
3. Average Vehicle Delay in seconds.

DR-TRAFFIC-197

Information Required:

Please provide scaled plans (40-scale) for each access point into the proposed project site, the access to the laydown/ construction area for Brown Road from US 395 so that proper analysis of site access can be performed.

Response:

Scaled plans showing access including design radii, grades lane widths, etc., will be developed during the design process as the Project moves forward and are not available at this time. However, we are currently preparing Conceptual Engineering Plans which will be provided to the CEC on February 10, 2010 and will depict the access points to the site from Brown Road and the alternate access point of connection to U.S. Highway 395. We believe that this information would be sufficient for Staff to conduct its CEQA/NEPA level of review to determine impacts. Additionally, the Staff Assessment/Draft Environmental Impact Statement should reflect that all work on Brown Road will be completed in conformance with Kern County standards, the Caltrans Traffic Manual, the American Association of State Highway and the Transportation Officials Geometric Policy on Street and Highway Design. The compliance of the design with appropriate standards will be monitored and approved by Kern County through the Encroachment Permit Process. That process requires the plans be approved by the County prior to initiating any construction in the public right of way (ROW) and then continues with the County providing inspection services during construction and a final signoff that all construction was completed in a satisfactory manner and in accordance with all requirements.

DR-TRAFFIC-198

Information Required:

Please provide anticipated internal traffic movement and parking.

Response:

The proposed site plan showing access, internal circulation, parking, and construction lay down areas is provided as Figure DR-ALT-49 in the Alternatives section of this document. The site will include at least 650 to 700 temporary spaces for construction worker parking. Conceptual Engineering Plans will be provided to the CEC on February 24, 2010 and will also show the internal roadway locations as part of the grading plans. The final design of these facilities will be subject to the requirements and approval of Kern County.

DR-TRAFFIC-199

Information Required:

Please provide traffic accident statistics for US Hwy. 395, SR-14 and SR-178, including the intersection of Brown Road and US 395, and causes for accidents on those roadways identified in the AFC.

Response:

Please see DR-TRAFFIC-195. Accident records for the above locations were requested from the California Highway Patrol in December and then again in January 2010. Our understanding from communication with the agency is that the information will be forthcoming. We expect to have it shortly, and once received, we will summarize the data in response to this comment. The data will be utilized in the evaluation of the intersection of U.S. Highway 395 and Brown Road/China Lake Boulevard. We estimate a submittal date of February 10, 2010.

DR-TRAFFIC-200

Information Required:

> Please provide any other known roadway hazards, such as poor sight distances or turning radii associated with accessing the project site and on roadways identified in the AFC.

Response:

Over the last 20 years, Caltrans has completed several highway improvements in the greater Project area to correct safety hazards. These include the grade separation of the intersection of U.S. Highway 395 with SR-178 (Inyokern Road), widening of sections of SR-178, and assorted smaller intersection-related improvements in the area. These improvements have corrected most safety needs in the area, particularly along SR-178. However, the intersection of U.S. Highway 395 with Brown Road/South China Lake Boulevard does have a higher than average accident rate (2.8 times greater than State average for similar at-grade intersections). This accident rate is believed to be the result of several issues. Both Brown Road and South China Lake Boulevard intersect the highway at an angle, there is a large curve in the highway immediately to the south, and there is a downhill grade from the north that can result in high speeds on the highway, particularly during ski season.

Accident records for the above locations were requested from the California Highway Patrol in December and then again in January 2010. Our understanding from communication with the agency is that the information is forthcoming. We expect to have it shortly, and once received, we will summarize the data in response to this comment. The data will be utilized in the evaluation of the intersection of U.S. Highway 395 and Brown Road/China Lake Boulevard. We estimate a submittal date of February 10, 2010.

DR-TRAFFIC-201

Information Required:

> Please consult Caltrans and Kern County to determine an acceptable alternative to access the proposed project site from US 395. Also, please provide plans and sets to the Energy Commission and Caltrans.

Response:

The Applicant is currently engaged in evaluating two alternatives for providing access to the site. The proposed site access route is described in the Application for Certification (AFC) and depicted in the reconfigured site plan (Figure DR-ALT-49 in the Alternatives section of this document). This alternative

proposes improvements to the existing intersection of U.S. Highway 395 and Brown Road/China Lake Boulevard relative to existing geometrics, sight distance, and accident records. For this alternative, the Applicant is gathering and reviewing accident reports and topographic mapping to identify potential causes of accidents and determine, in close coordination with Caltrans, appropriate types of modifications to correct existing hazards as well as modifications needed to accommodate project-related construction and operations traffic safely (turn pockets, acceleration and deceleration lanes, etc.). A key part of the evaluation of this alternative will be the identification of needed improvements versus grading requirements to construct them. The potential for implementation of Caltrans' proposed long-term improvement, which includes the re-alignment of China Lake Boulevard and Brown Road together with widening U.S.Highway 395, is not being pursued at this time due to the extended time needed to acquire additional ROWs. Caltrans has acknowledged they do not expect to complete this project for at least the next ten years or more and does not have the necessary ROW assembled yet.

The second alternative proposes a new driveway to U.S. Highway 395 at a minimum of one mile north of Brown Road and includes both a potential for a new driveway/access point with U.S. Highway 395 and the extension of the roadway onto the site. Conceptual Engineering Plans will be provided to the CEC on February 10, 2010 and will show this alternate access point of connection to U.S. Highway 395. Adding turn movements directly to and from a State highway is generally not an acceptable practice, and Caltrans will need to confirm that any new location of an access to and from U.S. Highway 395 north of Brown Road would be done at their direction and demand.

At this time, the Applicant expects to move forward with two alternative points of access with the ongoing review of alternatives and selection of a preferred occurring as project design and development continues. The Applicant is currently coordinating and will continue to coordinate with Caltrans and Kern County staff during the evaluation and selection process. The actual design and construction of improvements associated with either alternative will be completed under Caltrans/Kern County encroachment permit processes, during which all design and Project construction is subject to those agencies' requirements.

DR-TRAFFIC-202

Information Required:

> Please consult with Caltrans and Kern County to determine the pro rata share for improvements to the intersection and provide a letter outlining the determination of pro rata cost share attributable to the project.

Response:

As stated in the response to DR-TRAFFIC-201, the Applicant is currently consulting with CalTrans and Kern County. As part of this process, the Applicant will work out details including the determination of pro rata cost shares.

DR-TRAFFIC-203

Information Required:

> Please provide locations and designs (geometrics such as turning radii, load capacities, grades, etc.) per Kern County design standards for potential emergency access routes.

Response:

Emergency access to the site is by way of Brown Road. The primary access into the site from Brown Road will be provided with a paved width of 24 feet, capable of allowing an emergency vehicle onto the site. A secondary point of access from Brown Road to the area of the warehouse can be provided if required by Kern County. All roadways at the site have grades less than 5 percent for access to the occupied areas. The internal turning radius for all the roadways will be a minimum of 35 feet to comply with the Kern County requirements. All roads to occupied areas will be a minimum of 20 feet in width, paved, and provided with a structural section capable of H-20 loading, which will meet or exceed the Kern County requirements for their emergency fire vehicles.

Scaled plans showing emergency access including design radii, grades lane widths, etc., will be developed during the design process as the project moves forward. Conceptual engineering plans will be provided by February 10, 2010. All emergency access work will be designed and completed in conformance with the Kern County Fire Marshall's standards and requirements. The compliance of the design with appropriate standards will be reviewed and approved by Kern County through the building permit process, during which the Project will be subject to the approval of the County's Fire Marshall.

DR-TRAFFIC-204

Information Required:

> Please provide documentation identifying how the proposed project will comply with any applicable traffic or transportation LORS, programs and design standards established by the Kern County COG.

Response:

The compliance of the proposed Project with all applicable traffic or transportation LORS, programs and design standards will be monitored and documented through the construction process in several ways. The need for capacity-related improvements will be evaluated using a LOS analysis and the significance of the Project's impacts will be determined based upon County and Caltrans criteria or standards. Exceedance of a standard must then be mitigated, typically with some kind of road or intersection improvement. The implementation of this improvement becomes a condition of the Project's approval.

Once a need for an improvement is identified, the design and construction of that improvement is controlled by the owner of the facility (Kern County, Caltrans, City of Ridgecrest, etc.) through the encroachment permit process. That process requires the design and plans to be approved by the Chief Building Official (CBO) in consultation with Kern County, Caltrans, and the City of Ridgecrest prior to construction. The CBO will provide inspection services during construction and will ensure that all construction was completed in a satisfactory manner and in accordance with all requirements.

The design of on-site traffic and transportation-related improvements will be in accordance with Kern County standards as described in the above responses to DR-TRAFFIC-198 and DR-TRAFFIC-203.

DR-TRAFFIC-205

Information Required:

Please provide the traffic study prepared by Wilson Engineering so staff can evaluate source information and methodologies supporting the data presented.

Response:

The traffic study is located in Attachment DR-TRAFFIC-205, provided at the end of this section.

DR-TRAFFIC-206

Information Required:

Please provide the explanation for the references.

Response:

The references in Table 5.13-5 were incorrectly provided and should be deleted. A revised Table 5.13-5 is provided in the response to DR-TRAFFIC-194.

DR-TRAFFIC-207

Information Required:

Please provide the percentage of construction trips for vehicles and trucks for each highway route identified in the AFC.

Response:

Figure DR-TRAFFIC-207, provided at the end of this section, depicts peak daily truck volumes and peak construction work force forecasts for State highways identified in the AFC. Please note the construction work force peak and truck volume peak do not overlap and truck trips do not occur during the peak commute period. Peak truck volumes are forecasted to occur during Month 8 and peak work force volumes in Month 11. The percentages are relative to existing daily traffic volumes.

DR-TRAFFIC-208

Information Required:

Please provide a discussion of the railroad corridor rights-of-way (ROW) and abandonment thereof, including setback requirements and any safety or liability concerns of the railroad owner and BLM.

Response:

LA 028634 is a former Southern Pacific Railroad ROW that intersects with the southwestern boundary of the RSPP ROW. This 100-foot wide ROW was abandoned in 1982 and rails were removed in 1998. There are no tracks, railroad ties or roadway crossings; however, the Phase I Environmental Site Assessment (Appendix I of the AFC) conducted for the Project identified some infrastructure associated with the former railroad ROW (e.g., bridges, storm water conveyances). The ballast rock has been left in place and the railroad ROW currently serves as a hiking trail. The closest project component to the railroad ROW is the access road that runs along the western side of the south solar field. The access road is approximately 230 feet from the railroad ROW, and the Project disturbance boundary is located, at its closest point, approximately 130 feet from the railroad ROW, thus no disturbance within the railroad ROW or of the remaining railroad infrastructure would occur.

The I 0330 RR Sta Grounds is a ROW for a railroad station, and is identified just south of the Project ROW. The Bureau of Land Management (BLM) is currently researching the I0330 RR Sta Grounds ROW to determine whether this ROW has been abandoned. However, the railroad station no longer exists and has been completely dismantled.

DR-TRAFFIC-209

Information Required:

> Please provide information pertaining to Caltrans and California Public Utilities Commission's requirements for crossing the railroad corridor ROW.

Response:

California Public Utilities Commission (CPUC) approval is required prior to constructing new, or modifying existing, highway rail crossings under General Order 88B. However, as stated above in DR-TRAFFIC-208, the railroad ROW is an abandoned crossing with no regulated roadway crossing. Neither Caltrans nor CPUC has any regulatory authority at this location and therefore General Order 88B requirements do not apply.

DR-TRAFFIC-210

Information Required:

> Please provide a map at a scale of 1:24,000 showing airports (the precise distance from Inyokern Airport), public transportation, school bus routes and bicycle routes.

Response:

Please refer to Figure DR-TRAFFIC-210, provided at the end of this section, which depicts airports, public transportation, school bus routes and bicycle routes.

DR-TRAFFIC-211

Information Required:

Please provide a discussion and a schedule pertaining to applying and obtaining the necessary BLM right-of-way (ROW) permits for the water pipeline route.

Response:

The water pipeline will run from the power block, which is located on BLM lands, to Brown Road and along China Lake Boulevard to the Ridgecrest Heights station. The portion of the water pipeline located within BLMs lands is included in the Applicant's ROW application for the RSPP (CACA – 49016). The remaining portion of the water pipeline route will run along Kern County Road ROWs. The Applicant will request a pipeline permit (encroachment permit) from the Kern County Roads Department for this route.

DR-TRAFFIC-212

Information Required:

Please address how much area (length and width) is needed for the water pipeline ROW.

Response:

The water pipeline will be constructed within existing Kern County ROWs or on BLM lands and as such will not have a ROW of its own. The construction ROW for the water pipeline is 30 feet wide. The CPUC provides franchise agreement rights for utility placement in government ROWs with permitting rights given to the governing authority, which in this case is Kern County. The water line will be constructed approximately 15 to 20 feet from the edge of the existing pavement along the west side of China Lake Boulevard and along the north side of Brown Road, well within the existing County ROW. The waterline is approximately 4.5 miles in length and will have a trench width of approximately 3 feet. There is no easement or ROW width directly associated with a pipeline that is located within a public ROW.

DR-TRAFFIC-213

Information Required:

Please identify alternate entry routes for the nine (9) private and public driveways or roadways the water pipeline will affect during installation.

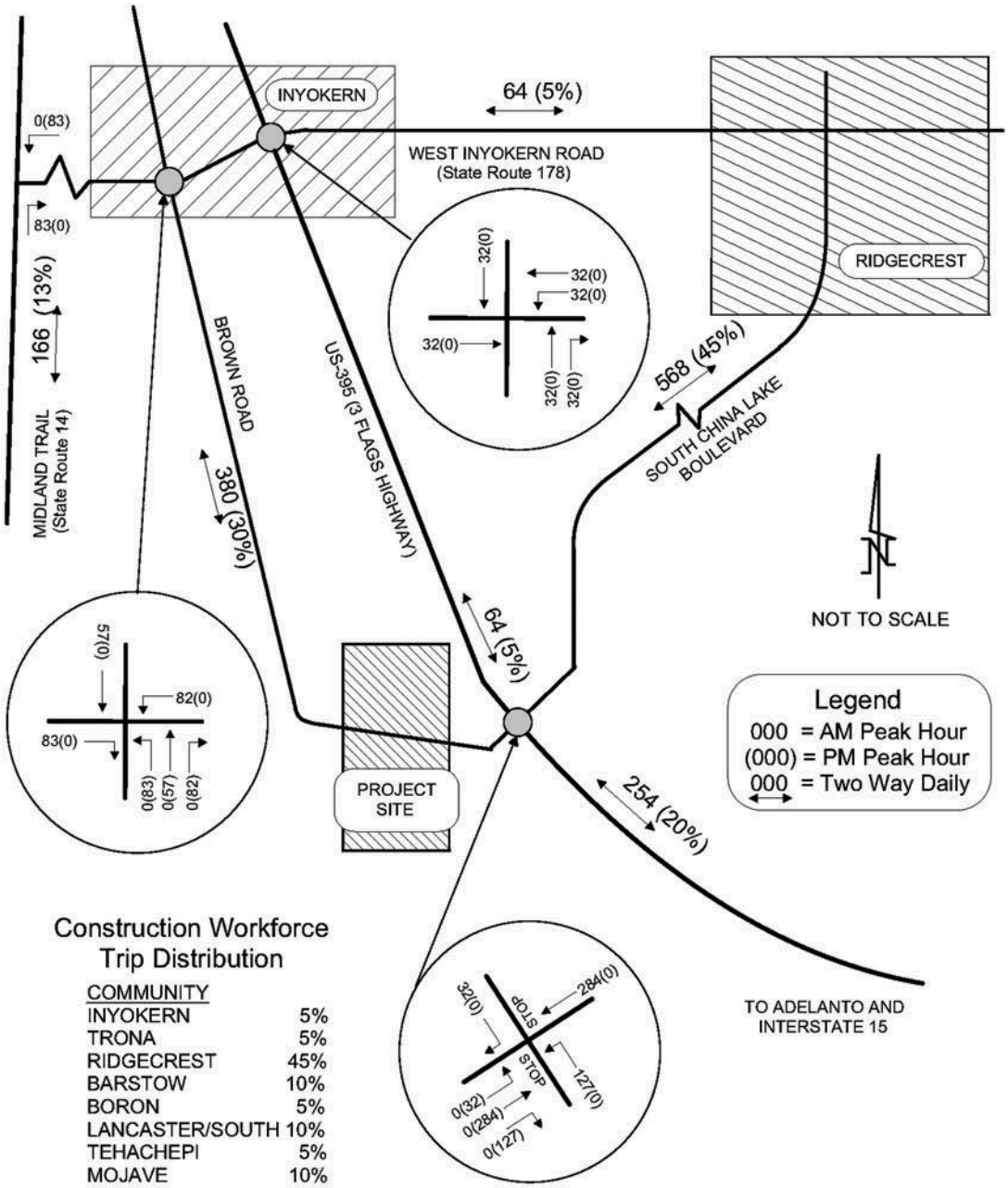
Response:

The contractor that installs the pipeline will be required to maintain access to the existing tenants that use any driveway from a public road. This will be a condition of permit from the County. The Contractor will meet this requirement by using temporary diversions of the driveways that are within the County ROW and/or by providing phased construction across the driveways with use of trench plates to provide access over any open excavation. Any temporary diversion of a driveway will be a 15 foot wide driveway located parallel and approximately 10 feet immediately adjacent to the existing driveway. These driveways, if needed, will only exist for one day, which will be sufficient time for the water line to be constructed. All work for the driveways will be within the existing Kern County ROW. The temporary relocation and

protection of the existing driveways will be defined on the engineering plans and will be subject to review and permit requirements of Kern County Engineering Department. No work will be allowed to be performed until the plans are approved and all requirements addressed. A condition could be placed on the project that "Developer shall maintain access to all driveways during construction of the water line and permits for the work in the ROW of China Lake Boulevard and Brown Road must be obtained from Kern County."

Attachment

Traffic Figures



Construction Workforce Trip Distribution

COMMUNITY	
INYOKERN	5%
TRONA	5%
RIDGECREST	45%
BARSTOW	10%
BORON	5%
LANCASTER/SOUTH	10%
TEHACHEPI	5%
MOJAVE	10%
RANDSBURG	5%

Map Location

Not to Scale

Ridgecrest Solar Power Project
DR - Traffic - 193

Solar Millennium

AECOM

Date: January 2010

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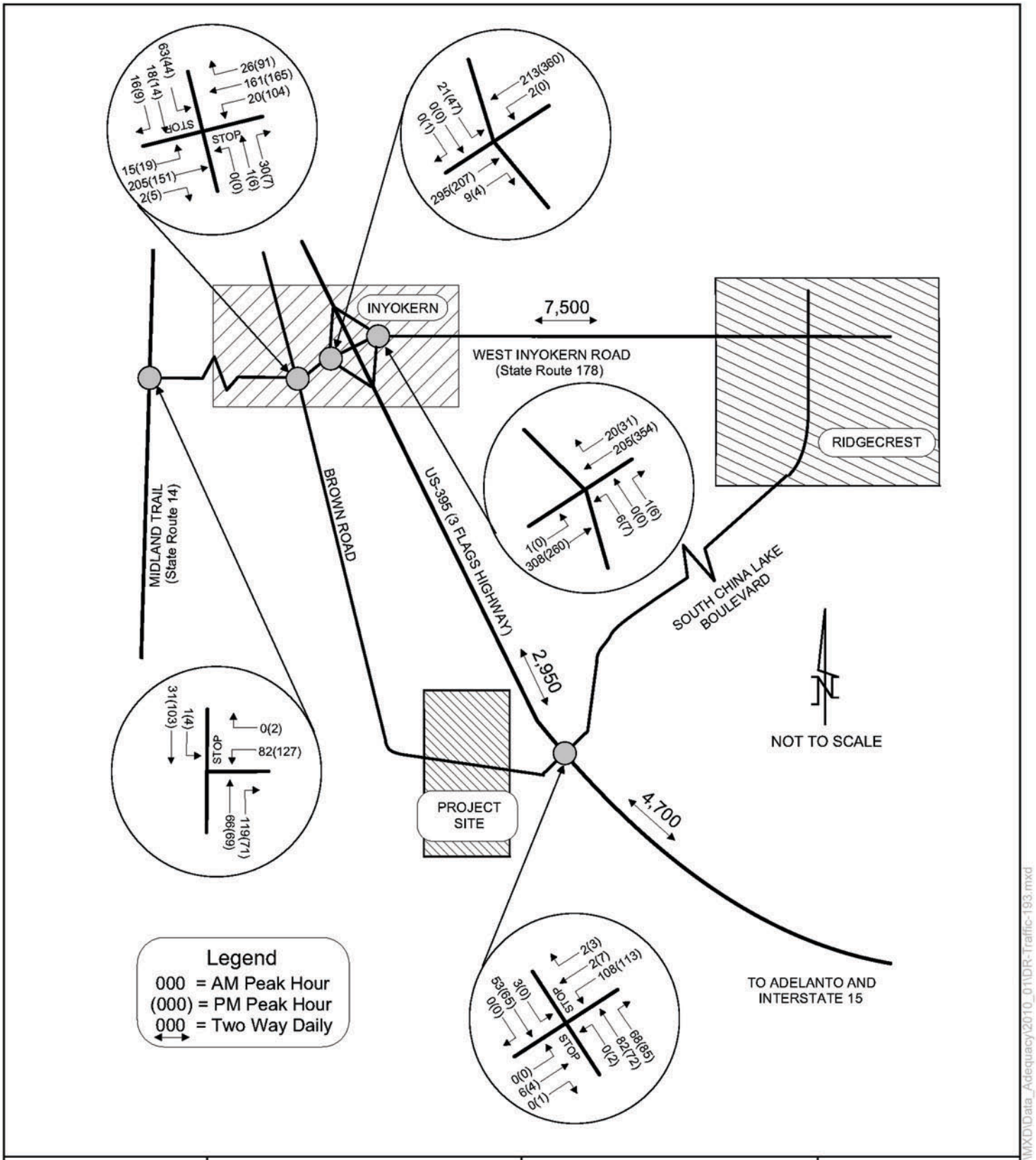

Map Location

Not to Scale

Ridgecrest Solar Power Project
DR - Traffic - 196
Existing Peak Traffic

Solar Millennium

AECOM

Date: January 2010

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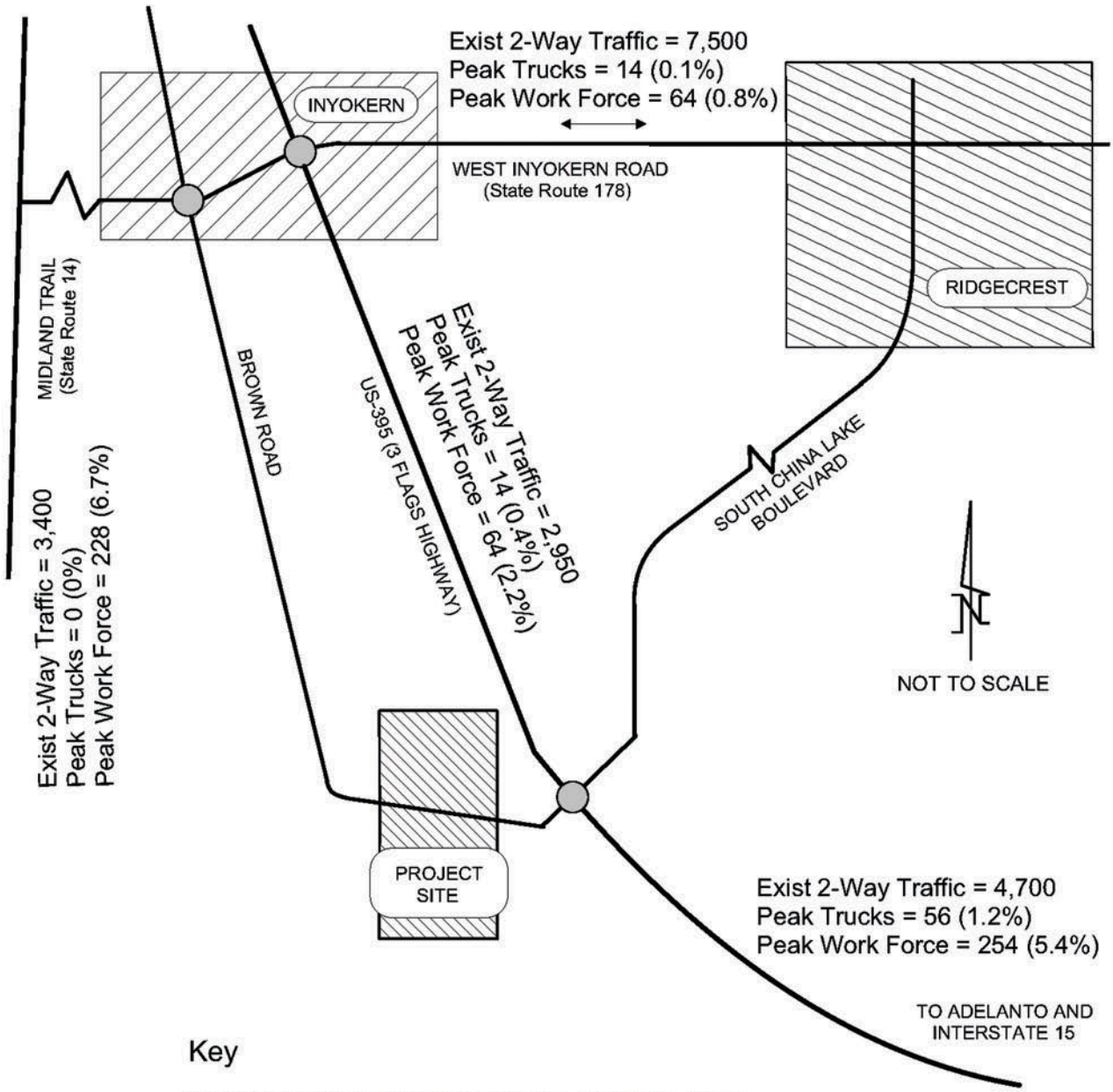

Key

Exist 2-Way Traffic = Daily Volume, Caltrans, 2009
Peak Trucks = 2-Way Daily Trucks during Peak Month
Peak Work Force = Peak Month 2-Way Daily Commute Traffic During Construction
(%) = Percent of Existing Daily Volume

Map Location

Not to Scale

Ridgecrest Solar Power Project
DR - Traffic - 207
Construction Traffic on State Highways

Solar Millennium

AECOM

Date: January 2010

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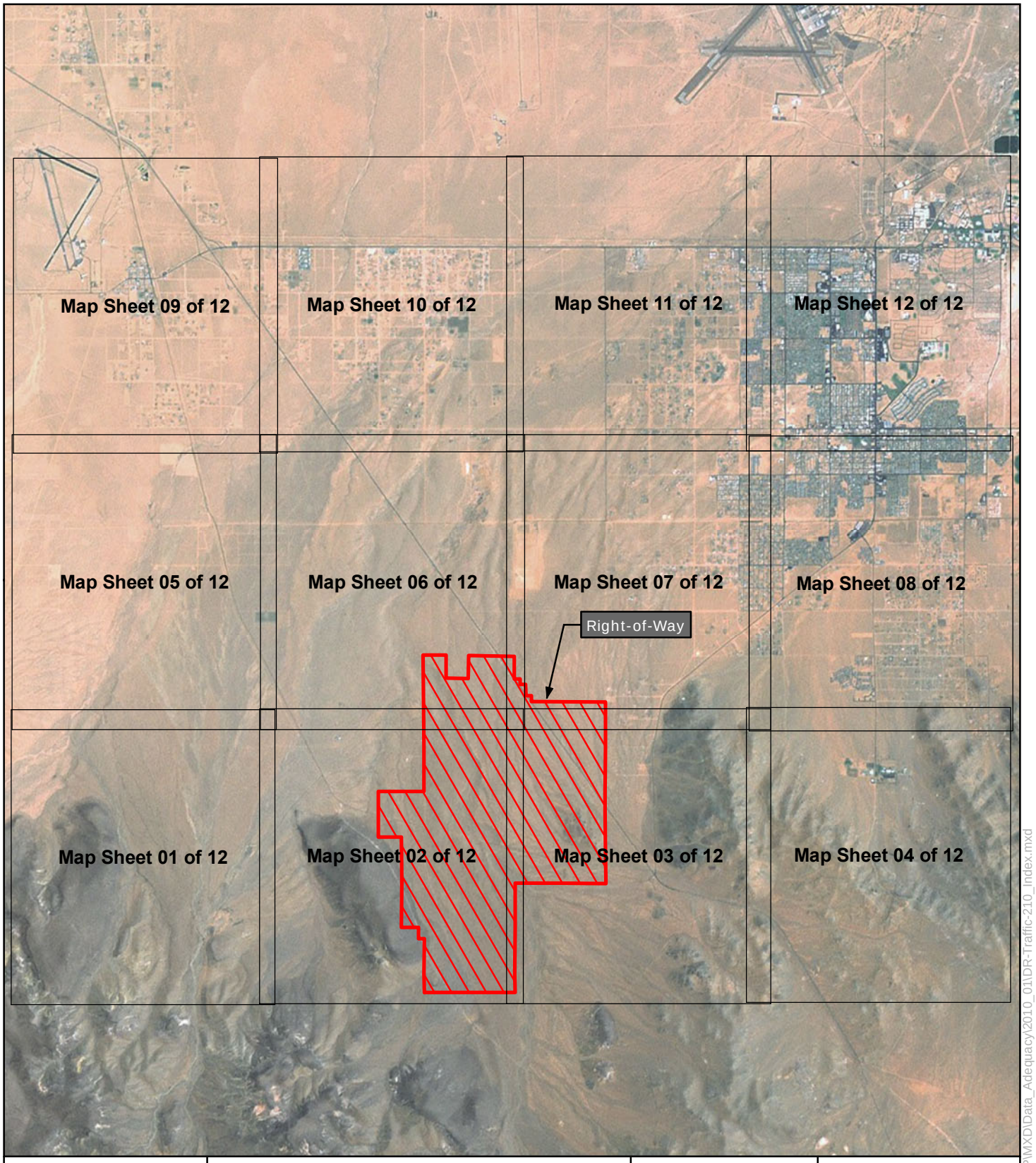

Map Location

Legend

Right-of-Way

1 inch = 1.5 miles

0 1.5 3 Miles

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Index Map

Solar Millennium

AECOM

Date: January 2010

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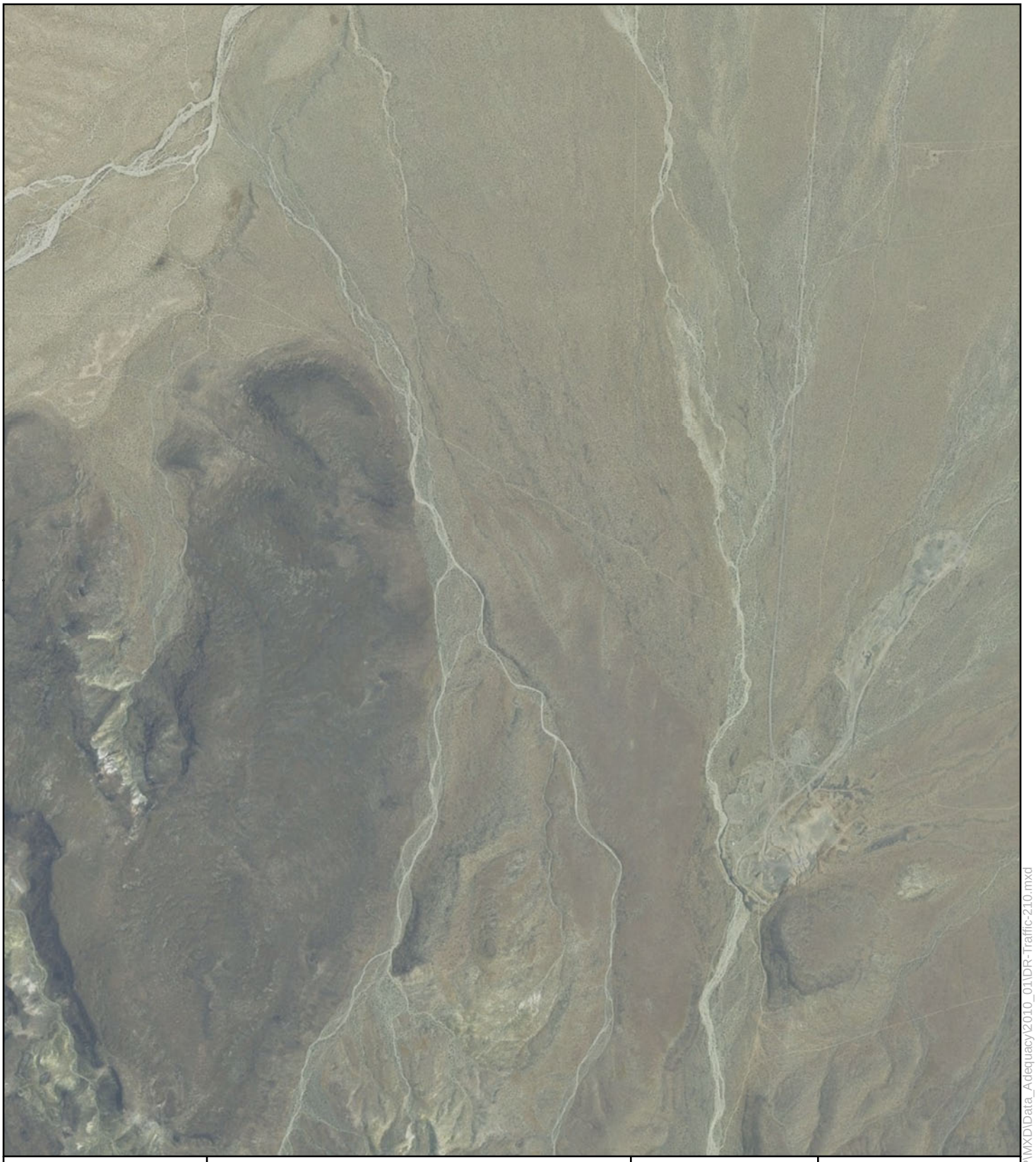

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N E S W

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 01 of 12

Solar Millennium

AECOM

Date: January 2010

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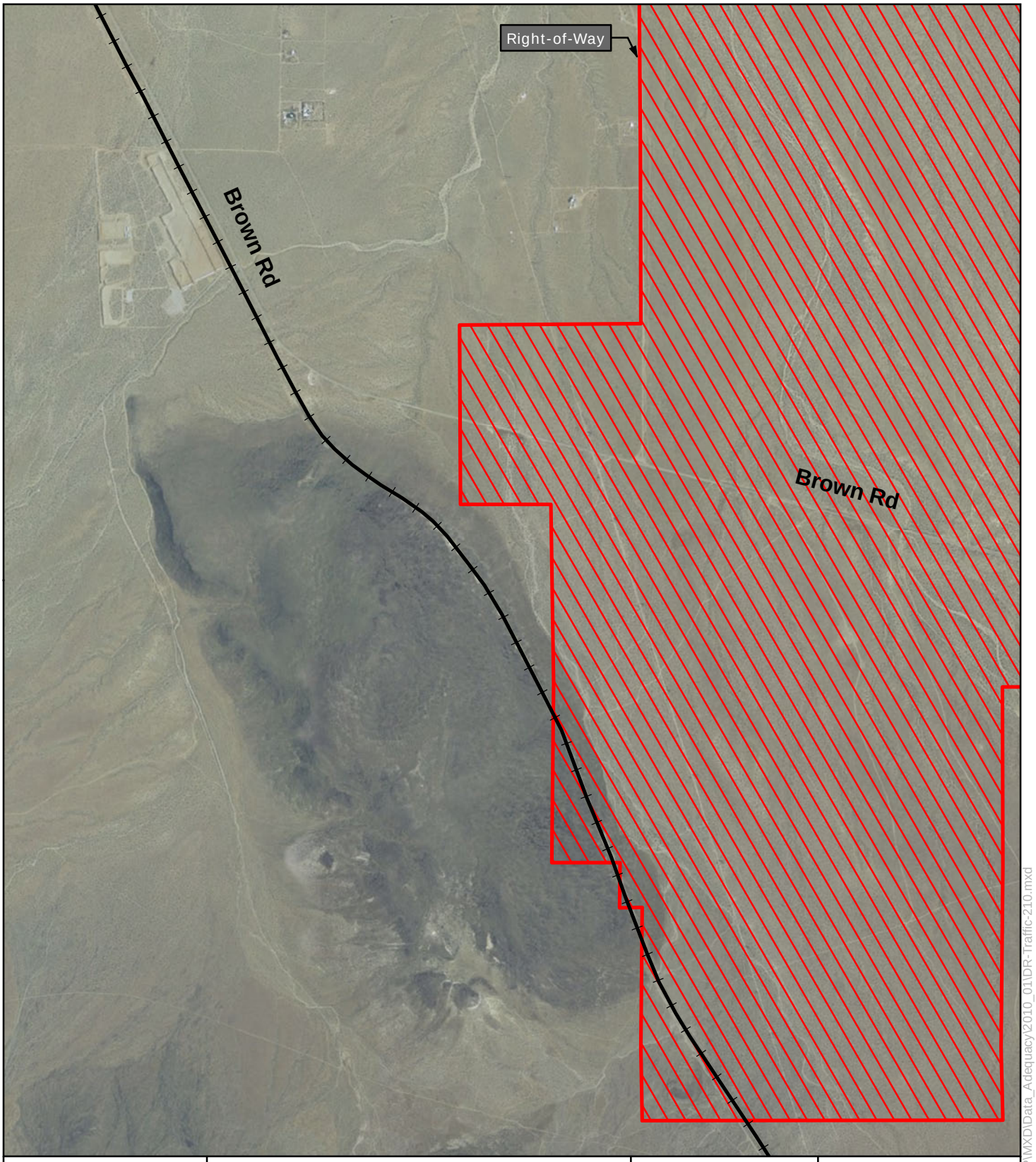

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 02 of 12

Solar Millennium

AECOM

Date: January 2010

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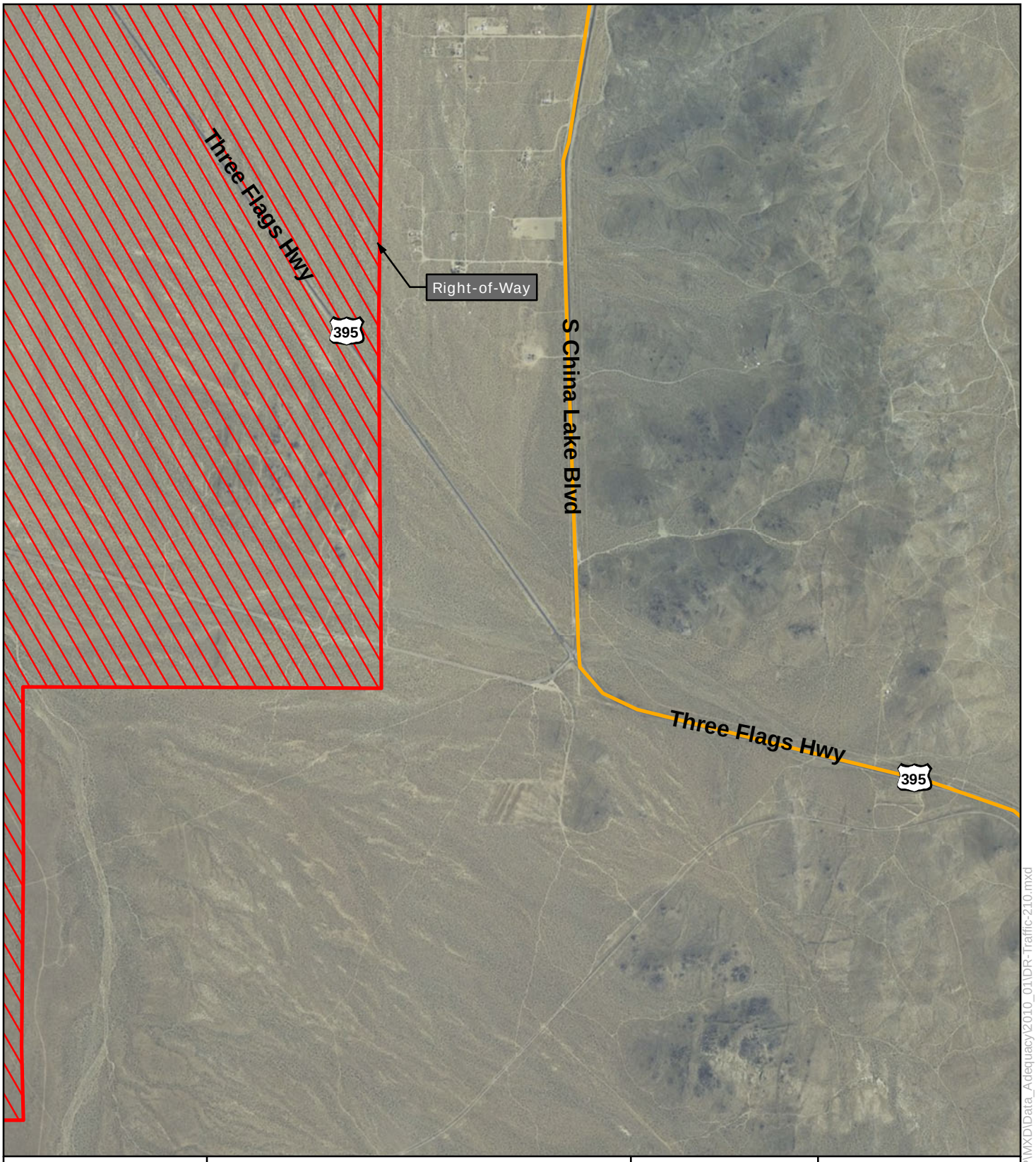

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N E S W

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 03 of 12

Solar Millennium

AECOM

Date: January 2010

Y:\Projects\Solar_Millennium\RSPP\MXD\Data_Adequacy\2010_01\DR-Traffic-210.mxd

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 04 of 12

Solar Millennium

AECOM

Date: January 2010

Y:\Projects\Solar_Millennium\RSPP\MXD\Data_Adequacy\2010_01\DR-Traffic-210.mxd

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 05 of 12

Solar Millennium

AECOM

Date: January 2010

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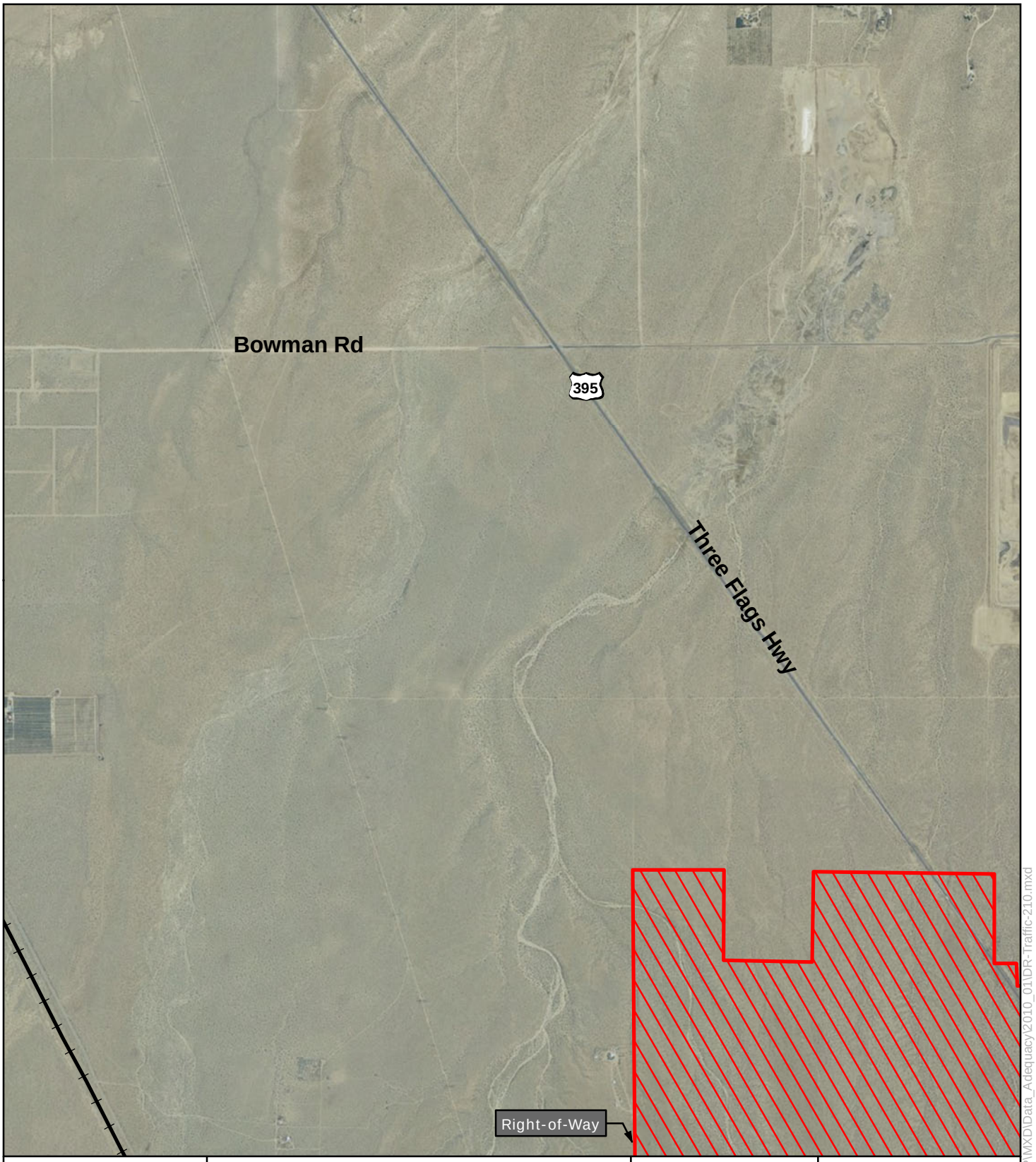

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 06 of 12

Solar Millennium

AECOM

Date: January 2010

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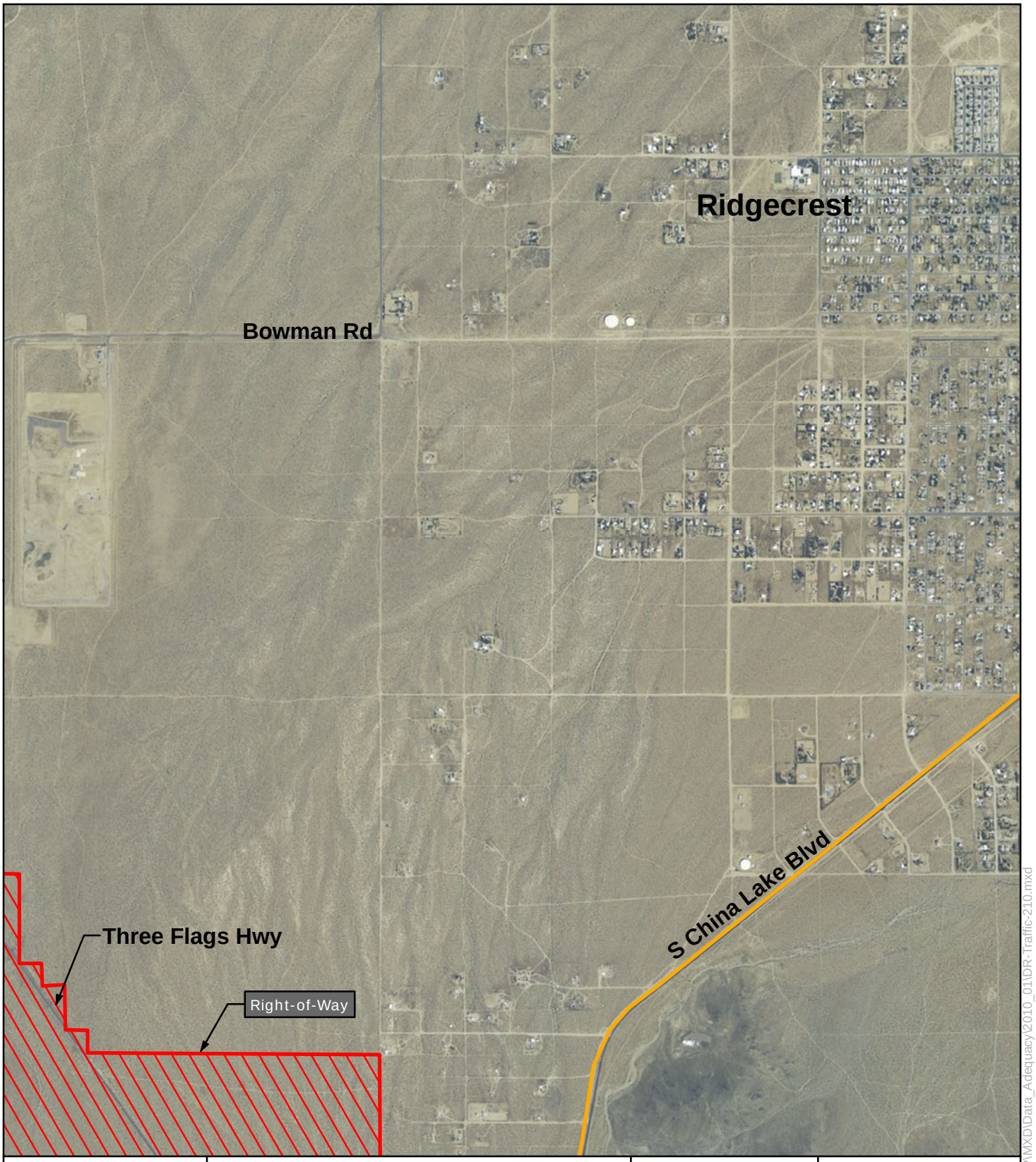

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 07 of 12

Solar Millennium

AECOM

Date: January 2010

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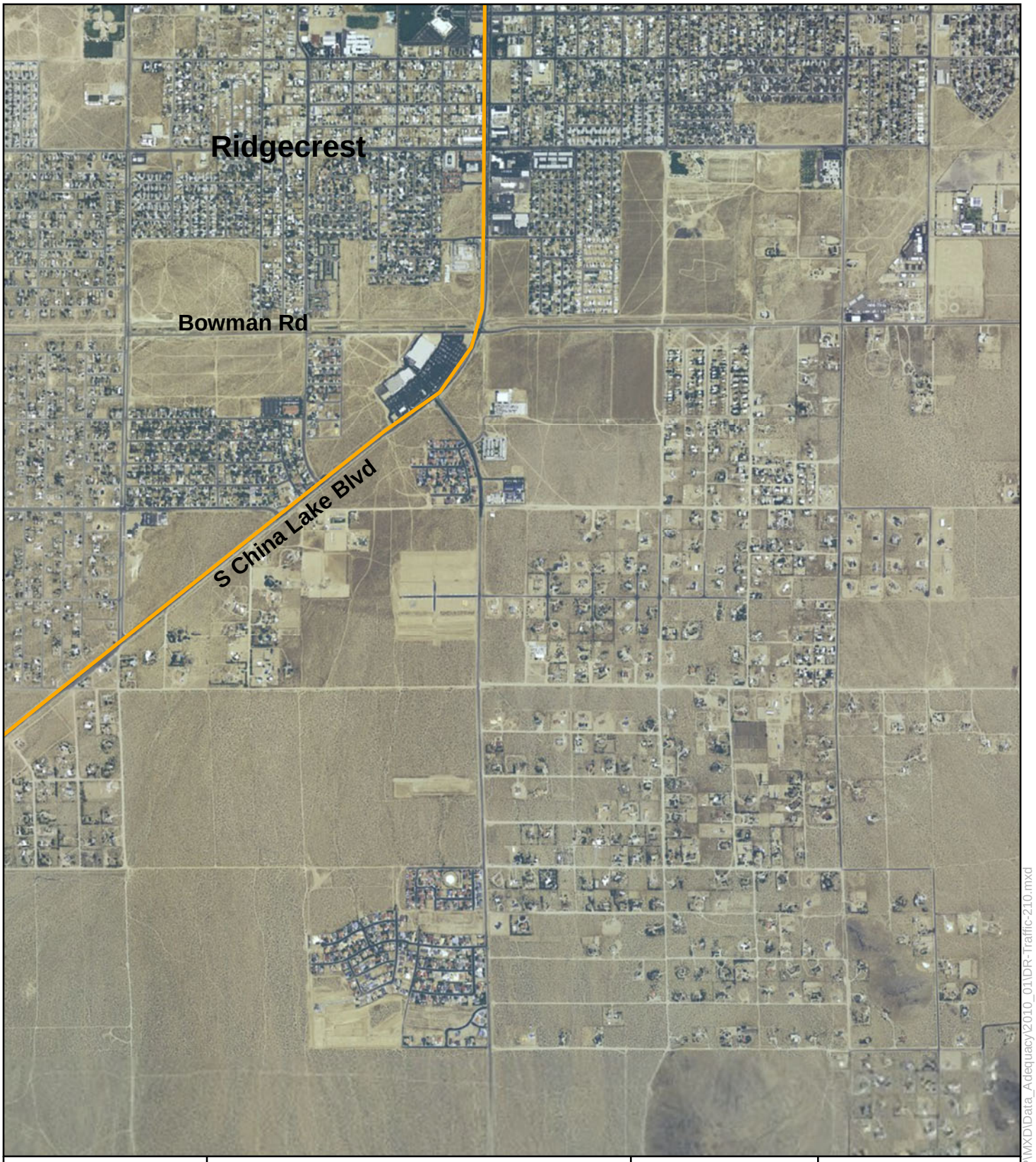

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 08 of 12

Solar Millennium

AECOM

Date: January 2010

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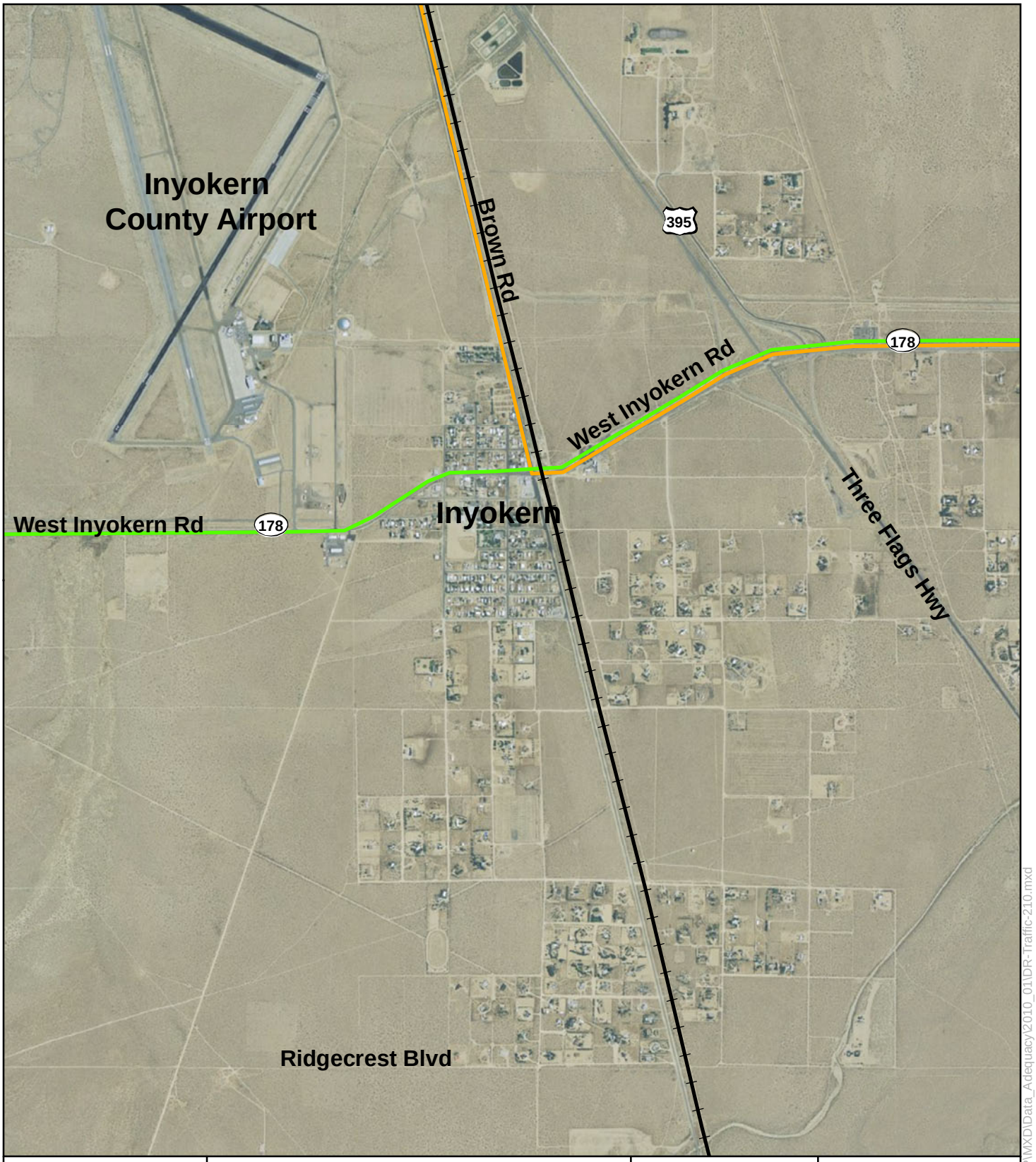

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 09 of 12

Solar Millennium

AECOM

Date: January 2010

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Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 10 of 12

Solar Millennium

AECOM

Date: January 2010

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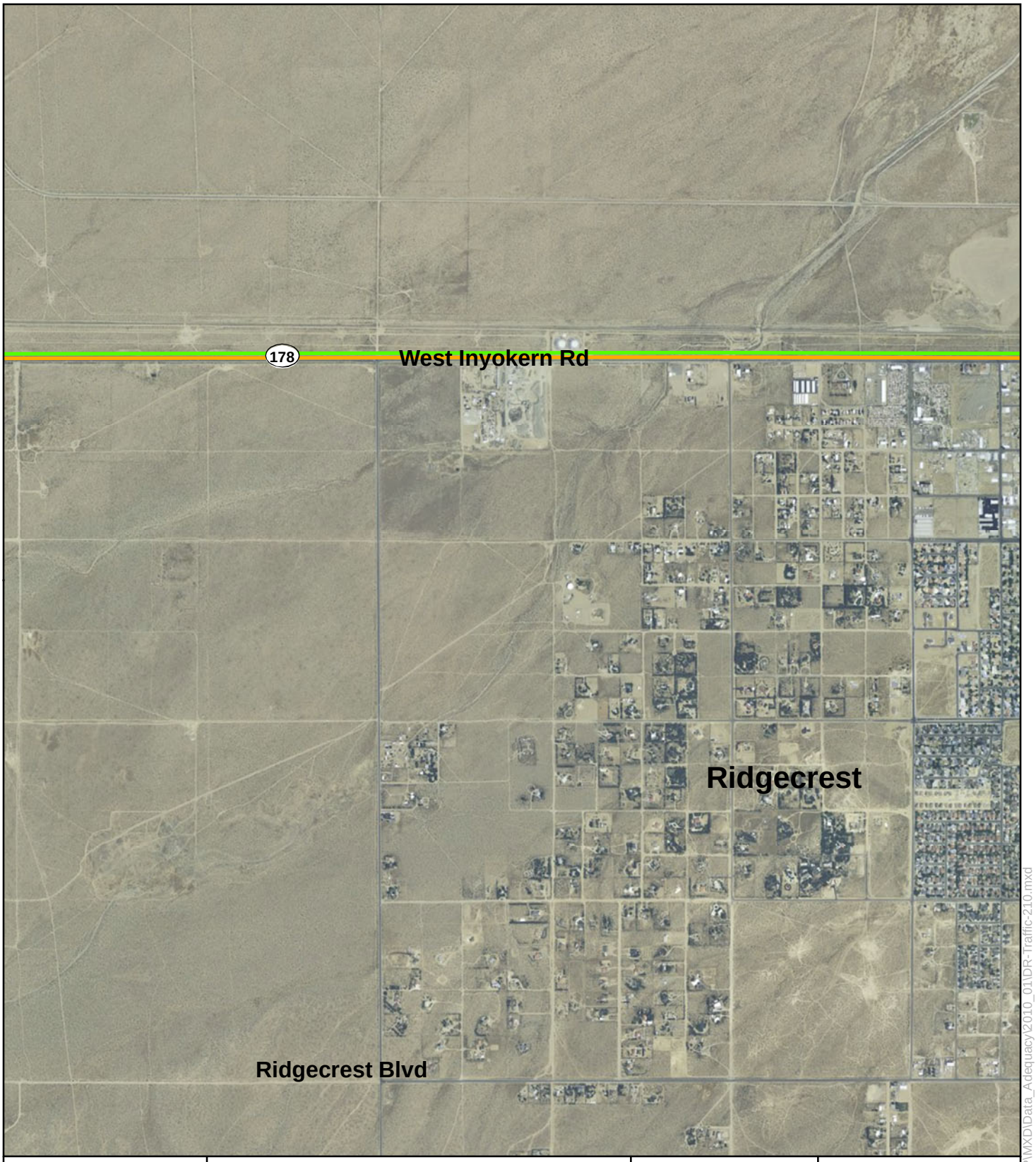

Map Location

Legend

- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 11 of 12

Solar Millennium

AECOM

Date: January 2010

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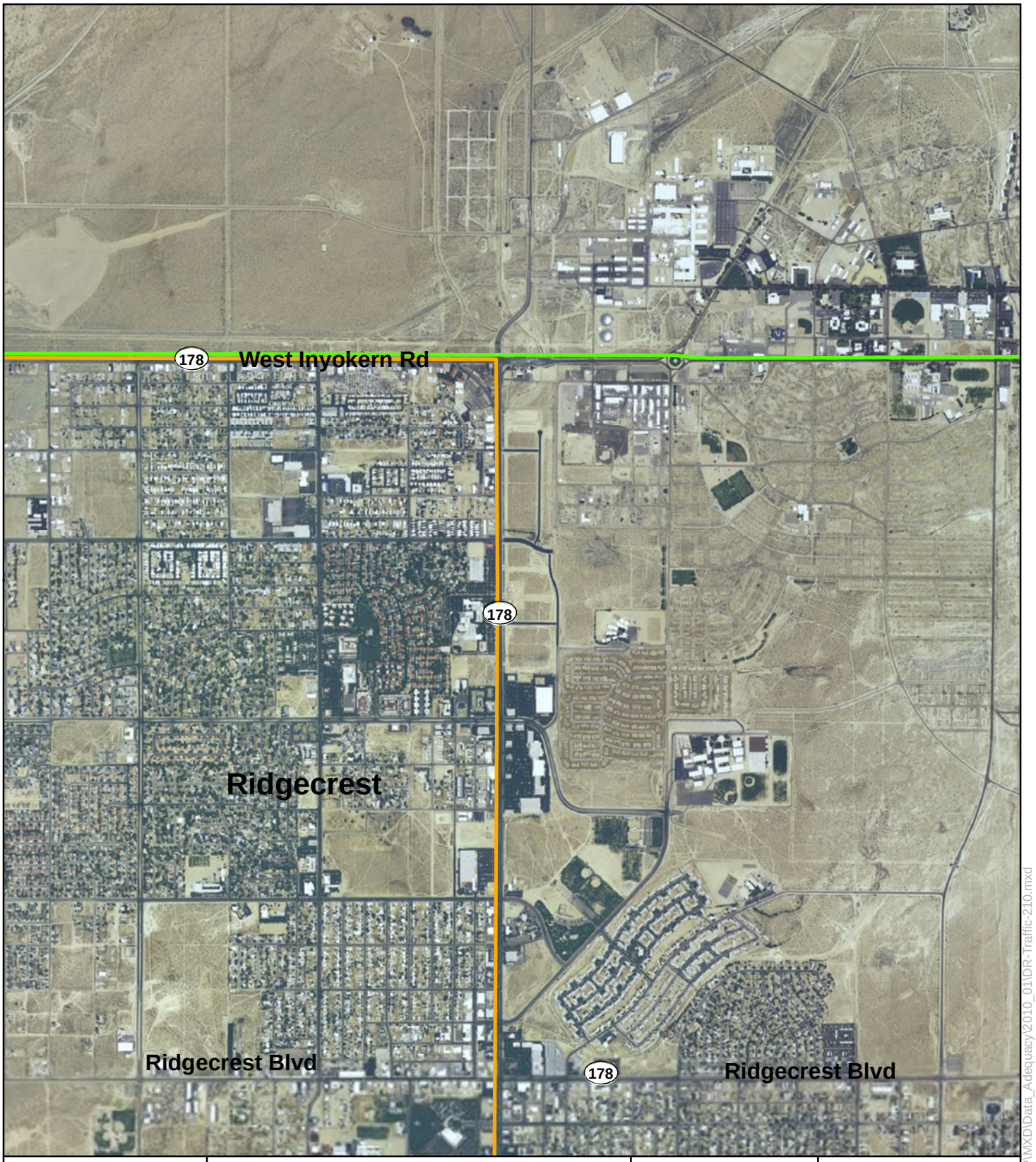

Map Location

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- Right-of-Way
- School Bus Route
- Regional Transit Route
- Abandoned and Removed Railroad line

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure DR - Traffic - 210

Map Sheet 12 of 12

Solar Millennium

AECOM

Date: January 2010

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Attachment DR-TRAFFIC-205

Traffic Study

TRAFFIC AND TRANSPORTATION STUDY

For:

Ridgecrest Solar Power

Prepared for:

AECOM

Prepared by:

Wilson engineering

September, 2009

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1.0 Introduction/ Summary

This report has been prepared to assess the potential impacts to the transportation system due to activities associated with construction and operation of the Ridgecrest Solar Power Project (RSPP or Project). The report addresses applicable laws, ordinances, regulations and standards (LORS); describes the existing transportation system (vehicular, rail, and air) and current traffic conditions; evaluates potential Project impacts; and identifies mitigation measures that would avoid, minimize, or compensate for adverse impacts.

The traffic and transportation resources discussion presented in the following pages is intended to support compliance by the California Energy Commission (CEC) with the requirements of the California Environmental Quality Act (CEQA), and by the Bureau of Land Management (BLM) with the requirements of the National Environmental Policy Act (NEPA). The two agencies are conducting a joint review of the Project and a combined CEQA/NEPA document will be prepared.

1.0 Summary

Construction will involve a work force of approximately 405 workers average monthly (633 workers peak) whose commuting vehicles will increase traffic volumes on U.S. Highway 395, Brown Road, and China Lake Boulevard, the primary access routes to the site vicinity. All roadways are forecast to continue operating at their existing traffic flow conditions with no Project impacts on Level of Service (LOS) during peak Project construction activity. However, the intersection of U.S. Highway 395 with South China Lake Boulevard and Brown Road potentially could be impacted during peak construction periods. To mitigate this, the Applicant will implement measures to reduce the volume of workers arriving at the work site at the same time, such as temporarily staggered work shifts or approaches such as contractor-required van pools, car pools, shuttle buses, park and ride, etc. This will allow the westbound approach to operate at an LOS C or better during periods of peak construction activity. Because of the moderate size work force of 84 people associated with plant operation around the clock, traffic impacts will be minimal during Project operations.

The proposed construction schedule for the Project is not expected to overlap with other large construction projects in the area. Traffic volume forecasts assumed other cumulative traffic influences, such as increases in traffic that may result from the proposed Wal-Mart, growth from BRAC realignment, and continued development both locally and regionally. Even when considering these factors, the Project is forecast to not contribute significantly to potential cumulative impacts on U.S. Highway 395 traffic in the Project vicinity. Subject to Kern County and Caltrans encroachment permits, acceptable access-related improvements and traffic management measures will be designed and implemented.

2.0 Existing Setting

The following section describes traffic related access and circulation in the project area including a description of facilities and current operating conditions.

2.0 Regional Setting

The Project site is located southwest of U.S. Highway 395 on the north and south sides of Brown Road, approximately 4.5 miles southwest of Ridgecrest, California. Regional access is provided to the Project site and the surrounding Ridgecrest area by U.S. Highway 395 (Figure 5.13-1). U.S. Highway 395 is a primary north/south regional arterial that extends northerly along the eastern side of the Sierra Nevada Mountain Range to Bishop. It extends southerly to I-15 approximately 10 miles south of Victorville. In the Project vicinity, U.S. Highway 395 is a two-lane facility with two, 12-foot travel lanes with approximately

6-foot paved shoulders and 6- to 8-foot graded shoulders on each side. The site is linked to U.S. Highway 395 via Brown Road, an existing two-lane paved road, approximately 24-feet wide, with variable graded shoulders from 4 to 10 feet on each side.

Additionally, the Project can be accessed from West Inyokern Road (SR-178), which extends westerly from the City of Ridgecrest as a four lane road to Inyokern and crosses Brown Road approximately nine miles north of the Project site. Between Ridgecrest and Brown Road, SR-178 is about 72 feet wide, including an approximately 24-foot wide unpaved median strip. It typically includes 4-foot paved shoulders with an additional 4-foot graded shoulder on each side. SR-178 is the northern-most boundary of the city of Ridgecrest.

2.1 Local Setting

As described above, regional access to the Ridgecrest area is limited to U.S. Highway 395 and SR-178. Circulation in the surrounding area other than these two facilities typically has a more rural characteristic, consisting of what are sometimes unpaved local roadways extending east and west from U.S. Highway 395.

The Project site is split by Brown Road, which extends westerly and northerly from U.S. Highway 395 through the Project site and finally intersects SR-178 approximately nine miles to the north. The intersections of Brown Road with U.S. Highway 395 and SR-178 are both at-grade with the Brown Road approaches controlled with stop signs. At U.S. Highway 395, the intersection is configured with four legs. The fourth leg is South China Lake Boulevard which extends northeasterly into the City of Ridgecrest. This intersection is currently controlled with stop signs on the South China Lake Boulevard and Brown Road approaches. There is a free-running right turn lane from northbound U.S. Highway 395 to eastbound South China Lake Boulevard. South China Lake Boulevard is a two-way facility with a 12-foot lane in each direction, and with 4-foot paved shoulders and 4- to 6-foot graded shoulders on each side.

The Project Site is approximately equally split north and south of Brown Road. The construction lay-down area will be north of Brown Road, on the edge of the site. The power block and parking lot will be on the south side of Brown Road on the westerly edge of the site.

2.2 Roadway Operating Characteristics

Existing daily traffic volumes on roadways providing access to the site are summarized below. The volumes on U.S. Highway 395 and SR-178 are from Caltrans and represent Year 2007 Average Annual Daily Traffic (AADT) volumes or the annual average of 24-hour volumes. U.S. Highway 395 currently accommodates an AADT of approximately 2,950 vehicles north of Brown Road and 4,700 to the immediate south. SR-178 currently accommodates an AADT of approximately 7,100 vehicles west of U.S. Highway 395 and 7,500 to the immediate east.

Use of the roadways is subject to the California Vehicle Code and vehicles without special permits are required to be no more than 60 feet long with a gross vehicle weight limitation of 80,000 pounds. A semi truck (tractor and semi-trailer) can have a maximum length of 65 feet. A set of doubles (tractor and two trailers) can have a maximum length of 75 feet.

Existing and future roadway operations have been characterized using a peak hour LOS analysis. LOS provides a standardized means of describing a roadway or an intersection's operation by relating traffic volumes to facility capacity. LOS is identified through a letter designation. As shown in Table 4, LOS range from A, representing the best conditions (free flow) to F, representing the worst (most congested) conditions.

Table 1 Level of Service Description for Roadway Sections

LOS	Interpretation	Nominal Range Volume to Capacity Ratio	Average Vehicle Delay at a Stop Controlled Approach
A	Low volumes; primarily free-flow operations. Density is low and vehicles can freely maneuver within the traffic stream. Drivers can maintain their desired speeds with little or no delay.	0.00 - 0.60	0 - 10
B	Stable flow with potential for some restriction of operating speeds due to traffic conditions. Maneuvering is only slightly restricted. The stopped delays are not bothersome, and drivers are not subject to appreciable tension.	0.61 - 0.70	> 10 - 15
C	Stable operations; however, the ability to maneuver is more restricted by the increase in traffic volumes. Relatively satisfactory operating speeds prevail, but adverse signed coordination or longer queues cause delays.	0.71 - 0.80	> 15 - 25
D	Approaching unstable traffic flow, where small increases in volumes could cause substantial delays. Most drivers are restricted in their ability to maneuver and in their selection of travel speeds. Comfort and convenience are low but tolerable.	0.81 - 0.90	> 25 - 35
E	Operations characterized by significant approach delays and average travel speeds of one-half to one-third free-flow speed.	0.91 - 1.00	> 35 - 50
F	Forced flow operations with high approach delays at critical signalized intersections. Speeds are reduced substantially, and stoppages may occur for short or long periods of time because of downstream congestion.	Not Meaningful	> 50
Source: Transportation Research Board, 1985, 2000.			

Existing and Baseline Year 2011 peak hour traffic volumes on roadways potentially accommodating Project-related traffic are summarized in Table 5, together with approximate capacities and LOS. The LOS presented is based on existing ratios of traffic volumes to vehicle capacity. Year 2011 is when the Project is expected to generate peak amounts of construction related traffic and associated worst-case traffic related impacts (month 11 after starting in November 2010). The Baseline Year 2011 traffic volume forecasts assume continued growth in the surrounding area commensurate with 2000 to 2007 growth levels.

Table 2 Baseline Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service (Without the Project)

Roadway/ Segment	Existing Conditions[1]				Year 2011 Base Conditions[2]			
	Travel Lanes	Volume	Capacity[3]	LOS	Travel Lanes	Volume	Capacity[3]	LOS
U.S. Highway 395 North of Brown Road	2	410[1]	2,000	A	2	508	2,000	A
U.S. Highway 395 South of Brown Road	2	660[1]	2,000	A	2	818	2,000	A
SR-178 West of U.S. Highway 395	4	750[1]	6,800	A	4	774	6,800	A
SR-178 East of U.S. Highway 395	4	820[1]	6,800	A	4	846	6,800	A
Brown Road West of U.S. Highway 395	2	14[4]	2,000	A	2	15[5]	2,000	A
China Lake Boulevard East of U.S. Highway 395	2	212[4]	2,000	A	2	219[5]	2,000	A

1 Caltrans, 2009
2 Year 2007 traffic volumes expanded to Year 2011 (estimated point of peak construction activity) at historical rates of Year 2000 to 2007 (0.8 to 6.0 percent/year dependent upon location).
3 Approximate two-way capacity in vehicles per hour

Table 6 shows that majority of roadways in the Project vicinity currently operate at LOS A (free flow). The table also shows that roadways are forecast to operate at similar, primarily free flowing conditions under Baseline Year 2011 conditions. All approaches of the intersection of Brown Road/U.S. Highway 395/ China Lake Boulevard currently operate at a LOS A/B during both the morning and evening peak commute periods and are forecast to continue to do so under Base Year 2011 conditions as indicated in Table 6.

Table 3 Existing and Baseline Peak Hour Intersection Levels of Service (Without the Project)

Intersection	Existing Conditions[1]				Year 2011 Base Conditions[2]			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay[3]	LOS	Delay[3]	LOS	Delay[3]	LOS	Delay[3]	LOS
U.S. Highway 395/Brown Road/China Lake Boulevard								
Westbound China Lake	10.0	A	10.0	A	10.2	B	10.3	B
Eastbound Brown	10.2	B	9.5	A	10.2	B	9.6	A

1 Wilson Engineering, May 2009
2 Year 2009 traffic volumes expanded to Year 2011 (estimated point of peak construction activity) at historical rates Year 2000 to 2007
3 Average Vehicle Delay in seconds.

As described earlier, the regional roadway network serving the Project site is effectively limited to the State highway network. In the Project vicinity, Caltrans traffic counts on U.S. Highway 395 show approximately 13 percent of the traffic stream consists of trucks. Similarly, approximately 35 percent of the traffic stream on SR-178 near U.S. Highway 395 is trucks.

2.3 Safety

No roadway features have been identified as potential safety hazards in the Project vicinity. U.S. Highway 395 is fully improved with one lane in each direction, with paved and graded shoulders on each side. Brown Road is a paved road with one lane in each direction and graded shoulders on either side. Caltrans actively monitors traffic operations and accident histories on U.S. Highway 395. However, the Applicant will work with Caltrans to install traffic signals at the intersection of U.S. Highway 395 and Brown Road/China Lake Boulevard in order to improve traffic safety through this intersection. Additional measures, such as advance signs with flashing lights warning of signals ahead on U.S. Highway 395, might be appropriate.

2.4 Rail and Bus Transportation

Regionally, the area has an extensive railroad network operated by Union Pacific and Burlington Northern and Santa Fe (BNSF), with major yards at Barstow and Colton. The Union Pacific mainline section extends northerly from Los Angeles County adjacent to SR-14 to Mojave where it intersects the BNSF mainline tracks extending westerly from Barstow. The mainline continues northerly and westerly over the Tehachapi Pass to Bakersfield and then turns north up the Central Valley. Union Pacific's Lone Pine Branch extends north from the mainline in Mojave toward Trona and Lone Pine (Figure 1). The Lone Pine Branch is single tracked and accommodates approximately four trains per day.

The nearest siding for offloading materials or equipment is located in the community of Mojave. It will be utilized during Project construction for the delivery of several pieces of major power generation equipment, which will then be transported by truck to the Project site.

There is no regional passenger railroad transportation in the immediate Project area. The nearest national rail passenger transportation is an Amtrak Station in Tehachapi to the southwest, which connects with Bakersfield to the west and Barstow to the east.

Regional transit service in the area is provided by Kern Regional Transit with the Mojave-Ridgecrest Route. Service is provided between the communities of Ridgecrest, Inyokern, California City and Mojave with two trips per day on Monday, Wednesday and Friday. Passengers may transfer to the CREST route, operated by the Eastern Sierra Transit Authority in Inyokern, or they can transfer to other regional carriers in Mojave.

The City of Ridgecrest together with Kern Regional Transit is operating an intercity public transit service from Ridgecrest through California City to Mojave. The Inyo-Mono County bus service now connects with the Kern regional transit system in Ridgecrest.

The City of Ridgecrest operates a dial-a-ride system in the Greater Ridgecrest Area as well as contracts for dial-a-ride, on a reservation basis only, to Randsburg and the Inyokern area. Currently, there is no fixed route system in Ridgecrest.

There is no national bus service (Greyhound or other) in Ridgecrest. The nearest Greyhound stations are in Mojave to the south, Bakersfield to the southwest, and Barstow to the southeast.

2.5 Bicycle and Pedestrian Circulation

No bicycle or pedestrian facilities are located in the Project vicinity. Bicycle and pedestrian circulation is currently limited to shoulder areas of rural U.S. Highway 395, SR-178, Brown Road and China Lake Boulevard.

2.6 Airport Operations

Six airport facilities are located in the general vicinity of the Project site: the California City Municipal Airport, the Inyokern Airport, the Trona Airport, the Mojave Air and Space Port, Edwards Air Force Base (AFB); and China Lake Naval Air Weapons Station (NAWS). The location and general characteristics of these aircraft facilities are described briefly below.

California City Municipal Airport

The California City Municipal Airport is located at 22636 Airport Way in California City, approximately 31 miles south of the Project site. The airport is open to the public and operations average 102 flights per day, of which 67 percent are transient general aviation and 33 percent are local general aviation. The airport has two runways which are 6,029 feet and 1,837 feet in length, respectively (California City 2008).

Inyokern Airport

The Inyokern Airport is located at 1669 Airport Road in Inyokern about 10 miles northwest from the Project. Inyokern Airport is open to the public and covers an area of 1,640 acres containing three paved runways ranging in length from 4,150 feet to 7,100 feet. For the 12-month period ending April 30, 2007, the airport reported 39,632 aircraft operations with an average of 108 per day. Of these, 86 percent were general aviation, 6 percent air taxi, 5 percent commercial and 3 percent military. At that time, there were 120 aircraft based at this airport, including several jets.

Trona Airport

The Trona airport is located in Trona, about 20 miles northeast from the Project. The Trona Airport is open to the public and has a single asphalt-paved runway (5,930 feet) and a helipad.

Mojave Air and Space Port

The Mojave Air and Space Port (formerly Mojave Airport) is located at 1434 Flight Line in Mojave approximately 42 miles southwest of the Project site. The Mojave Air and Space Port serves as an aircraft storage facility as well as providing facilities for aerospace testing and commercial and civilian flight. Numerous large aircraft owned by major airlines are stored onsite. Some aircraft reach the end of their useful lifetime and are scrapped at Mojave while others are refurbished and returned to active service. The Mojave Air and Space Port is served by three runways of length 3,943 feet, 7,050 feet, and 12,500 feet, respectively, and is the home of the National Test Pilot School.

Edwards Air Force Base

Edwards AFB is located on 301,000 acres in the Mojave Desert approximately 45 miles south of the Project site. Edwards AFB has 19 runways--three are paved and the other 16 are located on a dry lakebed within the base. The base is home to the Air Force Flight Test Center, the 412th Test Wing, and the 95th Air Base Wing. A vast array of test and test support aircraft are currently assigned to Edwards AFB flying test missions that evaluate everything from airframe structures and propulsion to avionics and electronic warfare. The 412th Test Wing at Edwards AFB maintains and flies an average of 90 aircraft, with upwards of 30 different aircraft designs, and performs over 7,400 missions (over 1,900 test missions) on an annual basis.

China Lake NAWS

China Lake NAWS, located near the city of Ridgecrest in the northeast Mojave Desert, approximately six miles northeast of the Project site, is an airborne weapons testing and training range operated by the United States Navy and its contractors. China Lake NAWS, situated on 1.1 million acres, has been in use since 1943. The main airfield, Armitage Field, has three runways of length 9,993 feet, 9,013 feet, and 7,702 feet, respectively.

R-2508 Special Use Airspace Complex

The R-2508 Complex encompasses 20,000 square miles within Inyo, Kern, San Bernardino, and Tulare Counties. It includes all the airspace and associated land presently used and managed by the three principal military activities in the Upper Mojave Desert region:

- Air Force Flight Test Center, Edwards AFB;
- National Training Center, Fort Irwin; and
- China Lake NAWS.

The R-2508 Complex is composed of internal restricted areas, Military Operations Areas, Air Traffic Control Assigned Airspace areas, and other special airspace. Use of these areas includes bombing ranges, supersonic corridors, low-altitude high-speed maneuvers, radar intercept areas, and refueling areas.

The State Planning and Zoning Law, includes the provisions of Senate Bill (SB) 1462, adopted in 2005, that require the military to be notified of any land use proposal located within 1,000 feet of a military installation, within special use airspace, or beneath a low level flight path. To aid in the implementation of SB 1462, the California Office of Planning and Research has drafted the R-2508 Joint Land Use Study (JLUS) to address land use issues for the R-2508 Complex.

According to the R-2508 JLUS, the Project site is located within a restricted area R-2506, a designation within the R-2508 area. Thus, the Project is within a “special use airspace” designation and beneath a “low level flight path” area. These designations require that an evaluation of land use compatibility be conducted pursuant to sections 65352, 65940, and 65944 of the California Government Code, which include the provision for consultation among the project applicant, public agency(ies), and the affected military branch(es).

3.0 Potential Impacts

This section discusses the potential impacts of the Project on traffic and transportation. The impact of the Project is measured by the potential change in traffic and transportation conditions of surrounding intersections and U.S. Highway 395.

3.0 Evaluation Methodology and Significance Criteria

For purposes of this evaluation, impacts are considered significant if the Project would:

- Cause an increase in vehicular traffic that is substantial in relation to the existing traffic load and capacity of the street system;
- Reduce a roadway segment or intersection LOS below acceptable levels, as defined below:
  - Kern County’s target for peak hour operations on County roads is LOS D or better and LOS C or better on State highways. A significant Project-related impact occurs if the addition of project-generated trips causes a County facility (roadway segment or intersection) operating at LOS D or better, to degrade to LOS E or worse or for a State facility operating at an LOS C or better, to degrade to LOS D or worse.
  - The Kern County CMP (Congestion Management Program) indicates a significant impact occurs when a County facility currently operating at an LOS D or better degrades to LOS E or F.
- The Project adversely affects traffic circulation and parking conditions in neighboring areas because of inadequate onsite parking and/or inadequate onsite circulation.

3.1 Construction Phase Impacts

Project site access will be provided via new driveway/access roads extending northerly and southerly from Brown Road. Construction of the Project would be completed over an approximately 28-month period. The Project construction work force will peak during Month 11 at approximately 633 workers per day and average approximately 405 workers over the course of construction. Construction of the transmission line is expected to require a limited crew with less than 30 workers during peak periods. The construction of the transmission line is scheduled to extend from Month 7 to Month 12 and will potentially overlap the peak of plant site construction employment. However, during Month 11, when the overall project workforce will peak, there will be a negligible amount of traffic associated with the transmission line construction (fewer than five vehicles).

A worst-case scenario, where all workers commute in automobiles with only one occupant per vehicle, yields a peak trip generation of approximately 633 inbound trips during the morning peak period and another 633 outbound trips during the evening peak hour. Under this worst-case scenario, there would be a peak of 1,266 one-way worker commute trips per day and an average of 1,204 one-way trips per day. Construction is also forecast to generate an average of approximately 100 one-way truck trips per day with a peak of approximately 140 one-way truck trips per day worst case; the peak truck travel would be during plant site foundation construction (Month 8) and would not coincide with the peak onsite worker commute time frame (Month 11).

A temporary parking area of approximately 5.5 acres would be required for construction personnel parking (assuming 350 square feet per vehicle) with additional area required for the staging/laydown of equipment, materials, and supplies. The Project will include onsite laydown and parking areas during construction, which will be relocated around the site as construction progresses. An additional pull-off lane would be constructed on Boron Road.

It is anticipated that the Project construction workforce will be drawn from the surrounding local and regional area, including from Barstow, Boron, Mojave and Tehachapi. However, the single largest source of workers is forecast to be the greater Ridgecrest area, even if only on a temporary basis. The majority of skilled workers travelling considerable distances (e.g., from the Palmdale, Lancaster or Victorville areas) are expected to stay in the Ridgecrest/Inyokern area in either motels or RVs during the week. Traffic approaching from Ridgecrest itself will generally follow China Lake Boulevard westerly across U.S. Highway 395 to Brown Road and continue westerly on Brown Road to the site. However, some traffic is forecast to follow U.S. Highway 395 southerly to Brown/China Lake Boulevard and then follow Brown Road westerly into the site. Traffic from the Boron/Barstow area is expected to follow U.S. Highway 395 north to Brown Road and into the site. Traffic from the Mojave/Lancaster/Palmdale and Tehachapi areas and points south will generally follow SR-14 north to SR-178 (West Inyokern Road) and then Brown Road southerly to the site.

Table 7 and Table 8 summarize existing and Baseline Year 2011 plus Project construction-related peak hour traffic volumes on U.S. Highway 395 and Brown Road. Peak construction traffic is forecasted to have a limited impact on surrounding roadways. U.S. Highway 395 is forecasted to continue operating acceptably. During the same construction periods, eastbound Brown Road is forecasted to continue operating at an LOS B during both the morning and evening commute periods. Similarly, Baseline Year 2011 LOS on SR-178, U.S. Highway 395, Brown Road, and China Lake Boulevard is forecasted to remain unchanged with the addition of peak construction traffic. However, the westbound approach of China Lake Boulevard would be at LOS E during the morning peak commute period at peak construction. Measures to reduce the peak arrival volumes should be considered, such as temporarily splitting the work shift to have two start times one hour apart. Other approaches could be considered such as requiring contractors to arrange employee busing, park and ride, carpooling, etc. that achieve similar substantial reductions in peak Project traffic. The Applicant will work with Caltrans to signalize the intersection, which will also help mitigate any potential impacts and improve traffic safety.

Table 4 Existing Plus Project Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service

Roadway/ Segment	Year 2011 Base Conditions[1]				Year 2011 Base plus Peak Construction Traffic Conditions[2]			
	Travel Lanes	Volume	Capacity[3]	LOS	Travel Lanes	Volume	Capacity[3]	LOS
U.S. Highway 395 North of Brown Road	2	508	2,000	A	2	540	2,000	A
U.S. Highway 395 South of Brown Road	2	818	2,000	A	2	945	2,000	A
SR-178 West of U.S. Highway 395	4	774	6,800	A	4	940	6,800	A
SR-178 East of U.S. Highway 395	4	846	6,800	A	4	910	6,800	A
Brown Road West of U.S. Highway 395	2	15	2,000	A	2	458	2,000	A
China Lake Boulevard East of U.S. Highway 395	2	219	2,000	A	2	503	2,000	A

1 Year 2007 traffic volumes expanded to Year 2011 (estimated point of peak construction activity) at historical rates of Year 2000 to 2007 (0.8 to 6.0% per year dependent upon location).

2 Year 2011 Month 11 Peak Workforce of 633 People

3 Approximate two-way capacity in vehicles per hour

Table 5 Existing Plus Project Peak Construction Peak Hour Intersection Levels of Service

Intersection	Base Year 2011 with 633-Person Workforce Arriving at Same time[1]				Base Year 2011 with Peak Hour Volume Reduced by ~50%			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay[2]	LOS	Delay[2]	LOS	Delay[2]	LOS	Delay[2]	LOS
U.S. Highway 395/Brown Road/China Lake Blvd.								
Westbound China Lake	40.4	E	18.9	C	21.4	C	18.5	C
Eastbound Brown	12.5	B	12.2	B	12.5	B	12.0	B

1 Year 2009 traffic volumes expanded to Year 2011 (estimated point of peak construction activity) at historical rates Year 2000 to 2007.

2 Average Vehicle Delay in seconds.

Project construction will involve transport to the site of several pieces of equipment that exceed roadway load or size limits and will require special permits for on-road transport. The maximum allowable load without a special permit is 80,000 pounds. Oversized equipment includes the steam turbine generator and main transformers. These items will likely be shipped by rail to Mojave or Barstow and then transported by truck to the Project plant site as described earlier. The equipment would be transported via multi-axle trucks along U.S. Highway 395 to Brown Road and into the site. Transport of this equipment will likely require the use of a truck and trailer with multiple axles, and advance and trailing warning vehicles. The moving contractor will be required to file for and obtain a permit from Caltrans following the determination of the size of the truck and configuration of the axles.

Overall, transportation impacts associated with construction of the Project should not be significant for the following reasons:

- U.S. Highway 395 has sufficient capacity to accommodate peak construction crews while continuing to operate at an LOS A during the morning and evening commute periods.
- The Applicant will take measures to reduce the number of workers arriving at the work site at the same time by measures such as staggered work shifts, or other methods such as contractor-required van pools, car pools, park and ride, etc. This will allow the westbound approach to operate at an LOS C or better during periods of peak construction activity.
- The requirements to obtain special permits to move oversize or overweight materials and equipment to and from the site would ensure use of proper vehicles, scheduling, routes, and escorts to minimize impacts.
- No bike lanes are currently present in the Project area that could be impacted by construction traffic.

3.2 Project Operation Impacts

Project operations will generate small amounts of vehicular traffic. The Project operation phase workforce is estimated at a total of 84 workers, who will cover operations on a 24 hour/seven days per week basis (e.g., peak hour weekday traffic will be less than 60 vehicles even if every employee commutes alone in their own vehicle). Existing-plus-Project operations traffic volumes will not alter existing roadway LOS and will not have significant impacts on roadway operations.

Project operations will also involve truck traffic for the delivery of materials and supplies as well as for other purposes such as the offsite shipment of wastes. Approximately three truck trips per day are expected including offsite shipments (e.g., solid waste) and deliveries of materials and supplies. An additional two deliveries of propane will also occur weekly. These volumes would not affect the LOS on roadways in the Project vicinity.

Project truck travel will include approximately a delivery every two months of hazardous materials (tanker trucks delivering Solar Field Heat Transfer Fluid). A separate Hazardous Materials report, describes the types and estimated quantities of hazardous materials to be transported to or from the Project. It is expected that hazardous materials shipments will utilize U.S. Highway 395 to access the Project site. Hazardous materials shipments will comply with applicable regulations in terms of route selection, operator training and qualifications, etc.

Transportation impacts associated with operation of the Project would not be significant for the following reasons:

- The Project will generate a maximum of 84 employee commute trips per day spread over a 24-hour period. As indicated in Tables 5 and 6, surrounding roadways are currently operating and are forecast to continue to operate well below capacity. The addition of operations traffic to the existing roadway network will not alter existing or future roadway operating characteristics (LOS).
- Truck travel and other non-employee site visits will be very limited and will typically occur during non-peak periods.
- Project design will not impact the ability to provide bike lanes anywhere in the future and Project traffic levels would not have significant adverse impacts on bike lanes that might be developed.

3.3 Potential Impacts on Aircraft Operations

This section addresses the potential impacts of Project operations on aircraft operations in the Project vicinity.

There are six airports located in the general vicinity of the Project site: the California City Municipal Airport, the Inyokern Airport, the Trona Airport, the Mojave Air and Space Port, Edwards AFB; and NAWS China Lake. Project operations potentially could cause concern with respect to aircraft flight operations in a number of ways, as listed immediately below and discussed individually further below:

- Project facility structures (e.g., transmission towers or cooling tower) conceivably could produce a hazard to low flying aircraft if the structures extending into restricted airspace;
- Project transmission lines or facility control systems' use of specific electronic frequencies potentially could cause concerns with respect to interference with aircraft communications or avionics; and
- The solar collector mirrors might be considered a potential source of glare, resulting in visual distraction to pilots.

Structure Height and Potential Air Space Obstruction

The maximum structure height for proposed Project facilities is approximately 120 feet and, as discussed in a separate Land Use repport, the Applicant has consulted with the Department of Defense (DoD) and has confirmed that Project structures comply with military air space requirements as described in FAA Advisory Circular No. 70/460-2K and the CFR.

Transmission Line Interference Potential

Transmission line interference affecting aircraft communications or avionics would be considered a hazard to aircraft operations. Transmission line-related radio-frequency interference (RFI) is one of the indirect effects of transmission line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as corona discharge and can occur within gaps between the conductor and insulators or metal fittings. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines.

The level of RFI that occurs usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is, therefore, minimized by reducing the line electric fields and locating the line away from inhabited areas. The Project transmission line would be built and maintained in keeping with standard practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and the Project line will be a 230-kV line. There is currently no available information to suggest that such issues have arisen from the operation of existing transmission lines in the general Project vicinity. Because only approximately 0.5 mile of new transmission line is needed for the Project and only 300 feet of the line would be outside the plant site boundary, it is reasonable to assume that no adverse effects would be generated by the Project.

Impacts on aviation safety would be less than significant. The Proponent will ensure that use of the electronic spectrum by the Project will not interfere with DoD activities. As discussed in Section 2.0, Project Description, the Proponent will provide information on planned use of the electronic spectrum at project facilities to the DoD, and as needed, the Proponent will modify the facility's planned frequency use based on the feedback provided by DoD.

Solar Collector Visual Distraction Potential

The Project will use solar thermal equipment comprised of arrays of parabolic trough mirrors. Each solar collector mirror is parabolic in shape and focuses the sun's energy on the glass-encased metal receiver tube containing the heat transfer fluid, thus limiting the potential for stray reflections. The receiver tube

may glow as the reflected sun rays enter the collector. The reflections from the curved surface of the receiver tube are greatly diminished in intensity from those that would be associated with a reflection of the sun in a mirror. These reflections are similar to the reflections one would observe from a body of water with waves on it if the viewer is in the right spot. The glow could be observed by a pilot if the aircraft were positioned at the right angle above the array, but it would not be a bright source of glare.

The Solar Electric Generating Station (SEGS) power plants in the Mojave Desert at Harper Lake and Kramer Junction have been operating since the 1980's and thus provide a reference for the issue of potential glare impacts to pilots. In the nearly 20 years that the SEGS facilities have been in operation, glare has not been reported as a distraction to pilots. As an additional data point, on October 4, 2007, Caltrans Aeronautics and CEC staff flew over the Kramer Junction and Harper Lake solar thermal facilities during a sunny mid-morning at about 1,500 feet above ground level and no glare was observed, although from a distance of 4 miles the solar facility appeared to be a lake or pond and reflected some sunlight.

Given this history of aircraft operations in the vicinity of nearby existing solar thermal power plants and no recorded aviation safety issues, it is not expected that the Project solar collectors will cause adverse effects on aviation operations in the Project vicinity.

3.4 Cumulative Impacts

Table 9 and Table 10 include Cumulative Year 2014 peak hour traffic forecasts for major roadways and intersection LOS in the Project vicinity; these forecasts assume continued development and growth in traffic volumes consistent with growth rates experienced on U.S. Highway 395 in the Project vicinity between 2000 and 2007. This continued development includes growth within the communities of Ridgecrest and Inyokern as well as increases in background through- or regional traffic. Increases in traffic may result from the proposed Wal-Mart Superstore, growth from BRAC realignment, and continued development both locally and regionally. In 2014, construction of the Project will be complete and the facility will have been operational for approximately one year.

Table 9 shows Baseline Year 2014 peak hour traffic forecasts for U.S. Highway 395 and projected traffic generated by operation of the Project. A comparison of the two scenarios demonstrates that the Project would not contribute significantly to potential cumulative impacts on U.S. Highway 395 traffic in the Project vicinity. Because of low current traffic volumes, significant cumulative traffic effects would not occur when also considering traffic volumes associated with continued local and regional growth. Review of Table 10 shows the same at the intersection of U.S. Highway 395 with Brown Road and China Lake Boulevard. The intersection is forecast to continue operating well (LOS B) in 2014 regardless of Project operation. The Project's impacts would not be cumulatively considerable.

Table 6 Cumulative Year 2014 Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service

Roadway/ Segment	Cumulative Year 2014 Conditions[1]				Cumulative Year 2014 plus Project Operations Traffic[2]			
	Travel Lanes	Volume	Capacity[3]	LOS	Travel Lanes	Volume	Capacity[3]	LOS
U.S. Highway 395 North of Brown Road	2	564[1]	2,000	A	2	568	2,000	A
U.S. Highway 395 South of Brown Road	2	908[1]	2,000	A	2	912	2,000	A
SR-178 West of U.S. Highway 395	4	792[1]	6,800	A	4	794	6,800	A
SR-178 East of U.S. Highway 395	4	866[1]	6,800	A	4	866	6,800	A
Brown Road west of U.S. Highway 395	2	15[1]	2,000	A	2	71	2,000	A
China Lake Boulevard East of U.S. Highway 395	2	224[1]	2000	A	2	270	2,000	A

1 Year 2007 traffic volumes expanded to Year 2014 (estimated point of peak construction activity) at historical rates of Year 2000 to 2007 (0.8 to 6.0% per year dependent upon location). This scenario reflects cumulative effects of completion of the cumulative projects identified in Section 5.1.

2 Year 2014 Project operational for a year.

3 Approximate two-way capacity in vehicles per hour.

Table 7 Baseline 2014 and Baseline Plus Project Operations Peak Hour Intersection Levels of Service

Intersection	Base Year 2014 [1]				Base Year 2014 with Project Operational[2]			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay[3]	LOS	Delay[3]	LOS	Delay[3]	LOS	Delay[3]	LOS
U.S. Highway 395/Brown Road/China Lake Boulevard								
Westbound China Lake	10.4	B	10.4	B	11.1	B	10.9	B
Eastbound Brown	10.1	B	9.7	A	10.1	B	10.0	B

1 Year 2009 traffic volumes expanded to Year 2014 (estimated point of peak construction activity) at historical rates Year 2000 to 2007. This scenario reflects cumulative effects of completion of Wal-Mart, BRAC etc

2 Assumes project fully operational in Year 2014.

3 Average Vehicle Delay in seconds.

4.0 Mitigation Measures

Although no significant adverse traffic or transportation impacts are expected during Project construction or operation, the following measures are proposed to minimize potential adverse but non-significant impacts during Project construction. No mitigation measures are required or proposed during Project operations.

TR-1 The Project owner will develop and implement a construction phase Traffic Management Plan (TMP) in consultation with Caltrans and Kern County for the roadway network potentially affected by construction activities at the plant site and offsite linear facilities.

TR-2 The Project owner will conduct construction activities in accordance with Caltrans and other applicable limitations on vehicle sizes and weights, Construction Excavation Permits obtained from the Kern County, Encroachment Permits from Caltrans, as well as permits and licenses from the California Highway Patrol and Caltrans for the transport of hazardous substances.

TR-3 The Project owner will split the arrival of the workforce in the morning into two parts arriving one hour or more apart when the total number of workers on site will exceed 300.

5.0 References

California Department of Transportation (Caltrans). 1996. Traffic Manual.

Caltrans. 2007. Traffic Volumes on California State Highways.

Kern County General Plan, Circulation Element.

Sergeant Headrick, Hazmat Route Coordinator, CHP. Personal communication, Milan Gill, Wilson Engineering. April 17, 2009.

Taylor, Damon, Permits Office, Kern County Roads Department. Personal communication, Milan Gill, Wilson Engineering, May 26, 2009.

Transportation Research Board, 1994, 1997, 2000. Highway Capacity Manual, Special Report 209, Washington D.C.

Winzenread, Stephen, Permits, California Department of Transportation (Caltrans) Personal communication, Milan Gill, Wilson Engineering. April 17, 2009.

6.0 Appendices

6.1 Traffic Counts

WILTEC

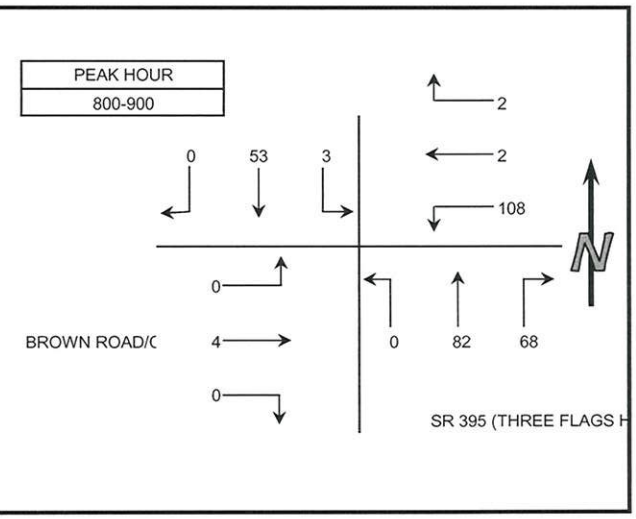
Phone: (626) 564-1944 Fax: (626) 564-1944 E-mail: info@wiltecusa.com

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: WILSON ENGINEERING
PROJECT: RIDGECREST TRAFFIC COUNTS
DATE: THURSDAY MAY 7, 2009
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S SR 395 (THREE FLAGS HIGHWAY)
E/W BROWN ROAD/CHINA LAKE BOULEVARD
CITY: RIDGECREST

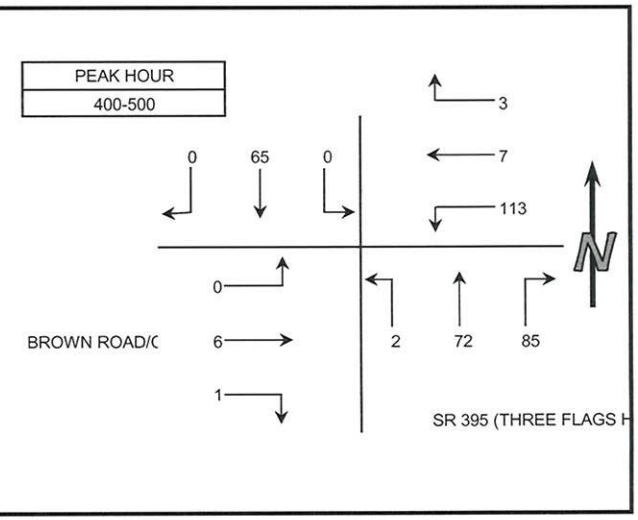
15 MIN COUNTS — 7:00 AM TO 9:00 AM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	0	5	0	1	3	19	8	8	0	0	0	0	44
715-730	0	6	0	0	6	13	13	21	1	0	0	0	60
730-745	0	4	3	1	1	20	12	16	0	0	1	0	58
745-800	0	12	0	0	0	20	26	22	0	0	2	0	82
800-815	0	13	0	1	0	28	11	11	0	0	2	0	66
815-830	0	11	3	1	0	26	16	21	0	0	1	0	79
830-845	0	14	0	0	2	27	15	28	0	0	0	0	86
845-900	0	15	0	0	0	27	26	22	0	0	1	0	91
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	0	27	3	2	10	72	59	67	1	0	3	0	244
715-815	0	35	3	2	7	81	62	70	1	0	5	0	266
730-830	0	40	6	3	1	94	65	70	0	0	6	0	285
745-845	0	50	3	2	2	101	68	82	0	0	5	0	313
800-900	0	53	3	2	2	108	68	82	0	0	4	0	322



15 MIN COUNTS — 4:00 PM TO 6:00 PM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	0	23	0	1	4	30	18	18	0	0	1	0	95
415-430	0	15	0	0	2	19	30	27	1	1	2	0	97
430-445	0	18	0	1	0	39	20	11	1	0	0	0	90
445-500	0	9	0	1	1	25	17	16	0	0	3	0	72
500-515	0	17	0	1	1	22	21	18	0	0	3	0	83
515-530	0	18	4	1	0	29	28	18	0	0	0	0	98
530-545	0	13	0	3	4	19	22	21	0	0	3	0	85
545-600	0	16	0	4	5	11	20	14	0	1	2	0	73
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	0	65	0	3	7	113	85	72	2	1	6	0	354
415-515	0	59	0	3	4	105	88	72	2	1	8	0	342
430-530	0	62	4	4	2	115	86	63	1	0	6	0	343
445-545	0	57	4	6	6	95	88	73	0	0	9	0	338
500-600	0	64	4	9	10	81	91	71	0	1	8	0	339



6.2 Level of Service Calculations

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2009
Analysis Time Period	am		

Project Description AM Existing	
East/West Street: Brown/China Lake	North/South Street: US 395
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	82		0	53	0
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	6	0	108	2	2
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	6	0	108	2	2
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	53	0	0	82	68
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	0	0	110		2	6		0
C (m) (veh/h)	1566	1444	831		983	697		1020
v/c	0.00	0.00	0.13		0.00	0.01		0.00
95% queue length	0.00	0.00	0.46		0.01	0.03		0.00
Control Delay (s/veh)	7.3	7.5	10.0		8.7	10.2		8.5
LOS	A	A	A		A	B		A
Approach Delay (s/veh)	--	--	10.0			10.2		
Approach LOS	--	--	A			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2011
Analysis Time Period	AM		

Project Description AM 2011 Base	
East/West Street: Brown/China Lake	North/South Street: US 395
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	92	0	3	59	0
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	6	0	110	2	2
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	6	0	110	2	2
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	3	59	0	0	92	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	0	3	112		2	6		0
C (m) (veh/h)	1558	1515	803		971	737		1012
v/c	0.00	0.00	0.14		0.00	0.01		0.00
95% queue length	0.00	0.01	0.48		0.01	0.02		0.00
Control Delay (s/veh)	7.3	7.4	10.2		8.7	9.9		8.6
LOS	A	A	B		A	A		A
Approach Delay (s/veh)	--	--	10.2			9.9		
Approach LOS	--	--	B			A		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2009
Analysis Time Period	AM		

Project Description AM 2014 PROJ

East/West Street: Brown/China Lake	North/South Street: US 395
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	104	0	3	70	0
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	6	0	114	2	2
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	6	0	114	2	2
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	3	70	0	0	104	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	0	3	116		2	6		0
C (m) (veh/h)	1544	1500	776		956	716		998
v/c	0.00	0.00	0.15		0.00	0.01		0.00
95% queue length	0.00	0.01	0.52		0.01	0.03		0.00
Control Delay (s/veh)	7.3	7.4	10.5		8.8	10.1		8.6
LOS	A	A	B		A	B		A
Approach Delay (s/veh)	--	--	10.4			10.1		
Approach LOS	--	--	B			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	jw
Agency/Co.	CEC
Date Performed	6/05/2009
Analysis Time Period	PM

Site Information

Intersection	Brown/ US 395
Jurisdiction	Kern CO
Analysis Year	2009

Project Description *PM Existing*

East/West Street: *Brown/China Lake* | North/South Street: *US 395*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	72	0	0	53	0
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	4	1	113	7	3
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	4	1	113	7	3
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	53	0	2	72	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	2	0	120		3	4		1
C (m) (veh/h)	1566	1541	835		996	764		1020
v/c	0.00	0.00	0.14		0.00	0.01		0.00
95% queue length	0.00	0.00	0.50		0.01	0.02		0.00
Control Delay (s/veh)	7.3	7.3	10.0		8.6	9.7		8.5
LOS	A	A	B		A	A		A
Approach Delay (s/veh)	--	--	10.0			9.5		
Approach LOS	--	--	A			A		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	jw
Agency/Co.	CEC
Date Performed	6/05/2009
Analysis Time Period	PM

Site Information

Intersection	Brown/ US 395
Jurisdiction	Kern CO
Analysis Year	2011

Project Description *PM 2011 Base*

East/West Street: *Brown/China Lake* | North/South Street: *US 395*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	81	0	0	72	0
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	4	1	115	7	3
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	4	1	115	7	3
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	72	0	2	81	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	2	0	122		3	4		1
C (m) (veh/h)	1541	1529	802		985	738		996
v/c	0.00	0.00	0.15		0.00	0.01		0.00
95% queue length	0.00	0.00	0.53		0.01	0.02		0.00
Control Delay (s/veh)	7.3	7.4	10.3		8.7	9.9		8.6
LOS	A	A	B		A	A		A
Approach Delay (s/veh)	--	--	10.3			9.6		
Approach LOS	--	--	B			A		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2009
Analysis Time Period	PM		

Project Description PM Base 2014	
East/West Street: Brown/China Lake	North/South Street: US 395
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	91	0	0	70	0
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	4	1	119	7	3
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	4	1	119	7	3
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	70	0	2	91	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	2	0	126		3	4		1
C (m) (veh/h)	1544	1517	793		972	730		998
v/c	0.00	0.00	0.16		0.00	0.01		0.00
95% queue length	0.00	0.00	0.56		0.01	0.02		0.00
Control Delay (s/veh)	7.3	7.4	10.4		8.7	10.0		8.6
LOS	A	A	B		A	A		A
Approach Delay (s/veh)	--	--	10.4			9.7		
Approach LOS	--	--	B			A		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	jw
Agency/Co.	CEC
Date Performed	6/05/2009
Analysis Time Period	AM

Site Information

Intersection	Brown/ US 395
Jurisdiction	Kern CO
Analysis Year	2011

Project Description: AM 2011 Base + Const

East/West Street: Brown/China Lake | North/South Street: US 395

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	127	92	0	3	59	32
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	6	0	110	286	2
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	6	0	110	286	2
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	3	59	32	127	92	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	127	3	396		2	6		0
C (m) (veh/h)	1517	1515	474		971	486		1012
v/c	0.08	0.00	0.84		0.00	0.01		0.00
95% queue length	0.27	0.01	8.25		0.01	0.04		0.00
Control Delay (s/veh)	7.6	7.4	40.6		8.7	12.5		8.6
LOS	A	A	E		A	B		A
Approach Delay (s/veh)	--	--	40.4			12.5		
Approach LOS	--	--	E			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	jw
Agency/Co.	CEC
Date Performed	6/05/2009
Analysis Time Period	AM

Site Information

Intersection	Brown/ US 395
Jurisdiction	Kern CO
Analysis Year	2011

Project Description: AM 2011 Base + Const + WB Separate thru

East/West Street: Brown/China Lake | North/South Street: US 395

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	127	92	0	3	59	32
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	6	0	110	286	2
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	6	0	110	286	2
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	3	59	32	127	92	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	1	1	1
Configuration	LT		R	L	T	R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	L	T	R	LT		R
v (veh/h)	127	3	110	286	2	6		0
C (m) (veh/h)	1517	1515	497	466	971	486		1012
v/c	0.08	0.00	0.22	0.61	0.00	0.01		0.00
95% queue length	0.27	0.01	0.84	4.04	0.01	0.04		0.00
Control Delay (s/veh)	7.6	7.4	14.3	24.2	8.7	12.5		8.6
LOS	A	A	B	C	A	B		A
Approach Delay (s/veh)	--	--	21.4			12.5		
Approach LOS	--	--	C			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2011
Analysis Time Period	PM		

Project Description PM 2011 Base + Const	
East/West Street: Brown/China Lake	North/South Street: US 395
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	81	0	0	72	0
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	32	284	127	115	7	3
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	32	284	127	115	7	3
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	72	0	2	81	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	2	0	122		3	316		127
C (m) (veh/h)	1541	1529	375		985	744		996
v/c	0.00	0.00	0.33		0.00	0.42		0.13
95% queue length	0.00	0.00	1.39		0.01	2.13		0.44
Control Delay (s/veh)	7.3	7.4	19.2		8.7	13.4		9.1
LOS	A	A	C		A	B		A
Approach Delay (s/veh)	--	--	18.9			12.2		
Approach LOS	--	--	C			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2011
Analysis Time Period	PM		

Project Description PM 2011 Base + Const + WB Thru

East/West Street: Brown/China Lake	North/South Street: US 395
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	81	0	0	72	0
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR (veh/h)	35	315	141	127	7	3
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	32	284	127	115	7	3
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR (veh/h)	0	80	0	2	90	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	1	1	1
Configuration	LT		R	L	T	R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	L	T	R	LT		R
v (veh/h)	2	0	127	7	3	350		141
C (m) (veh/h)	1531	1518	317	722	973	727		986
v/c	0.00	0.00	0.40	0.01	0.00	0.48		0.14
95% queue length	0.00	0.00	1.86	0.03	0.01	2.64		0.50
Control Delay (s/veh)	7.4	7.4	23.7	10.0	8.7	14.5		9.3
LOS	A	A	C	B	A	B		A
Approach Delay (s/veh)	--	--	22.7			13.0		
Approach LOS	--	--	C			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2014
Analysis Time Period	AM		

Project Description *Base AM 2014 + Proj Ops*

East/West Street: *Brown/China Lake* | North/South Street: *US 395*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	4	104	0	3	70	4
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	1	18	1	114	36	2
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	18	1	114	36	2
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	3	70	4	4	104	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	4	3	150		2	19		1
C (m) (veh/h)	1538	1500	735		956	708		998
v/c	0.00	0.00	0.20		0.00	0.03		0.00
95% queue length	0.01	0.01	0.76		0.01	0.08		0.00
Control Delay (s/veh)	7.3	7.4	11.1		8.8	10.2		8.6
LOS	A	A	B		A	B		A
Approach Delay (s/veh)	--	--	11.1			10.1		
Approach LOS	--	--	B			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	jw	Intersection	Brown/ US 395
Agency/Co.	CEC	Jurisdiction	Kern CO
Date Performed	6/05/2009	Analysis Year	2014
Analysis Time Period	PM		

Project Description PM Base 2014 + Proj Ops	
East/West Street: Brown/China Lake	North/South Street: US 395
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	91	0	0	70	1
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	4	38	5	119	19	3
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	38	5	119	19	3
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	70	1	3	91	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R	LT		R
v (veh/h)	3	0	138		3	42		5
C (m) (veh/h)	1542	1517	738		972	732		998
v/c	0.00	0.00	0.19		0.00	0.06		0.01
95% queue length	0.01	0.00	0.68		0.01	0.18		0.02
Control Delay (s/veh)	7.3	7.4	11.0		8.7	10.2		8.6
LOS	A	A	B		A	B		A
Approach Delay (s/veh)	--	--	10.9			10.0		
Approach LOS	--	--	B			B		

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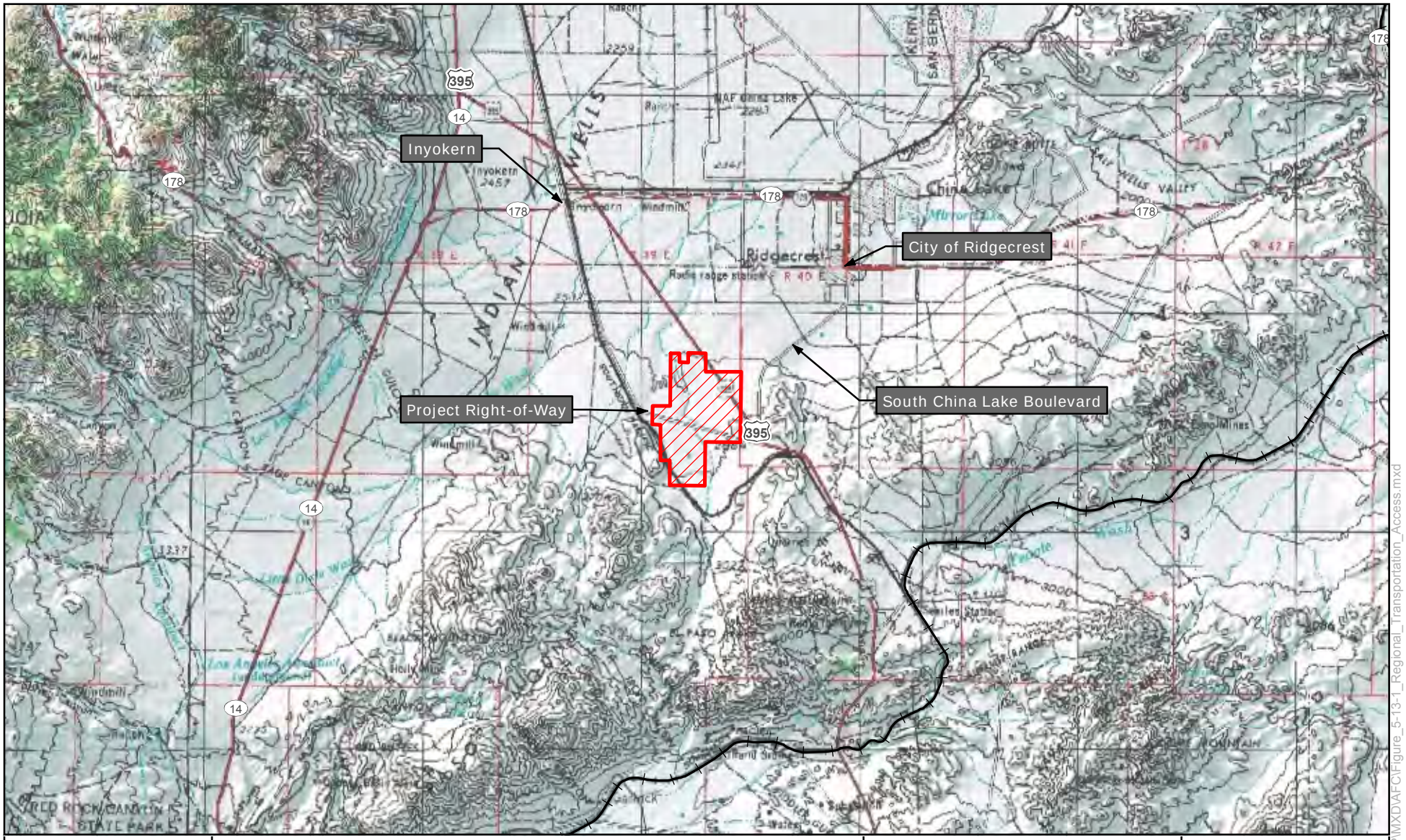
Traffic Study Figures



Map Location

Legend

Project Right-of-Way

Railroad

1:250,000

0 4 8 12 Miles

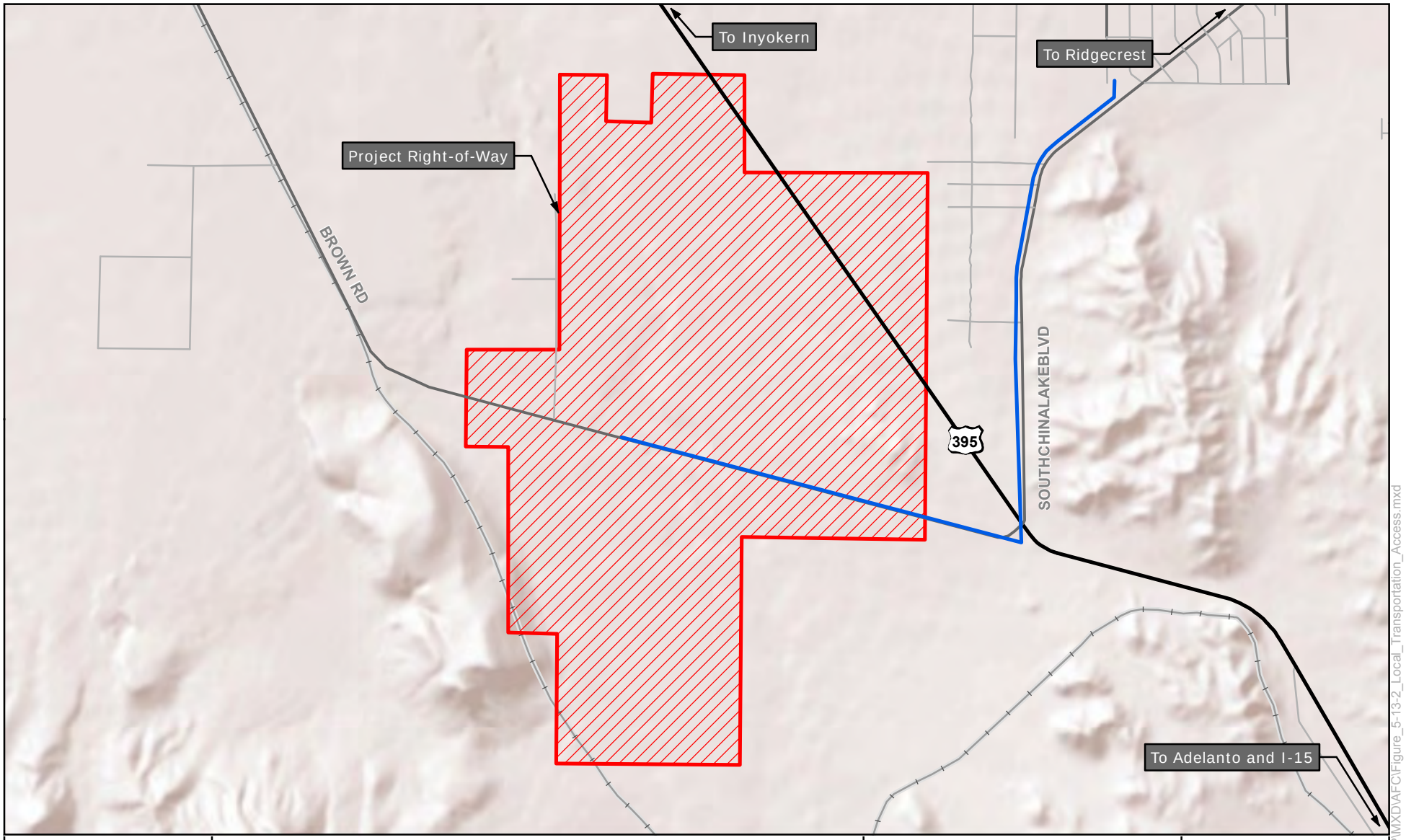
Ridgecrest Solar Power Project
Figure 5.13-1
Regional Transportation Access

Solar Millennium

AECOM

Date: September 2009

Y:\Projects\Solar_Millennium\RSPP\MXD\AFC\Figure_5-13-1_Regional_Transportation_Access.mxd



Map Location

Legend

- Project Right-of-Way
- Highway
- Major Road
- Local or Rural Road
- Railroad
- Water Line

1 inch equals 4,000 feet

0 4,000 8,000 12,000 Feet

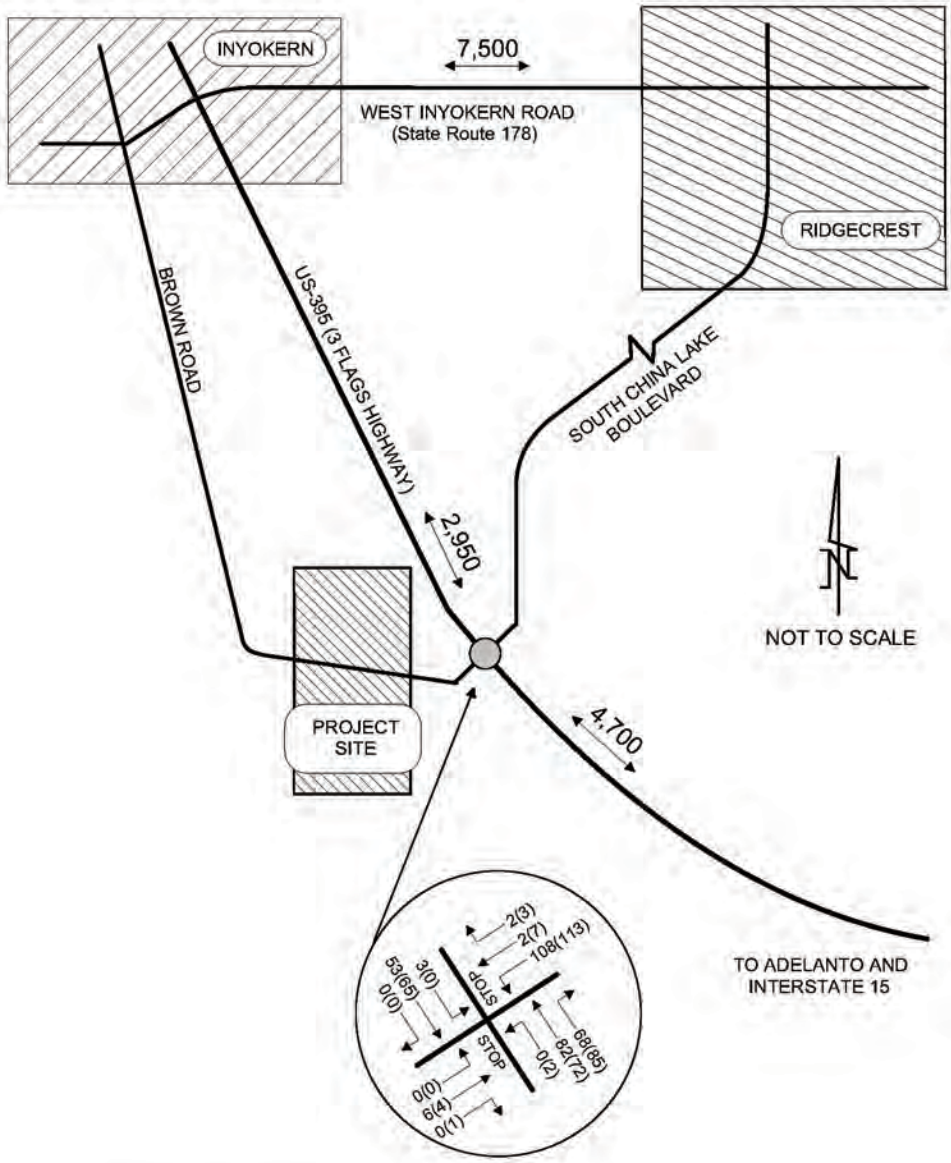
Ridgecrest Solar Power Project
Figure 5.13-2
Local Transportation Access

Solar Millennium

AECOM

Date:Sept. 2009

Y:\Projects\Solar_Millennium\RSPP\MXD\AFC\Figure_5-13-2_Local_Transportation_Access.mxd



Legend
000 = AM Peak Hour
(000) = PM Peak Hour
000 = Two Way Daily

Map Location

Not to Scale

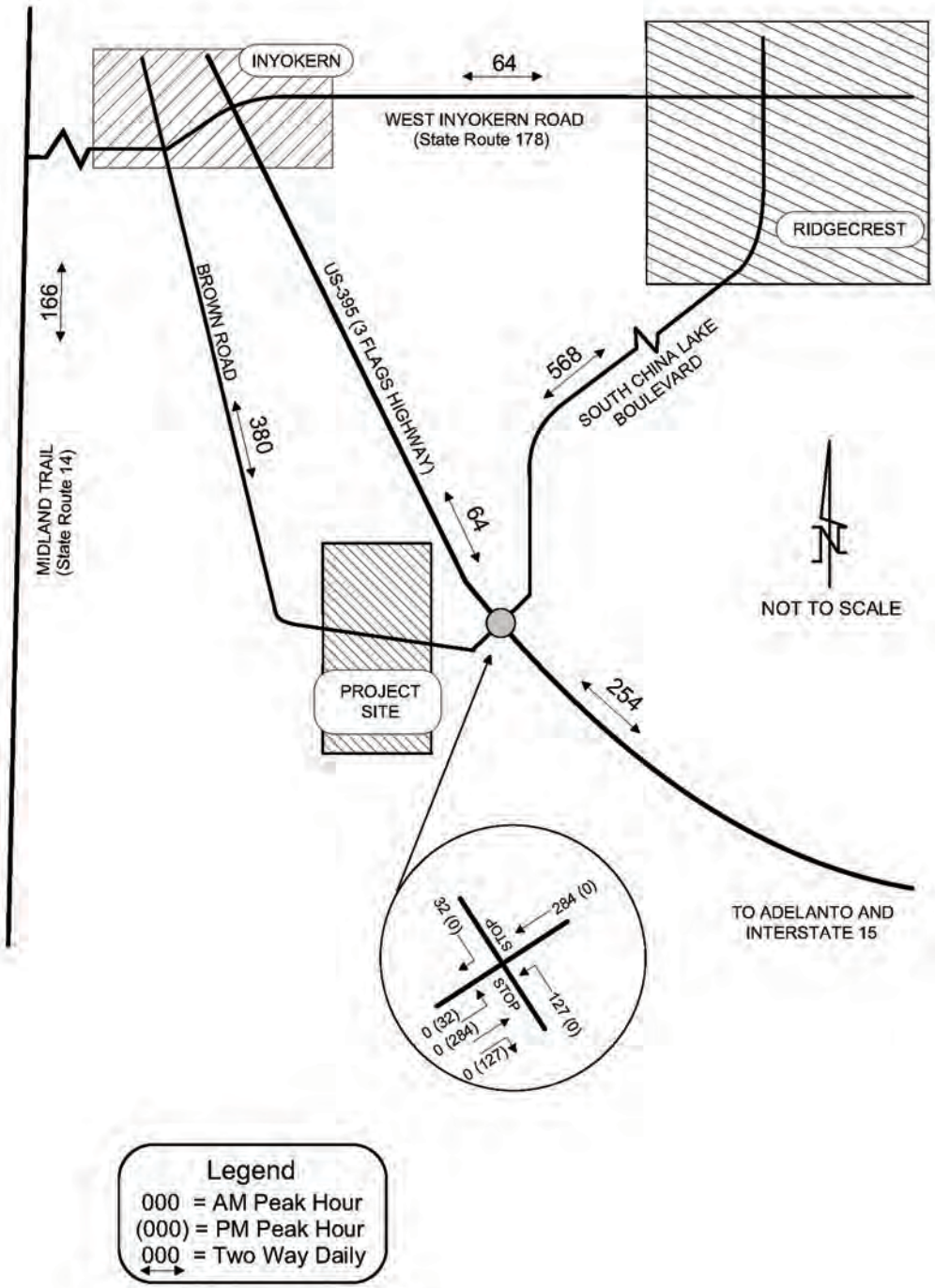
Ridgecrest Solar Power Project

Figure 5.13-3
Existing Traffic Volumes

Solar Millennium

AECOM

Date: September 2009



Legend
000 = AM Peak Hour
(000) = PM Peak Hour
000 = Two Way Daily

Map Location

Not to Scale

Ridgecrest Solar Power Project

Figure 5.13-4
Peak Month Construction Traffic

Solar Millennium

AECOM

Date: September 2009

DR-TSE-214

Information Required:

Submit a revised and complete Transition Cluster Phase 1 Interconnection study report performed by California ISO in coordination with SCE for the interconnection of the 250 MW net RSPP generation output to the SCE system based on 2013 summer peak and off-peak system base cases. The study must include a power flow, transient stability and short circuit analyses with a mitigation plan for all identified downstream facilities where reliability criteria violations would occur. The study report must include all appendices.

Response:

The requested information will be provided separately under confidential cover.

The completed Project will change the visual appearance of the area and the views from three KOPs (KOP-2, KOP-11, and KOP-14) are considered adverse impacts. However, due to the following conditions, overall visual impacts of the Project are less than significant. When viewed from eye level, during most hours of the day, the solar fields would be relatively unobtrusive, with the power block visible above the solar fields. Power block structures, tanks and buildings would have neutral desert colors and non-reflective surfaces to minimize their contrast with the natural background. From elevated locations, because of the movement of the sun and the changing orientation of the mirrors to track the sun's movement, the view would change over time. In afternoon hours when viewed from distant elevated locations to the southwest, the reflective surface of the mirror would be oriented toward the viewer. At these times, on a sunny day, the solar collectors would create a visual impression that more closely resembles a body of water than a power plant or other industrial facility because the collectors would be reflecting the blue sky. On a cloudier day, the visual impression would appear grayer. In the morning hours viewed from the same elevated locations to the southwest, viewers would have the non-reflective backs of the mirrors toward them, in which case the visual contrast with the surrounding environment would be considerably less. The China Lake Naval Weapons Station and associated hanger infrastructure are visible in the background view of northeast facing KOPs and represent significant modifications to the visual environment. Finally, viewers may find visually interesting this facility that will contribute to important societal goals (providing renewable energy and reducing greenhouse gases).

DR-VIS-215

Information Required:

For the benefit of the analysis and readers, please review the visibility analysis presented in the AFC and revise Figure 5.15-1 to show a more accurate depiction of the Project's regional visibility. Map coverage can be expanded up to 25 miles distant from the Project site due to the availability of distant, elevated viewing opportunities. Also, if the assumed viewing height is different than 5.5 feet relative to ground level, please identify what the viewing height is.

Response:

The visibility analysis (using a viewing height of 5.5 feet above ground level), has been extended out to 25 miles from the Project site. Please refer to the revised Figure 5.15-1 in Attachment DR-VIS-Figures at the end of this section.

DR-VIS-216

Information Required:

Please show the location of the transmission line route and substation in both the map area and legend of Figure 5.15-2.

Response:

Please refer to the revised Figure 5.15-2 in Attachment DR-VIS-Figures at the end of this section.

DR-VIS-217

Information Required:

Please establish a new KOP from the hilltop immediately adjacent and to the southwest of the Project site in the vicinity of coordinates – Latitude: 35o 33' 7.14" N, Longitude: 117o 46' 14.36" W, viewing to the east-northeast and provide a new KOP analysis and visual simulation (see Attachment 2 for perspective view guidance).

Response:

The approach to evaluating the visual impacts of the Project is based on views from Key Observation Points (KOPs). KOPs are view receptors that are sensitive and/or considered representative. Views from these locations are the framework for comparing existing visual conditions with photographic simulations of a proposed project.

Based on guidance from the Bureau of Land Management (BLM), ten KOPs were selected to evaluate the Project's existing conditions and potential visual impacts. The CEC staff's data requests identified four additional KOPs.

Due to the reconfiguration of the Project layout, updated KOP analyses and simulations for the original ten KOPs (KOPs 1-10) are presented at the end of this section in Attachment DR-VIS-Figures. The analyses for the four new KOPs are provided in Data Responses DR-VIS-217, VIS-219, VIS-221, and VIS-224; the simulations for the new KOPS are presented in Attachment DR-VIS-Figures.

The 14 KOPs (see Figure 5.15-2) are as follows:

- KOP-1 U.S. Highway 395 Northbound
- KOP-2 U.S. Highway 395 Southbound
- KOP-3 Brown Road
- KOP-4 Northern Residence on Calvert Boulevard
- KOP-5 Middle Residence on Calvert Boulevard
- KOP-6 Residence on Clone Avenue
- KOP-7 BLM Recreation Road
- KOP-8 Railroad Bed Bike Trail (South)
- KOP-9 Railroad Bed Bike Trail (Southeast)
- KOP-10 BLM Recreation Area
- KOP-11 BLM Ridgeline (West)
- KOP-12 Brown Road Westbound
- KOP-13 Brown Road Eastbound
- KOP-14 Railroad Bed Bike Trail (West)

Existing visual conditions of the view from each KOP were evaluated and documented during fieldwork conducted in June and December 2009.

The Project area, including the Project site, was designated as interim Visual Resources Management (VRM) Class III. The BLM management objective of Class III areas is to partially retain the existing character of the landscape, and the permissible level of visual change is moderate (moderate contrast). Management activities may attract attention, but should not dominate the view of the casual observer. The scenic quality, viewer sensitivity ratings and distance zones for the project area are: Scenic Quality: C (Low); Viewer Sensitivity: High; and, Distance Zone: Foreground-middleground.

KOP-11 BLM Ridgeline

KOP-11 is located approximately 0.5 miles west of the Project site, approximately 1.5 miles southwest of the power block, and 0.5 miles west of the transmission line (Figure 5.15-15a). The foreground-middleground views from KOP-11 are typical of the visual character of the natural landscape of the Mojave Desert with the addition of electrical transmission structures. The background view is composed of the valley floor and distant mountain range to the west. The visual quality of this view is moderate; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and human-built landscape is minimal. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a low number of recreational viewers (hikers) in the foreground-middleground distance zone, the level of visual sensitivity is low to moderate.

Impacts KOP-11 BLM Ridgeline

The simulation of the view of the Project site and facilities from KOP-11 is shown in Figure 5.15-15b; the existing view is shown in Figure 5.15-15a. The view from KOP-11 is elevated as compared to the Project site (the site is at a lower elevation than the KOP). In this foreground-middleground view, the prominent visible features of the Project would be the solar collectors, power block structure and substation. The Project site features would be visible in the foreground-middleground and would present a moderate to high level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Due to their distance and location, the power block would be substantially visible from this KOP. The transmission line structures would also be visible from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

Therefore, the effect of the RSPP on the overall character of the view is expected to be moderate to high. The general level of visual quality of the view from KOP-11 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have a strong effect on the overall intactness of the view, and would have a moderate effect on the visual unity of the composition of the landscape. Due to the magnitude of the project in the view from KOP-11 and its strong contrast as compared with the existing scene, the overall impact on visual resources would be significant when the Project is considered in the context of its surroundings.

The KOP-11 BLM Visual Contrast Rating Form is provided at the end of this section in an Attachment titled Contrast Rating Forms.

DR-VIS-218

Information Required:

> In order to present a simulation that more accurately captures the actual viewing experience from the new Hilltop KOP, please present the existing view photograph and visual simulation as 11” x 17” images at a “life-size scale” when the image is held approximately 18 inches from the eye, so that the landscape and built features in the images match the actual scale of the features in the landscape (when the paper image is viewed at a distance of approximately 18 inches from the eye).

Response:

Please see new Figure 5.15-15a (existing condition) and Figure 5.15-15b (simulated condition), provided in Attachment DR-VIS-Figures at the end of this section.

DR-VIS-219

Information Required:

Please establish a new key viewpoint from westbound Brown Road within the Project site in the vicinity of coordinates – Latitude: 35o 33' 21.47" N, Longitude: 117o 44' 41.82" W, viewing to the west to capture a foreground view of the power block facilities and provide a new KOP analysis and visual simulation (see Attachments 3 and 4 for foreground and perspective view guidance).

Response:

KOP-12 Brown Road Westbound

KOP-12 is located approximately 0.5 miles east of the Project site, approximately 1.4 miles east of the power block, and 1.6 miles east of the transmission line (Figure 5.15-16a). This KOP has been moved to the edge of the project in order to represent the approach to the project by motorists, hikers, and bicyclists. The foreground-middleground views from KOP-12 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the valley floor and distant mountain range to the west. The visual quality of this view is moderate; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and human-built landscape is minimal. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists, hikers and motorists) in the foreground-middleground distance zone, the level of visual sensitivity is high.

<u>Impacts KOP-12 Brown Road Westbound</u>

The simulation of the view of the Project site and facilities from KOP-12 is shown in Figure 5.15-16b; the existing view is shown in Figure 5.15-16a. The view from KOP-12 is at eye-level as compared to the Project site. In this foreground-middleground view, the prominent visible features of the Project would be the solar collectors, power block structure and substation. The Project site features would be visible in the foreground-middleground and would present a moderate to high level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Due to the distance and location, the power block would be substantially visible from this KOP. The transmission line structures would also be visible from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the RSPP on the overall character of the view is expected to be moderate. The general level of visual quality of the view from KOP-12 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have a strong effect on the overall intactness of the view, and would have a moderate effect on the visual unity of the composition of the landscape. The Project's 30-foot high wind screen fence and the presence of existing foreground-middleground transmission structures would help to ameliorate the effects of the RSPP transmission line and solar collectors. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-12 would be less than significant when the Project is considered in the context of its surroundings.

The KOP-12 BLM Visual Contrast Rating Form is provided at the end of this section in the Attachment Contrast Rating Forms.

DR-VIS-220

Information Required:

In order to present a simulation that more accurately captures the actual viewing experience from the new Brown Road West KOP, please present the existing view photograph and visual simulation as 11" x 17" images at a "life-size scale" when the image is held approximately 18 inches from the eye, so that the landscape and built features in the images match the actual scale of the features in the landscape (when the paper image is viewed at a distance of approximately 18 inches from the eye).

Response:

Please see Figure 5.16-16a (existing condition) and Figure 5.15-16b (simulated condition), provided in Attachment DR-VIS-Figures at the end of this section.

DR-VIS-221

Information Required:

Please establish a new key viewpoint from eastbound Brown Road within the Project site in the vicinity of coordinates – Latitude: 35o 33' 28.85" N, Longitude: 117o 45' 16.88" W, viewing to the north-northeast to capture a foreground view of the north solar field west wind fence and provide a new KOP analysis and visual simulation.

Response:

KOP-13 Brown Road Eastbound

KOP-13 is located approximately 0.1 miles west of the Project site, approximately 0.8 miles southwest of the power block (not visible from this KOP), 0.2 miles northwest of the Project switchyard, and 0.1 miles west of the RSPP transmission line (Figure 5.15-17a). This KOP has been moved to the edge of the Project in order to represent the approach to the Project by motorists, hikers, and bicyclists. The foreground-middleground views from KOP-13 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the valley floor and distant mountain range to the west. The visual quality of this view is moderate; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and human-built landscape is minimal. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists, hikers and motorists) in the foreground-middleground distance zone, the level of visual sensitivity is high.

Impacts KOP-13 Brown Road Eastbound.

The simulation of the view of the Project site and facilities from KOP-13 is shown in Figure 5.15-17b; the existing view is shown in Figure 5.15-17a. The view from KOP-13 is at eye-level as compared to the Project site (i.e., the KOP and the Project are at the same elevation). In this near foreground-middleground view, the prominent visible features of the Project would be the transmission line, switchyard, wind fences, solar collectors, and power block structures. The Project site features would be visible in the near foreground-middleground and would present a moderate to high level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. As noted above, the power block would not be substantially visible from this KOP. The transmission line structures would be visible from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree. Therefore, the effect of the RSPP on the overall character of the view is expected to be moderate.

The general level of visual quality of the view from KOP-13 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have a strong effect on the overall intactness of the view, and would have moderate effect on the visual unity of the composition of the landscape. The 30-foot high wind screen fence and presence of existing foreground-middleground transmission structures would help to ameliorate the effects of the transmission line and solar collectors. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-13 would be less than significant when the Project is considered in the context of its surroundings.

The KOP-13 BLM Visual Contrast Rating Form is provided at the end of this section in the Attachment titled Contrast Rating Forms.

DR-VIS-222

Information Required:

> In order to present a simulation that more accurately captures the actual viewing experience from the new Brown Road North-Northeast KOP, please present the existing view photograph and visual simulation as 11” x 17” images at a “life-size scale” when the image is held approximately 18 inches from the eye, so that the landscape and built features in the images match the actual scale of the features in the landscape (when the paper image is viewed at a distance of approximately 18 inches from the eye).

Response:

Please see Figure 5.17-a (existing condition) and Figure 5.15-17b (simulated condition), provided in Attachment DR-VIS-Figures at the end of this section.

DR-VIS-223

Information Required:

Please provide a detailed description and diagram of the wind fence including the fence color.

Response:

The wind fences would be installed to protect the solar arrays from high wind loads. The wind fences would be 30 feet tall and would be placed along the east and west boundaries of each solar field. The wind fences would be made of steel A-frames and a screen mesh tarpaulin, black in color, much like that used to screen tennis courts. The fence is separated in 4-meter sections, which is the size of the A-frames supporting the wire mesh. The wire mesh is fixed on horizontal steel ropes.

Figure DR-VIS-223-1, provided at the end of this section, illustrates the framing of the wind fence prior to installation of the horizontal steel ropes and wire mesh. The photograph (DR-VIS-223-2) and diagram (DR-VIS-223-3), also provided at the end of this section, illustrate the appearance of the wind fence.

DR-VIS-224

Information Required:

Please establish a new key viewpoint on the Bike Trail in the immediate vicinity of coordinates – Latitude: 35o 32' 27.86" N, Longitude: 117o 45' 34.38" W, viewing to the northeast and provide a new key viewpoint analysis and visual simulation.

Response:

KOP-14 Railroad Bed Bike Trail (West)

KOP-14 is located approximately 0.1 miles west of the Project site and 0.3 miles west of the nearest wind fence, approximately 2.4 miles southwest of the power block, and 1.0 miles southeast of the transmission line (Figure 5.15-18a). The foreground-middleground views from KOP-14 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the valley floor. The visual quality of this view is low; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and human-built landscape is moderate. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists and hikers) in the foreground-middleground distance zone, the level of visual sensitivity is high.

<u>Impacts KOP-14 Railroad Bed Bike Trail (West).</u>

The simulation of the view of the Project site and facilities from KOP-14 is shown in Figure 5.15-18b; the existing view is shown in Figure 5.15-18a. The view from KOP-14 is slightly elevated as compared to the Project site. In the view from KOP-14, the visible features of the Project would be the transmission line and wind fence, which would be seen in the near foreground-middleground and would present a moderate to high level of dominance in the view, the solar arrays in the foreground-middleground, and the cooling tower at the power block, which would be visible in the foreground-middleground and would present a moderate level of dominance . The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the Project on the overall character of the view is expected to be moderate. The presence of existing foreground-middleground transmission line structures would help to ameliorate the visual effects of the Project facilities. Due to the magnitude of the Project in the view from KOP-11 and its strong contrast as compared with the existing scene, the overall impact on visual resources would be significant when the Project is considered in the context of its surroundings.

The KOP-13 BLM Visual Contrast Rating Form is provided at the end of this section in Attachment Contrast Rating Forms.

DR-VIS-225

Information Required:

In order to present a simulation that more accurately captures the actual viewing experience from the new Bike Trail key viewpoint, please present the existing view photograph and visual simulation as 11" x 17" images at a "life-size scale" when the image is held approximately 18 inches from the eye, so that the landscape and built features in the images match the actual scale of the features in the landscape (when the paper image is viewed at a distance of approximately 18 inches from the eye).

Response:

Please see Figure 5.15-18-a (existing condition) and Figure 5.15-18b (simulated condition), provided in Attachment DR-VIS-Figures at the end of this section.

DR-VIS-226

Information Required:

Please provide a site plan at a scale that better identifies the location of the various project components including the wind fences.

Response:

Please see Figure DR-ALT-49-1 and -2 for site plans that identifies the location of the Project components and Figure DR-VIS-226 for a representation of the location of the wind fences on the RSPP.

DR-VIS-227

Information Required:

Please clarify what the horizontal, linear tan feature is that borders most of the simulations (KOPs 2-10). Include a description of its size, composition and purpose. Attachment 3 shows a similar facility without such a feature.

Response:

The horizontal linear tan feature referred to in the Data Request is the wind fence, which borders the solar array areas on the east and west (not north and south). It would consist of black screen mesh tarpaulin (50 percent porosity). The support structures are as shown on Figures DR-223-1 and DR-223-2 at the end of this section

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DR-VIS-228

Information Required:

Please describe in detail the tan surface treatments of other project components that are illustrated in the simulations including color name and manufacturer and texture.

Response:

Project components are painted either during the manufacturing process or in the field. Project components to be painted include:

- Air-cooled Condenser Cooling tower and the small auxiliary cooling tower within the power block (BLM Standard Environmental Color for desert settings: Covert Green 18-0617 TPX (RGB #7D745E) RGB: 125,116,94 – CMYK: 0,7,25,51);
- Buildings and steel support structures within the power block (i.e., buildings– except piping and vessels) (BLM Standard Environmental Color: Covert Green 18-0617 TPX (RGB #7D745E) RGB: 125,116,94 – CMYK: 0,7,25,51);
- Wind fences (black screen mesh tarp); and
- Transmission monopoles (standard, non-specular grey).

Project components that cannot be painted include:

- Electrical substation equipment (standard non-specular grey);
- Transmission lattice structures (standard, nonspecular grey);
- Piping and vessels within the power block (galvanized steel – grey);
- Pedestals of parabolic troughs (galvanized steel - grey);
- The backs of parabolic troughs (white); and
- Heat transfer fluid (HTF) insulation wrap (galvanized cladding - grey).

DR-VIS-229

Information Required:

Please be sure to illustrate these surface treatments in the new simulations requested in Data Requests 3 through 11 above.

Response:

The tan (i.e. Covert Green) surface treatments as described above in DR-VIS-228 are depicted in the new simulations requested in DR-VIS-217 through DR-VIS-225.

DR-VIS-230

Information Required:

Please identify the color surface treatment for each project component listed in Table 5.13-3 including the transmission line.

Response:

Colors surface treatment for those Project components that can be painted would be based on the BLM's standard environment colors publication, which was developed to assist with color selection to minimize the visual contrast of a facility. Certain Project components, such as the electrical substation equipment, transmission lattice structures, parabolic trough backings, pedestals of parabolic troughs, wind fencing, and HTF insulation wrap are either not practical to paint or, if painted,would result in inflated-costs associated with maintaining the painted surface. Project components that can be painted, such as the cooling towers, structures within the power block, and the transmission monopoles, would be painted with colors of the desert as outlined in the BLM's colors publication.

DR-VIS-231

Information Required:

If any of the simulations require revisions as a result of these data requests, please provide revised/updated simulations as necessary.

Response:

Due to the reconfiguration of the Project layout and clarification of colors of Project elements, previous simulations for the original 10 KOPs (KOPs 1-10) have been revised (see revised AFC Figures 5.15-5a through 5.15-14b provided at the end of this section). BLM Visual Contrast Rating Forms for each KOP are provided in Attachment Contrast Rating Forms, at the end of this section. Revised analyses for KOPs 1 through 10 are provided in the following paragraphs. Additionally, a revised oblique figure (Figure 2-3b) is provided at the end of this section.

KOP-1 U.S. Highway 395 Northbound

KOP-1 is located approximately 2.1 miles southeast of the Project site, approximately 3.2 miles southeast of the power block, and 3.4 miles southeast of the transmission line (see Figure 5.15-5a). The foreground views from KOP-1 are typical of the visual character of the highway and natural landscape of the Mojave Desert. The background view is composed of the Scodie Mountain Range. The natural features in the view form a strong, coherent pattern, and the visual integrity in the natural landscape is high. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a large number of viewers (motorists) in the foreground-middleground distance zone, the level of visual sensitivity is high.

<u>Impacts KOP-1 U.S. Highway 395 Northbound</u>

The simulation of the view of the Project site and facilities from KOP-1 is shown in Figure 5.15-5b; the existing view is shown in Figure 5.15-5a; the KOP-1 BLM Visual Contrast Rating Form is provided at the end of this section. The view from KOP-1 is elevated compared with the Project site (the KOP is at a higher elevation). In this foreground-middleground view, the prominent visible features of the Project

would be portions of the solar fields and power block structure. The transmission line structures would be minimally apparent from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree. The plant site features would be visible and would present a moderate level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Due to their distance and location in the middle of the Project site, the power block facilities would be moderately visible from this KOP.

The effect of the Project on the overall character of the view is expected to be moderate. The general level of visual quality of the view from KOP-1 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have moderate effects on the overall intactness of the view, and would have moderate effects on the visual unity of the composition of the landscape. According to the BLM Interim VRM Class III management objectives (see AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-1 would be less than significant when the Project is considered in the context of its surroundings.

KOP-2 U.S. Highway 395 Southbound

KOP-2 is located approximately 0.2 miles northeast of the Project site, approximately 1.5 miles northeast of the power block, and 1.8 miles northeast of the transmission line route (see Figure 5.15-6a). The foreground-middleground views from KOP-2 are typical of the visual character of the natural landscape of the Mojave Desert. The background view is composed of the El Paso Mountain Range. The natural features in the view form a strong, coherent pattern, and the visual integrity in the natural landscape is high. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a large number of viewers (motorists) in the foreground-middleground distance zone, the level of visual sensitivity is high.

Impacts KOP-2 U.S. Highway 395 Southbound

The simulation of the view of the Project site and facilities from KOP-2 is shown in Figure 5.15-6b; the existing view is shown in Figure 5.15-6a. The view from KOP-2 is at eye-level with the nearest solar collectors and below the rest of the Project site. In this foreground-middleground view, the prominent visible features of the Project would be the solar collectors and power block structures. The transmission line structures would be moderately apparent from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree. The Project site features would be visible in the foreground-middleground and would present a high level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Due to its location in the middle of the site, the power block would be moderately visible from this KOP. Therefore, the effect of the Project on the overall character of the view is expected to be strong.

The general level of visual quality of the view from KOP-2 would change moderately to strongly. The presence of the Project features would increase moderately the vividness of the view, would have moderate effect on the overall intactness of the view, and would have moderate effect on the visual unity of the composition of the landscape. Due to the magnitude of the project in the view from KOP-11, the overall impact on visual resources would be significant when the Project is considered in the context of its surroundings. Regardless, it is anticipated that viewers may soon see the facility as a landmark and their expectations will be met by the form, meaning, and context of a sensitively designed solar field.

KOP-3 Brown Road

KOP-3 is located approximately 0.9 miles west of the Project site, approximately 1.6 miles west of the power block, 1.0 miles northwest of the switchyard, and 0.9 miles west of the transmission line (Figure 5.15-7a). The foreground-middleground views from KOP-3 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the foothills of the El Paso Mountain Range. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists, hikers and motorists) in the foreground-middleground distance zone, the level of visual sensitivity is high.

Impacts KOP-3 Brown Road

The simulation of the view of the Project site and facilities from KOP-3 is shown in Figure 5.15-7b; the existing view is shown in Figure 5.15-7a. The view from KOP-3 is at eye-level as compared to the Project site. In this foreground-middleground view, the prominent visible features of the Project would be the solar collectors, power block structure and substation. The Project site features would be visible in the foreground-middleground and would present a moderate to high level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Because of distance and location, the power block would be substantially visible from this KOP. The transmission line structures would also be visible from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the RSPP on the overall character of the view is expected to be moderate. The general level of visual quality of the view from KOP-3 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have a strong effect on the overall intactness of the view, and would have moderate effect on the visual unity of the composition of the landscape. The 30-foot high wind screen fence and the presence of existing foreground-middleground transmission structures would help to ameliorate the effects of the transmission line and solar collectors. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-3 would be less than significant when the Project is considered in the context of its surroundings.

KOP-4 Northern Residence on Calvert Boulevard

KOP-4 is located approximately 0.3 miles west of the Project site and approximately 1.0 miles northwest of the power block, and 1.3 miles north of the switchyard and transmission line (Figure 5.15-8a). The foreground-middleground and background views from KOP-4 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the El Paso Mountain Range. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground at this KOP. Because this view would be experienced by residential viewers in the foreground-middleground, the level of visual sensitivity is moderate to high.

Impacts KOP-4 Northern Residence on Calvert Boulevard

The simulation of the view of the Project site and facilities from KOP-4 is shown in Figure 5.15-8b; the existing view is shown in Figure 5.15-8a. The view from KOP-4 is at eye-level as compared to the Project site. In this foreground-middleground and background view, the prominent visible features of the Project would be the solar collectors and power block structure. The transmission line structures would be apparent from these foreground-middleground distances. The site features would be visible in the background and would present a moderate level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree. Because of distance and location, the power block would be substantially visible from this KOP.

The effect of the RSPP on the overall character of the view is expected to be moderate. The general level of visual quality of the view from KOP-4 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have moderate effect on the overall intactness of the view, and would have moderate effect on the visual unity of the composition of the landscape. The 30-foot high wind screen fence and presence of existing foreground-middleground transmission structures would help to ameliorate the effects of the transmission line and on-site Project facilities. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-4 would be less than significant when the Project is considered in the context of its surroundings.

KOP-5 Middle Residence on Calvert Boulevard

KOP-5 is located approximately 0.4 miles west of the Project site, approximately 0.8 miles northwest of the power block, and 1.1 miles north of the switchyard and transmission line (Figure 5.15-9a). The foreground and middleground views from KOP-5 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the El Paso Mountain Range. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground at this KOP. Because this view would be experienced by residential viewers in the foreground-middleground, the level of visual sensitivity is moderate to high.

Impacts KOP-5 Middle Residence on Calvert Boulevard

The simulation of the view of the Project site and facilities from KOP-5 is shown in Figure 5.15-9b; the existing view is shown in Figure 5.15-9a. The view from KOP-5 is at eye-level as compared to the Project site. In this foreground-middleground view, the prominent visible features of the Project would be the solar collectors, power block structure and substation. The Project site features would be visible in the foreground-middleground and would present a moderate to high level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Due to their distance and location, the power block would be substantially visible from this KOP. The transmission line structures would also be visible from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the RSPP on the overall character of the view is expected to be moderate. The general level of visual quality of the view from KOP-3 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have a strong effect on the overall intactness of the view, and would have moderate effect on the visual unity of the composition of the landscape. The 30-foot high wind screen fence and presence of existing foreground-middleground transmission structures would help to ameliorate the effects of the transmission line and plant site facilities. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-5 would be less than significant when the Project is considered in the context of its surroundings.

KOP-6 Residence on Clone Avenue

KOP-6 is located approximately 0.5 miles west of the Project site, approximately 0.7 miles northwest of the power block, and 0.8 miles north of the transmission line (see Figure 5.15-10a). The foreground-middleground views from KOP-6 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the El Paso Mountain Range. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground at this KOP. Because this view would be experienced by residential viewers in the foreground-middleground, the level of visual sensitivity is moderate to high.

Impacts KOP-6 Residence on Clone Avenue

The simulation of the view of the Project site and facilities from KOP-6 is shown in Figure 5.15-10b; the existing view is shown in Figure 5.15-10a. The view from KOP-6 is at eye-level as compared to the Project site. In this foreground-middleground view, the prominent visible features of the Project would be the wind fence, solar collectors, power block structures and switchyard. The Project site features would be visible in the foreground-middleground and would present a moderate to high level of dominance in the view. The neutral color and non-reflective surfaces of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Because of distance and location, the power block would be substantially visible from this KOP. The transmission line structures would also be visible from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the RSPP on the overall character of the view is expected to be moderate. The general level of visual quality of the view from KOP-3 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have a strong effect on the overall intactness of the view, and would have moderate effect on the visual unity of the composition of the landscape. The 30-foot high wind screen fence and presence of existing foreground-middleground transmission structures would help to ameliorate the effects of the transmission line and Project site. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-6 would be less than significant when the Project is considered in the context of its surroundings.

KOP-7 BLM Recreation Road

KOP-7 is located approximately 0.8 miles west of the Project site, approximately 2.4 miles southwest of the power block (due to intervening topography, the power block is not visible from this KOP), and 0.8 miles west of the transmission line (Figure 5.15-11a). The foreground-middleground views from KOP-7 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the mountain ranges to the east and northeast. The visual quality of this view is moderate; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and cultural landscape is moderate. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists, hikers and motorists) in the foreground-middleground distance zone, the level of visual sensitivity is high.

Impacts KOP-7 BLM Road

The simulation of the view of the Project site and facilities from KOP-7 is shown in Figure 5.15-11b; the existing view is shown in Figure 5.15-11a. The view from KOP-7 is elevated as compared to the Project site. In the view from KOP-7, the visible features of the Project would be the solar collectors and transmission line, which would be visible in the foreground-middleground and would present a moderate level of dominance in the view. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the Project on the overall character of the view is expected to be moderate. The presence of existing foreground-middleground transmission structures would help to ameliorate the effects of the Project site. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (see AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-7 would be less than significant when the Project is considered in the context of its surroundings.

KOP-8 Railroad Bed Bike Trail (South)

KOP-8 is located approximately 1.4 miles south of the Project site, approximately 2.7 miles south of the power block, and 1.4 miles southeast of the transmission line (Figure 5.15-12a). The foreground-middleground views from KOP-8 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures. The background view is composed of the valley floor. The visual quality of this view is low; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and human-built landscape is moderate. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists and hikers) in the foreground-middleground distance zone, the level of visual sensitivity is high.

Impacts KOP-8 Railroad Bed Bike Trail (South)

The simulation of the view of the Project site and facilities from KOP-8 is shown in Figure 5.15-12b; the existing view is shown in Figure 5.15-12a. The view from KOP-8 is elevated as compared to the Project site. In the view from KOP-8, the visible features of the Project would be the transmission line, which would be visible in the foreground-middleground and would present a moderate level of dominance in the

view, and the upper extent of the cooling structures at the power block, which would be visible in the foreground-middleground and background and would present a low level of dominance. The presence of existing foreground and middleground structures would help to ameliorate the effects of the transmission line and plant site features. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the Project on the overall character of the view is expected to be moderate. The presence of existing foreground-middleground structures would help to ameliorate the effects of the transmission line and Project site. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-8 would be less than significant when the Project is considered in the context of its surroundings.

KOP-9 Railroad Bed Bike Trail (Southeast)

KOP-9 is located approximately 1.4 miles southeast of the Project site, approximately 2.4 miles southeast of the power block, and 2.4 miles east of the transmission line (Figure 5.15-13a). The foreground-middleground views from KOP-9 are typical of the visual character of the natural landscape of the Mojave Desert with addition of electrical transmission structures and residential development. The background view is composed of the valley floor and distant mountain ranges to the northwest. The visual quality of this view is moderate; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and human-built landscape is moderate. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists and hikers) in the foreground-middleground distance zone, the level of visual sensitivity is high.

<u>Impacts KOP-9 Railroad Bed Bike Trail (Southeast)</u>

The simulation of the view of the Project site and facilities from KOP-9 is shown in Figure 5.15-13b; the existing view is shown in Figure 5.15-13a. The view from KOP-9 is elevated as compared to the Project site. In the view from KOP-9, the visible features of the Project would be the transmission line, which would be visible in the foreground-middleground and would present a moderate level of dominance in the view, and the upper extent of the cooling structures at the power block, which would be visible in the foreground-middleground and background and would present a low level of dominance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the Project on the overall character of the view is expected to be moderate. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new renewable energy facility that uses surface treatments and finishes (colors, textures, non-reflective surfaces, etc.) to minimize visible change and contrast with the existing site environment, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-9 would be less than significant when the Project is considered in the context of its surroundings.

KOP-10 BLM Recreation Area

KOP-10 is located approximately 0.3 miles east of the Project site, approximately 1.1 miles east of the power block, and 1.3 miles east of the transmission line (Figure 5.15-14a). The foreground-middleground views from KOP-10 are typical of the visual character of the natural landscape of the Mojave Desert with

addition of electrical transmission structures. The background view is composed of the valley floor and distant mountain range to the west. The visual quality of this view is moderate; there are no striking or distinctive visual patterns in the view. The visual resources do not form a strong, coherent pattern, and the visual integrity in the natural and human-built landscape is minimal. The cultural and natural features in the view form a discordant pattern, and the visual integrity in the natural landscape is moderate to low. The Project would be visible in the foreground-middleground distance zone at this KOP. Because this view would be experienced by a moderate number of recreational viewers (bicyclists and hikers) in the foreground-middleground distance zone, the level of visual sensitivity is high.

Impacts KOP-10 BLM Recreation Area

The simulation of the view of the Project site and facilities from KOP-10 is shown in Figure 5.15-14b; the existing view is shown in Figure 5.15-14a. The view from KOP-10 is situated among the rock formations within the recreation area and elevated as compared to the Project site. In this foreground-middleground view, the prominent visible features of the Project would be the solar collectors, power block structure and substation. The Project site features would be visible in the foreground-middleground and would present a moderate to high level of dominance in the view. The neutral color and non-reflective surface of the Project structures would reduce their visual contrast with their surroundings and help them to be absorbed into the overall view. Due to their distance and location, the power block would be substantially visible from this KOP. The transmission line structures would also be visible from this distance. The neutral color and non-reflective surface of the transmission line structures would reduce their visual contrast with the background and help them to be absorbed into the overall view to a moderate degree.

The effect of the RSPP on the overall character of the view is expected to be moderate to high. The general level of visual quality of the view from KOP-10 would change moderately. The presence of the Project features would increase moderately the vividness of the view, would have a strong effect on the overall intactness of the view, and would have moderate effect on the visual unity of the composition of the landscape. Given the dominating effect of the two existing high-voltage steel lattice transmission lines, the form and meaning (for the public) of a new sensitively designed renewable energy facility, and the BLM Interim VRM Class III management objectives (refer to AFC Section 5.15.1.1, Federal LORS), the overall impact on visual resources from KOP-10 would be less than significant when the Project is considered in the context of its surroundings.

DR-VIS-232

Information Required:

> Please provide close-up photographs of SCAs of the type proposed for the SM Ridgecrest Project. Please include photographs showing fronts, backs and mounting structures for the SCAs. If SCAs in the photographs differ in detail from those proposed under the SM Ridgecrest Project, please describe the differences.

Response:

Photos of the SCAs of the type proposed for the Project are included as Figures DR-VIS-232-1 and DR-VIS-232-2, provided at the end of this section. They are of the same type of SCAs to be installed on the other California projects; therefore, there are no differences to describe.

DR-VIS-233

Information Required:

Please characterize the maximum potential brightness (luminance) of diffuse and spread reflection from mirrors in candela per square meter.

Response:

The diffuse light and spread reflection coming off the parabolic mirrors from most visible angles during most hours of the day would simply reflect the global irradiation of the sky; clouds would also be visible in these reflections. This leads to a lower intensity of light with respect to the sun itself. The intensity of these reflections would be less than that of the instantaneous global diffuse radiation at the moment of measurement. The diffuse reflections could vary from 200,000 candela per square meter in the morning and afternoon to as much as 700,000 depending on scattering due to cloud patterns. Staring at the diffuse light and spread reflection coming off the parabolic mirrors would be in all cases less intense than staring at the sky away from the sun.

It is possible that the back reflected light or light not absorbed by both the envelope and steel annulus of the Heat Collecting Element (HCE) could be seen in the reflection of the parabolic mirror at certain angles above the horizon (but not visible to someone on the ground. The intensity 11 feet or farther from the front of the vertex of the collector would be fully diverged direct (not diffuse) incident luminance of the sun, but with a worst-case intensity approximately 20 percent less than the direct luminance of the sun. This would be similar to viewing a body of water from the sky.

DR-VIS-234

Information Required:

Please describe the hours in which the mirror surface of a trough could be visible to an off-site viewer on the ground, and the proportion of surface visible in the course of the day.

Response:

At the RSPP, a 30-foot tall wind fence would extend along the entire eastern and western perimeter of the solar field. Consequently, anywhere along the eastern or western border, the wind fence would always block the view of the mirror surface for a person standing off site on the ground. However, a portion of the mirror surface would be visible to an off-site viewer on the ground along the north or south perimeter of the plant. The distance from the collector to a person standing outside the perimeter fence is approximately 30 feet. The collector has an aperture of 22 feet and sits atop a 13-foot pylon.

Depending on where a person is standing and the time of day, different quantities of mirror area would be visible. During daily start up until approximately 9:00 A.M., the majority of the mirror surface would be visible to viewers positioning themselves to see down the length of a row of collectors (i.e., from a location to the north or south of the facility). As the collector continues to track the sun throughout the day, less and less of the mirror surface would be visible. Between 11:00 A.M. to 1:00 P.M., only about 20 percent of the mirror surface would be visible. (The angle of the collector with respect to local time would change throughout the year, these above visibility estimates are for summer months.) As the sun continues to the west, more of the mirror surface would become visible.

DR-VIS-235

Information Required:

Please provide any available anecdotal information on glare effects of the Kramer Junction and existing SEGS projects, including photographs of off-site diffuse or spread glare, and images of the heated HCEs, as seen from public roads/viewpoint.

Response:

Figure DR-VIS-235-1 (at the end of this section), is a photo of the SEGS plants looking at a tracking collector looking from the west side of collector eastward towards the receiver and shows glare that is a result of the spread reflection of the envelope of the HCE tube itself. In the RSPP, a wind fence would be located on the east and west sides of the solar field effectively blocking this view of the collector. The view shown in the Figure DR-VIS-235-2 photo (also at the end of the section), is a viewing angle that would be possible at the Project from public area, i.e. looking north or south down the rows of collectors through the security fence. Spread reflection can be seen from the HCE tubes and metal holders and other metal parts.

The collector that is planned to be utilized for the Project would be much taller with larger mirrors than the collector assemblies depicted in Figures DR-VIS-235-1 and -2, making it difficult to see most of the HCE during the time of the day shown in the photos from the distance between the photo vantage point and the collector. From a greater distance than shown in the two photos, more of the HCE would be visible, but as a viewer moves farther away from the collector, the intensity of any reflections would be diminished.

Additional anecdotal information from an Internet search is provided at the end of this section in Attachment DR-VIS-235.

DR-VIS-236

Information Required:

Please describe whether any portion of the HCEs would be visible to viewers on the ground, either on- or off-site. Please characterize the maximum potential brightness (luminance) of heated HCEs in candela per square meter.

Response:

As with the visibility of the mirror surface or front of the collector discussed in DR-VIS-235, the amount of the HCE tube that is visible to a viewer on the ground changes throughout the day as the collector tilts to follow the sun. The HCE tubes would be most visible during mornings and afternoon to a viewer looking down the length of a row of solar collectors, while during the hours approaching, at and directly after solar noon, only the ends of the tubes would be visible from the ground off or on site. (Again, visibility also would vary according to the time of year.)

The metal annulus of the HCE does not glow when heated. Rather, reflections from and illumination within the glass envelope surrounding the annulus makes the HCE appear like it is glowing. Most of the reflection off the HCE is directed toward the mirror surface, shielding most of the reflection from a viewer on the ground. It is possible for an on-site viewer to get close enough to the collector to experience the

reflection at the end of the collector. From such a proximate location, one could theoretically be exposed to a maximum back reflectance of HCE envelope. This worst-case intensity could be 93 percent of the sun's direct incidence radiation concentrated with respect to the HCE envelope (42 times) and not transmitted through the envelope (four percent). During highest radiation levels, around 1,200 watts per square meter, this would lead to a back reflectance of 1,875 watts per square meter, or 1.28 million candela per square meter. While this is deemed not eye-damaging, maintenance workers and visitors to the site who plan to be this close to the the HCE would be required to wear polarized sunglasses.

Viewers standing outside the perimeter fence (at least 30 feet away) could only be exposed to a maximum of one-tenth this luminance, when uniform diffuse scatter is assumed at this distance.

DR-VIS-237

Information Required:

> Please explain whether any portion of the directly reflected solar radiation could pass by the HCEs (the steel tube annulus) due to the total divergence factor of the reflectors. If so, how much? Is this amount sufficient to cause any potential retinal damage or flash blindness? Are there measures that would prevent such inadvertent off-site reflection (such as shielding of the HCEs, etc.)?

Response:

During morning and evening movement of the collector from the stow position to the tracking position, it is possible that some amount of sunlight would diverge from the collector focal point to a point farther in the distance. This divergence also could occur in the event the drive pylon of the collector tracking system malfunctions, essentially freezing in one place as the sun passes over it. This event is unlikely because the collectors would be specifically maintained to avoid any such malfunction. During operation, a constant supervisory system indicates to the operator if a collector is not tracking properly. Depending on the time of day and time of year and the distance from the face of the collector, the level of the divergence or the intensity of luminance can vary greatly.

It has been calculated in previous CEC submittals[1] that beam intensity reaches levels which pose a threat of retinal damage within distances of 100 feet of a collector facing east or west, i.e. the only time at which an observer from the ground could possibly see a divergent beam and very low sun angles. At the RSPP Project, a 30-foot tall wind fence would be erected along the east and west perimeter of the solar field, approximately 70 feet from the collector. The wind fence effectively would act as large privacy fence, blocking the view into the field and attenuating any direct beam light intensity far below safe levels coming from outer most collectors. Moreover, the movement from tracking to stow and vice-versa would move any diverged beam quickly out of view.

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1. San Joaquin Solar 1 & 2 – Application for Certification Volume 2, Appendix L, "Glint and Glare Study," http://www.energy.ca.gov/sitingcases/sjsolar/documents/applicant/afc/AFC_volume_02/

DR-VIS-238

Information Required:

Please clarify what information is supposed to be presented on page 5.15-19 and whether or not any information has been inadvertently omitted.

Response:

Paragraphs were inadvertently omitted from the document. The text preceding the information presented on page 5.15-19 states:

Vapor Plume Analysis

The Project's main cooling load for the turbine generator steam cycle would be provided by a 120-foot tall air-cooled condenser (dry cooled) and is a not potential source of visible water vapor plumes. There would be a 32-foot tall ancillary equipment wet cooling tower which might, under some weather conditions, produce only minor visible water vapor plumes. Accordingly, no analysis was performed to estimate the potential size and frequency of visible plume formation during daylight hours.

Evaluation Against Significance Criteria

Project impacts were evaluated in terms of four questions (CEQA Guidelines, Appendix G), each of which is presented below along with a response:

1) Would the project have a substantial adverse effect on a scenic vista?

   Possibly. According to the BLM Interim VRM Class III management objectives, the Project's contribution to visual resources might be considered significant. The Project would be an industrial facility in a lightly populated area and there would be a substantial change to the view for residents and visitors.

2) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

   No. There are no scenic resources in the Project site.

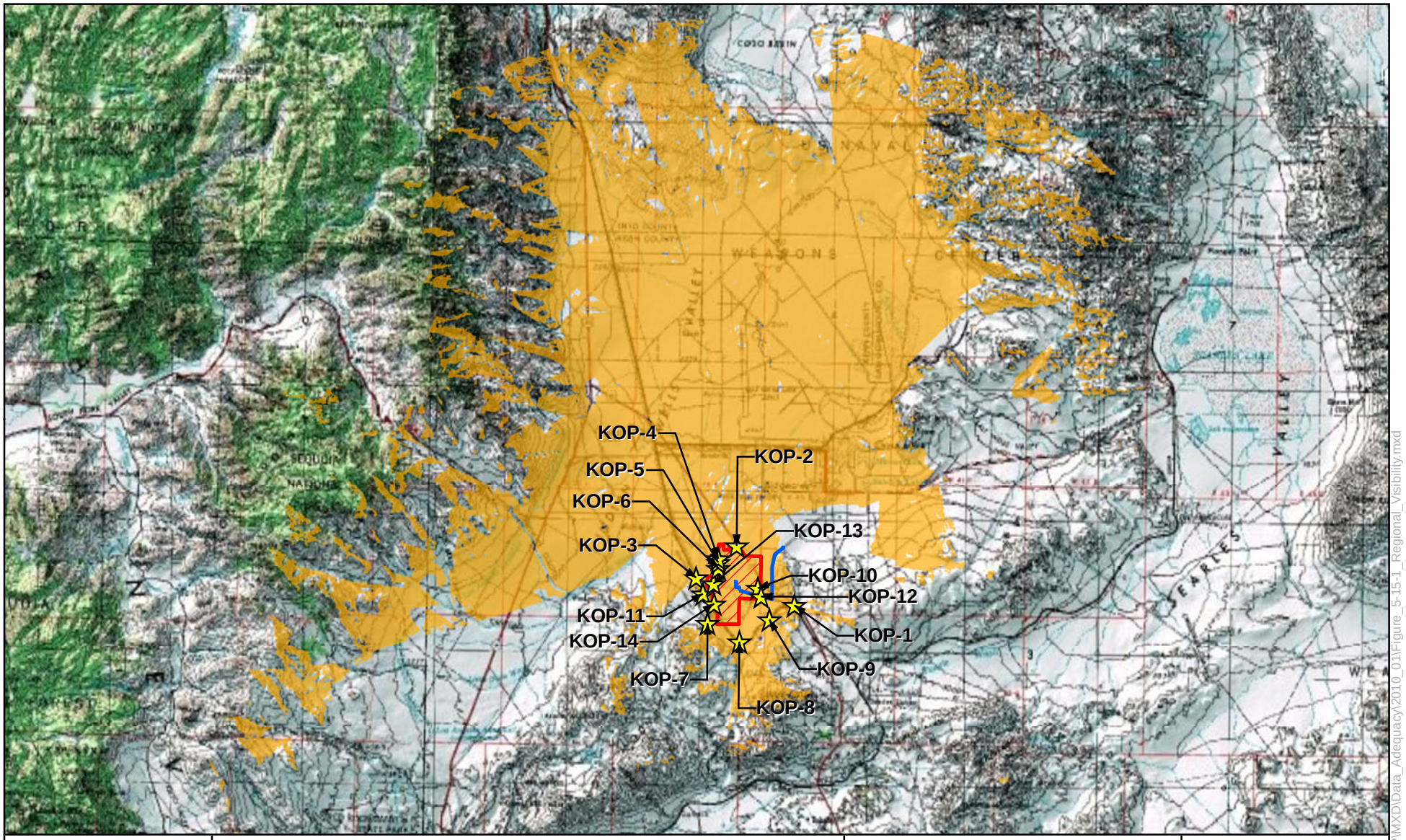
3) Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

   No. The Project site is not in a designated area of natural beauty or scenic recreational area. However, visual resources of the surrounding valley and mountain environment are substantial and overall views would be degraded to a degree. The presence of the Project facilities would create a strong to moderate contrasting change in the visual quality of the overall landscape which could conflict with BLM Interim VRM Class III management objective.

Attachment

Revised and New Figures, KOPs and Simulations

DR-VIS-215:	Revised Figure 5.15-1	Regional Visibility of the Plant Site
DR-VIS-216:	Revised Figure 5.15-2	Project Site and Key Observation Points
DR-VIS-223:	Figure DR-VIS-223-1	Framing of the Wind Fence Prior to Installation of the Horizontal Steel Ropes and Wire Mesh
	Figure DR-VIS-223-2	Close-up of Wind Fence
	Figure DR-VIS-223-3	Diagram of Wind Fence
DR-VIS-226:	Figure DR-VIS-226	Wind Fences
DR-VIS-231:	Revised Figures 5.15-5a through 5.15-18b and Figure 2-3b	
DR-VIS-232:	Figure DR-VIS-232-1	Same SCA to be Installed (View from Front)
	Figure DR-VIS-232-2	Same SCA to be Installed (View from Below)
DR-VIS-235:	Figure DR-VIS-235-1	Same HCE Glare, view from area outside perimeter fence, looking east
	Figure DR-VIS-233-2	HCE Glare, view from area outside perimeter fence, looking northwest



Map Location

Legend

- Project Right-of-Way
- Water Line
- Project Visible

1 inch equals 6.5 miles

0 3.25 6.5 13 Miles

Ridgecrest Solar Power Project
Figure 5.15-1
Regional Visibility of the Plant Site

Solar Millennium

AECOM

Date: January 2010

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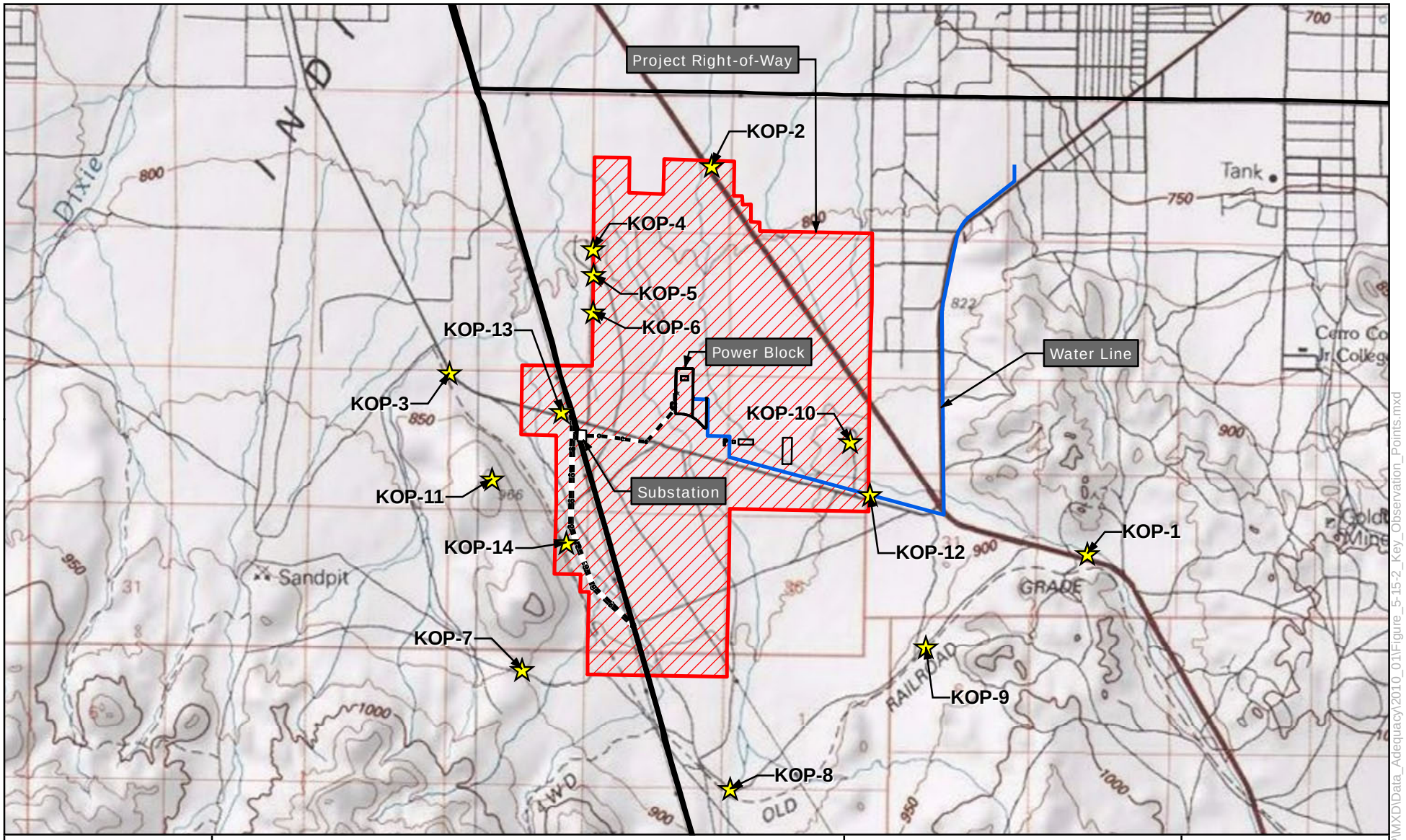

Map Location

Legend

- Key Observation Points
- Project Right-of-Way
- Water Line
- Existing Transmission Lines
- Proposed Transmission Lines

1 inch equals 1 miles 0 0.5 1 2 Mile

Ridgecrest Solar Power Project
Figure 5.15-2
Project Site and
Key Observation Points

Solar Millennium

AECOM

Date: January 2010

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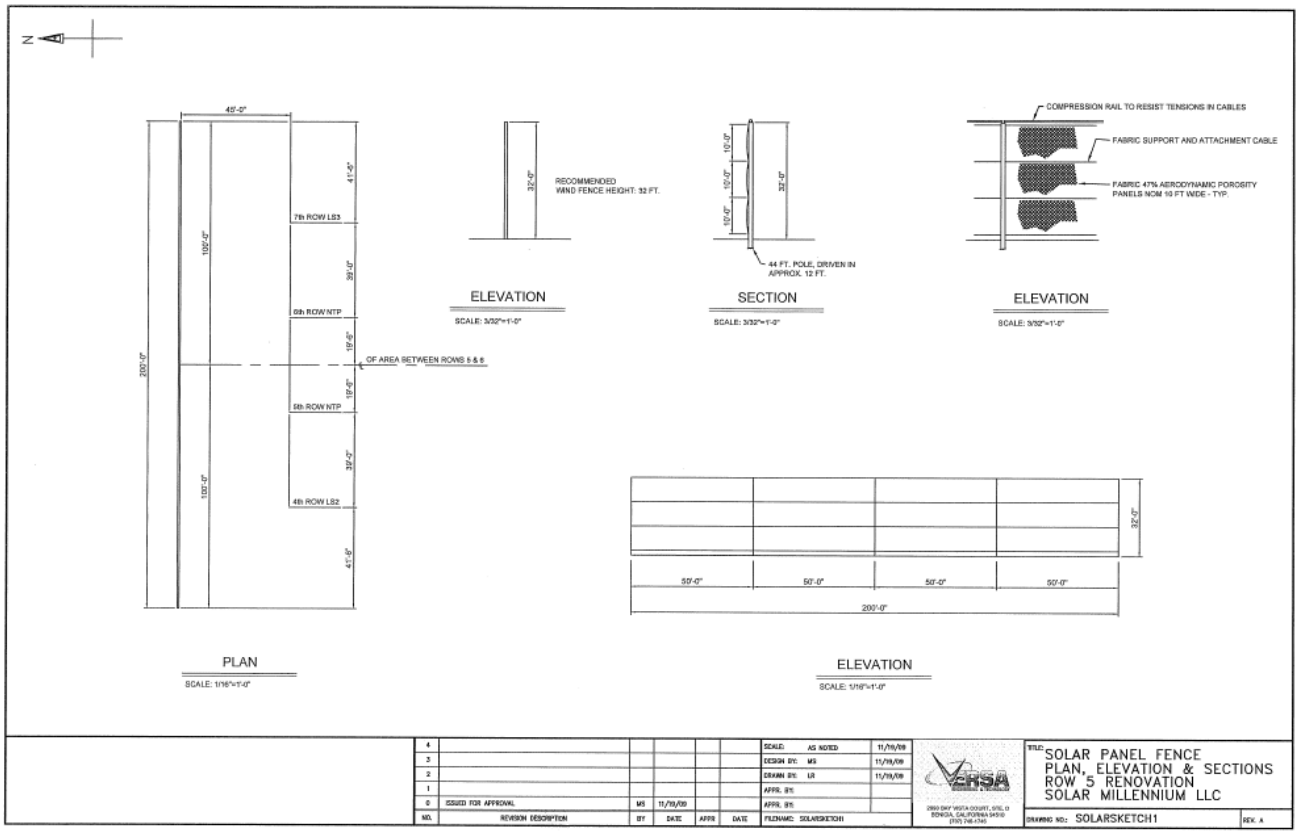
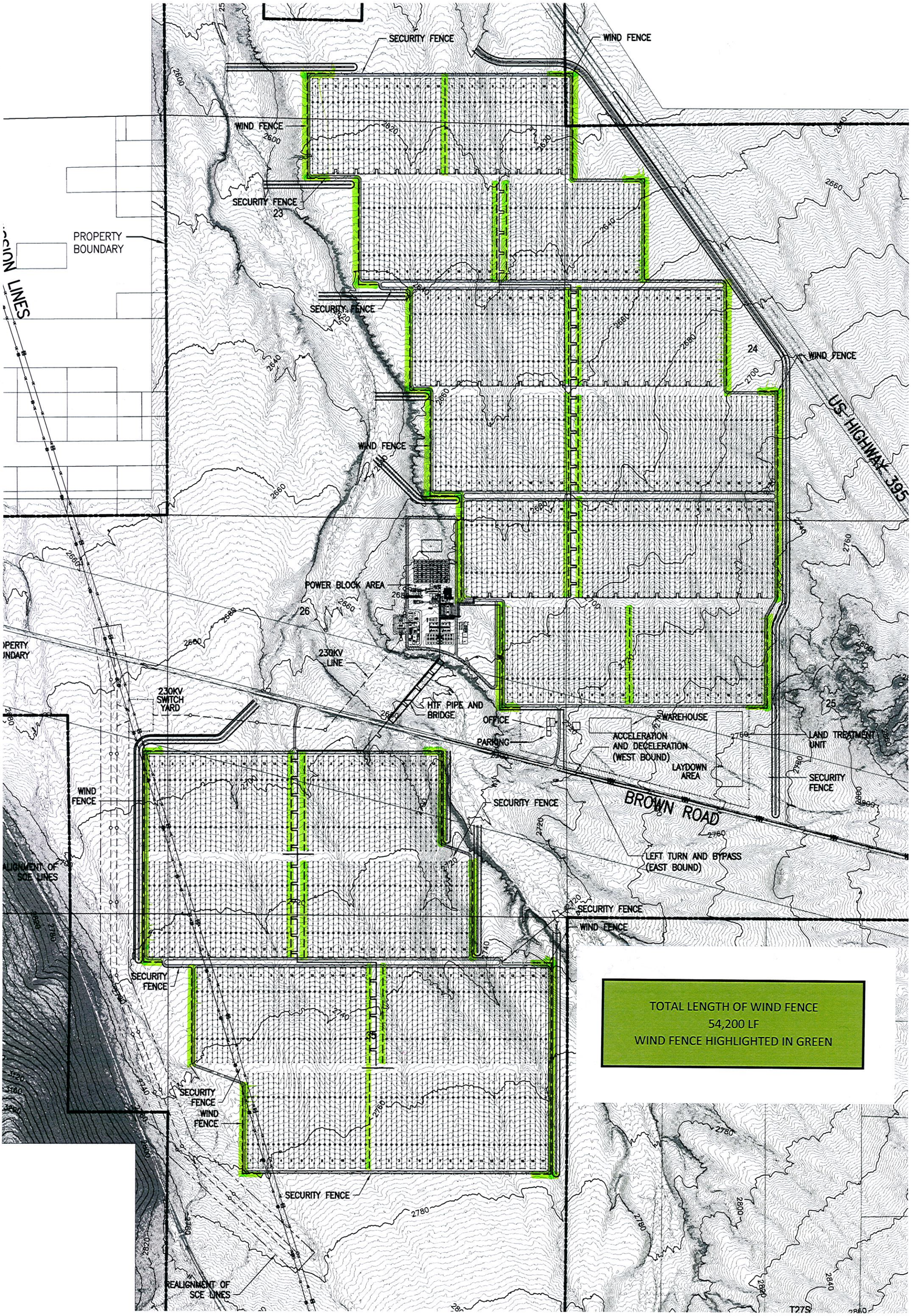
Figure DR-VIS-223-1
Framing of the Wind Fence Prior to Installation of the Horizontal Steel Ropes and Wire Mesh

Figure DR-VIS-223-2
Close-up of Wind Fence

Figure DR-VIS-223-3
Diagram of Wind Fence





TOTAL LENGTH OF WIND FENCE
54,200 LF
WIND FENCE HIGHLIGHTED IN GREEN

Figure 5.15-5a – View from KOP-1 U.S. Highway 395 Northbound of RSPP Site-Existing Condition

Figure 5.15-5b – View from KOP-1 U.S. Highway 395 Northbound of RSPP Site-Simulated Condition

Figure 5.15-6a – View from KOP-2 U.S. Highway 395 Southbound of RSPP Site-Existing Condition

Figure 5.15-6b – View from KOP-2 U.S. Highway 395 Southbound of RSPP Site-Simulated Condition

Figure 5.15-7a – View from KOP-3 Brown Road of RSPP Site-Existing Condition

Figure 5.15-7b – View from KOP-3 Brown Road of RSPP Site-Simulated Condition

Figure 5.15-8a – View from KOP-4 Northern Residence on Calvert Blvd of RSPP Site-Existing Condition

Figure 5.15-8b – View from KOP-4 Northern Residence on Calvert Blvd of RSPP Site-Simulated Condition

Figure 5.15-9a – View from KOP-5 Middle Residence on Calvert Blvd of RSPP Site-Existing Condition

Figure 5.15-9b – View from KOP-5 Middle Residence on Calvert Blvd of RSPP Site-Simulated Condition

Figure 5.15-10a – View from KOP-6 Residence on Clone Avenue of RSPP Site-Existing Condition

Figure 5.15-10b – View from KOP-6 Residence on Clone Avenue of RSPP Site-Simulated Condition

Figure 5.15-11a – View from KOP-7 BLM Recreation Road of RSPP Site-Existing Condition

Figure 5.15-11b – View from KOP-7 BLM Recreation Road of RSPP Site-Simulated Condition

Figure 5.15-12a – View from KOP-8 Railroad Bed Bike Trail (South) of RSPP Site-Existing Condition

Figure 5.15-12b – View from KOP-8 Railroad Bed Bike Trail (South) of RSPP Site-Simulated Condition

Figure 5.15-13a – View from KOP-9 Railroad Bed Bike Trail (Southeast) of RSPP Site-Existing Condition

Figure 5.15-13b – View from KOP-9 Railroad Bed Bike Trail (Southeast) of RSPP Site-Simulated Condition

Figure 5.15-14a – View from KOP-10 BLM Recreation Area of RSPP Site-Existing Condition

Figure 5.15-14b – View from KOP-10 BLM Recreation Area of RSPP Site-Simulated Condition

Figure 5.15-15a – View from KOP-11 BLM Ridgeline (West) of RSPP Site-Existing Condition

Figure 5.15-15b – View from KOP-11 BLM Ridgeline (West) of RSPP Site-Simulated Condition

Figure 5.15-16a – View from KOP-12 Brown Road Westbound of RSPP Site-Existing Condition

Figure 5.15-16b – View from KOP-12 Brown Road Westbound of RSPP Site-Simulated Condition

Figure 5.15-17a – View from KOP-13 Brown Road Eastbound of RSPP Site-Existing Condition

Figure 5.15-17b – View from KOP-13 Brown Road Eastbound of RSPP Site-Simulated Condition

Figure 5.15-18a – View from KOP-14 Railroad Bed Bike Trail (West) of RSPP Site-Existing Condition

Figure 5.15-18b – View from KOP-14 Railroad Bed Bike Trail (West) of RSPP Site-Simulated Condition

Figure DR-VIS-232-1
Same SCA to be Installed (View from Front)

Figure DR-VIS-232-2
Same SCA to be Installed (View from Below)

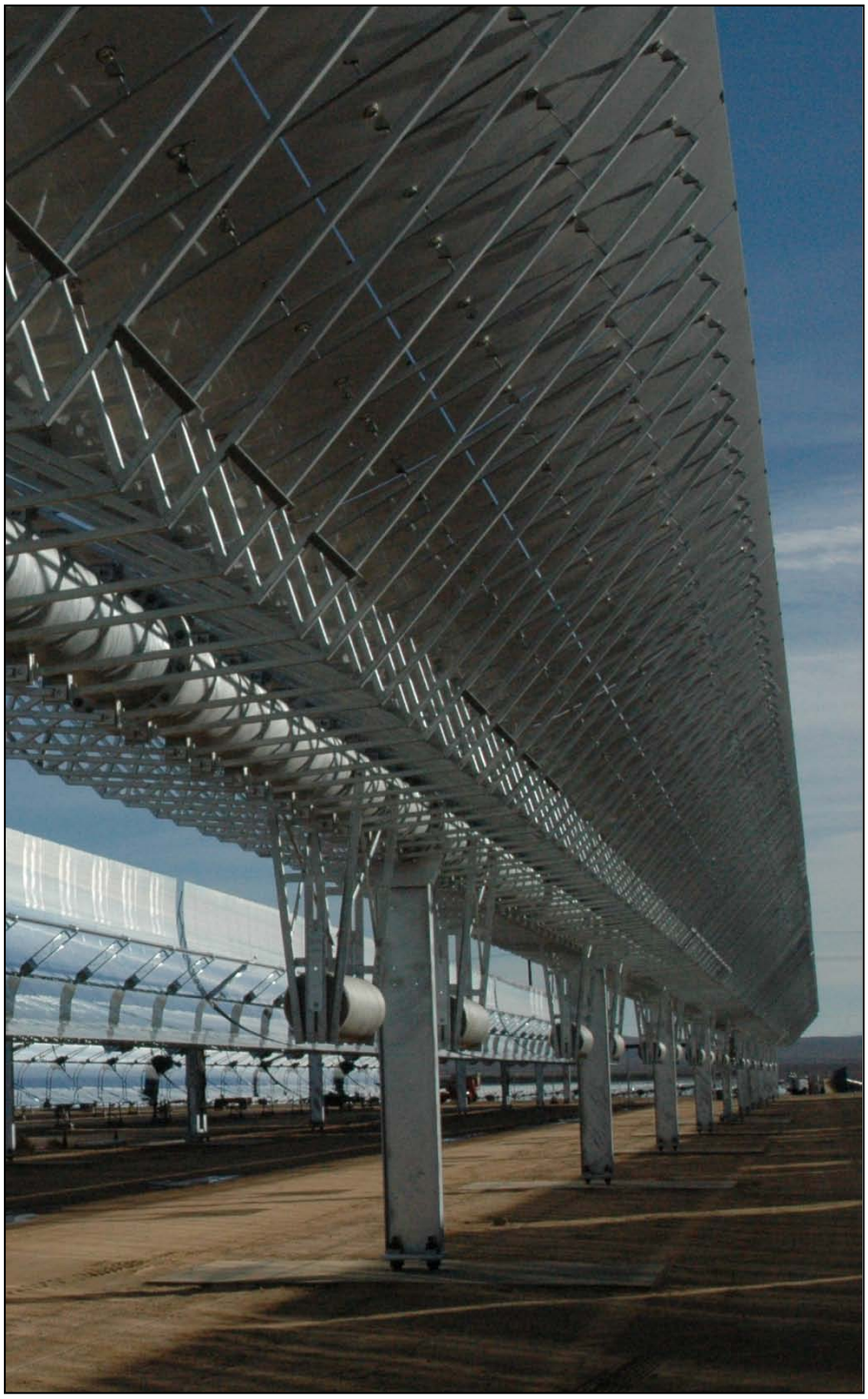


Figure DR-VIS-235-1
HCE Glare, view from area outside perimeter fence, looking east

Figure DR-VIS-235-2
HCE Glare, view from area outside perimeter fence, looking northwest

Attachment

Contrast Rating Forms

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/14/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#1	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, steep-sided, rounded and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Strong planar highway
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Dark grays, whites and light tans
TEX-TURE	Moderate to fine valley patterns, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form	x				x				x			
Line		x			x				x			
Color		x			x				x			
Texture		x			x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/14/10

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/14/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#2	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form	x					x			x			
	Line		x				x				x		
	Color			x			x			x			
	Texture			x			x				x		

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/14/10

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/14/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#3	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, steep-sided, rounded and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Strong planar highway
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Dark grays, whites and light tans
TEX-TURE	Moderate to fine valley patterns, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form	x				x				x			
	Line		x			x				x			
	Color	x				x				x			
	Texture		x			x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/14/10

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#4	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, steep-sided, rounded and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Strong planar highway
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Dark grays, whites and light tans
TEX-TURE	Moderate to fine valley patterns, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form	x				x				x			
	Line		x			x				x			
	Color	x				x				x			
	Texture		x			x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

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VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#5	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, steep-sided, rounded and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Strong planar highway
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Dark grays, whites and light tans
TEX-TURE	Moderate to fine valley patterns, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form	x				x				x			
	Line		x			x				x			
	Color	x				x				x			
	Texture		x			x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

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BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#6	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, steep-sided, rounded and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Strong planar highway
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Dark grays, whites and light tans
TEX-TURE	Moderate to fine valley patterns, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form	x				x				x			
	Line		x			x				x			
	Color	x				x				x			
	Texture		x			x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#7	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form	x				x				x			
Line		x			x				x			
Color			x		x				x			
Texture			x		x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#8	Township 27S Range 39E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form	x				x				x			
Line		x			x				x			
Color	x				x				x			
Texture		x			x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#9	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form	x				x				x			
Line		x			x				x			
Color	x				x				x			
Texture		x			x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#10	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Blue to crey solar arrays, light tan structures and t-lines
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form	x				x				x			
Line	x				x				x			
Color	x				x				x			
Texture	x				x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#11	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	x				x				x			
Line	x				x				x			
Color	x				x				x			
Texture	x				x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#12	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form	x				x				x			
	Line	x				x				x			
	Color	x				x				x			
	Texture	x				x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#13	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
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COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form	x				x				x			
Line	x				x				x			
Color	x				x				x			
Texture	x				x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	01/15/2010
District	Ridgecrest
Resource Area	
Activity (program)	Solar arrays, power block transmission lines, roads

SECTION A. PROJECT INFORMATION

1. Project Name	Ridgecrest Solar Power Project	4. Location	5. Location
2. Key Observation Point	KOP#14	Township 27 S Range 39 E Section Multiple	See Figure 5.15-2
3. VRM Class	Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat valley floor, rounded ridges, steep-sided and pyramidal mountain backdrops	Irregular organic mosaics of shrubs and complex irregular patterns of woodland scrub trees and shrubs	Scattered cubes and rectangular blocks
LINE	Complex horizontal, inclined, angular mix of valley and mountains	Horizontal, curvilinear, inclined angular	Horizontal and vertical
COLOR	Light tans to dark, reddish browns	Light golds and tans to reddish browns and light sage greens	Whites and light tans
TEX-TURE	Moderate valley floor, moderate mountain mosaics	Fine to moderate shrub patterns, moderate scrub shrubs	Fine, smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Graded planar, horizontal	Removed	Planar solar arrays, cubed structures and rectangular t-lines
LINE	Graded horizontal	Removed	Horizontal solar arrays and vertical structures and t-lines
COLOR	Light tans to dark, reddish browns and blacks	Removed	Black wind fences, blue to grey solar arrays, Colvert Green structures and galvanized grey utilities
TEX-TURE	Smooth surfaces	Removed	Smooth arrays, and structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	x				x				x			
Line	x				x				x			
Color	x				x				x			
Texture	x				x				x			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Merlyn Paulson	01/15/10

Attachment DR-VIS-235

Anecdotal Information on Glare Effects

650 Town Center Drive, 20th Floor
Costa Mesa, California 92626-1925
Tel: (714) 540-1235 Fax: (714) 755-8290
www.lw.com

LATHAM&WATKINS LLP

FIRM / AFFILIATE OFFICES
Barcelona, Brussels, Chicago, Frankfurt, Hamburg, Hong Kong, London, Los Angeles, Madrid, Milan, Moscow, Munich, New Jersey, New York, Northern Virginia, Orange County, Paris, San Diego, San Francisco, Shanghai, Silicon Valley, Singapore, Tokyo, Washington, D.C.

October 9, 2007

File No. 039610-0001

DOCKET
07-AFC-1
DATE OCT 0 9 2007
RECD. OCT 0 9 2007

VIA FEDEX

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 07-AFC-1
1516 Ninth Street, MS-4
Sacramento, California 95814-5512

Re: Victorville 2 Hybrid Power Project: Docket No. 07-AFC-1

Dear Sir/Madam:

Pursuant to California Code of Regulations, title 20, sections 1209, 1209.5, and 1210, enclosed herewith for filing please find a document entitled, "Parabolic Trough Mirror Design Prevents Escape of Reflected Incident Rays."

Please note that the enclosed submittal was filed today via electronic mail to your attention and to all parties on the CEC's current electronic proof of service list.

Very truly yours,

Paul E. Kihm
Senior Paralegal

Enclosure

cc: CEC 07-AFC-1 Proof of Service List (w/encl. via e-mail)
Michael J. Carroll, Esq. (w/encl.)

OC\913281.1

Parabolic Trough Mirror Design

Prevents Escape of Reflected Incident Rays

The design of VV2's single axis solar collector essentially prevents the escape of incident rays that directly strike the surface of the mirror. This is accomplished by the fundamental physics of the parabolic reflector as shown at Figure A in EXHIBIT 1 (attached). All rays entering the parabolic reflector are concentrated at single point (the focal point), located ½ the distance of the arc's radius, shown as Fp in Figure A. A Parabolic Trough Mirror type solar array is engineered so as to place the Heat Collection Element (HCE) precisely at the Fp (see also Figure B, on the attached EXHIBIT 1).

The solar array will track the East to West movement of the sun with an accuracy of 0.1 degrees. The concentrated area of the sun's reflected incident rays will be magnitudes smaller than the 70MM diameter of the HCE. The HCE positioned in this direct line of sight with the sun will block or absorb all entering direct incident or reflected incident rays. As a result, aircraft flying over the array will generally not be exposed to reflected incident rays of sunlight -- in other words, the sun itself (or any portions thereof) will not appear to pilots as a reflection in a mirror.

It is important to note that the HCE is encased in glass and will be a minor source of reflection as described below (this is generally what accounts for the "glittering" effect of parabolic trough solar arrays, often described as similar to flying over a body of water):

1) The HCE is designed to absorb and collect incident rays reflecting off the parabolic mirror but, of course, some incident rays will strike the HCE directly as it is located in front of the mirror. As a result, there will be some reflections from the glass coating the HCE; however, these reflections will be minor as the HCEs are designed to absorb sunlight, not reflect it.

2) The reflected incident rays of the sun will generally be directed to the lower portion of the HCE glass encasement by design and will produce a glow from the reflected scattered beams as they enter the collector. If an aircraft were positioned at exactly the right angle above the array, this "glow" phenomenon could be visible along the entire length of the collector element for an individual row of mirrors. However, there are no reflected incident rays of sunlight associated with this glow and the brilliance/intensity of the light is much less by comparison to reflected sunlight.

In summary

Based on practical experience and the laws of physics, solar arrays using the parabolic trough mirror design do not produce significant glare or reflection that would pose a distraction to aviation. The fundamental reason for this conclusioncan be found in the design of the parabolic trough mirror. The focal point created by the parabolic mirror will not allow any concentrated rays to escape the solar field. As a result, descriptions by pilots over flying a solar thermal facility (SEGS) indicate that, with regard to reflective glare, the general appearance of the array from the air is similar to flying over a body of water (see for example, the attached e-mail from Peter Soderquist of SCLA describing a recent overflight of the existing SEGS plants).

EXHIBIT 1: Parabolic reflectivity

Fp = Focal Point = A point located ½ the distance of the arc's radius

C = Center of Arc

Incident Ray = Separate and continuous bombardment of sunlight

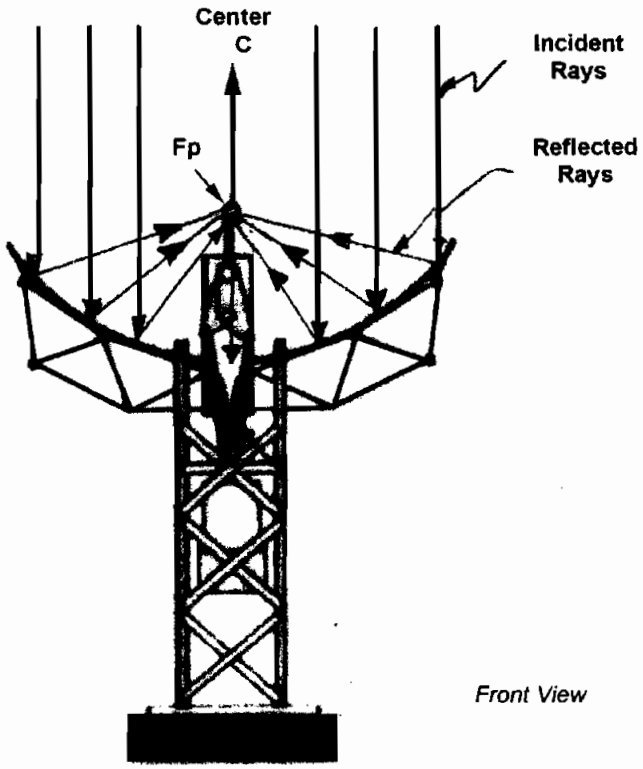

Figure A

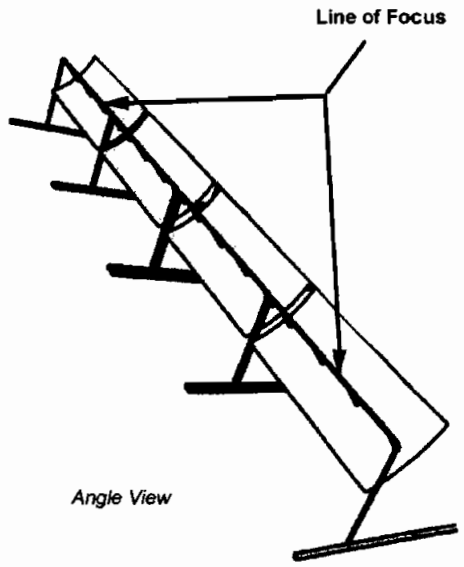

Figure B

A parabolic reflective surface (Figure A) will precisely direct an Incident Ray of light (Ir) to a focal point (Fp) ½ the distance from the center (C) of the arc. There is a "line of focus" (Figure B) created by the parabolic trough that will travel the full length of the mirror.

STATE OF CALIFORNIA
ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of:	)	Docket No. 07-AFC-1
	)	
Application for Certification,	)	**ELECTRONIC PROOF OF SERVICE**
for the VICTORVILLE 2	)	**LIST**
HYBRID POWER PROJECT	)	
by the City of Victorville	)	**(revised August 22, 2007)**
	)	
	)	

☒ Transmission via electronic mail and by depositing one original signed document with FedEx overnight mail delivery service at Costa Mesa, California with delivery fees thereon fully prepaid and addressed to the following:

DOCKET UNIT

CALIFORNIA ENERGY COMMISSION
Attn: DOCKET NO. 07-AFC-1
1516 Ninth Street, MS-4
Sacramento, California 95814-5512
docket@energy.state.ca.us

☒ Transmission via electronic mail addressed to the following:

APPLICANT

Jon B. Roberts
City Manager
City of Victorville
14343 Civic Drive
P.O. Box 5001
Victorville, CA 92393-5001
JRoberts@ci.victorville.ca.us

APPLICANT'S CONSULTANTS

Thomas M. Barnett
Inland Energy, Inc.
South Tower, Suite 606
3501 Jamboree Road
Newport Beach, CA 92660
TBarnett@inlandenergy.com

Sara Head
Environmental Manager
ENSR
1220 Avenida Acaso
Camarillo, CA 90012
SHead@ensr.aecom.com

INTERESTED AGENCIES

Electricity Oversight Board
770 L Street, Suite 1250
Sacramento, CA 95814
esaltmarsh@eob.ca.gov

INTERVENORS

California Unions for Reliable Energy (CURE)
c/o Gloria D. Smith
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
gsmith@adamsbroadwell.com

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CHolmes@energy.state.ca.us

Mike Monasmith
Public Adviser
pao@energy.state.ca.us

DECLARATION OF SERVICE

I, Paul Kihm, declare that on October 9, 2007, I deposited a copy of the attached:

PARABOLIC TROUGH MIRROR DESIGN PREVENTS ESCAPE OF REFLECTED INCIDENT RAYS

with FedEx overnight mail delivery service at Costa Mesa, California with delivery fees thereon fully prepaid and addressed to the California Energy Commission. I further declare that transmission via electronic mail was consistent with the requirements of California Code of Regulations, title 20, sections 1209, 1209.5, and 1210. All electronic copies were sent to all those identified on the Proof of Service List above.

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 9, 2007, at Costa Mesa, California.

Paul Kihm

ABENGOA SOLAR INC
13911 Park Avenue, Suite 206, Victorville, California 92392

Jan. 24, 2008

DOCKET
07-AFC-1
DATE JAN 24 2008
RECD. JAN 31 2008

Mr. Thomas Barnett
Inland Energy, Inc.
3501 Jamboree Road
Newport Beach, CA 92660

Dear Mr. Barnett:

At the CEC Workshop held on December 11, 2007 in Victorville, Mr. Jim Adams of the CEC raised some issues relating to photographs describing what was categorized as "glare" from the parabolic trough mirror array at the CSP generating plant(s) at Kramer Junction. As the former COO of KJC Operating Company, the company that owned and operated those SEGS for more than 14 years, I was requested to provide some further clarification to the comments I made at the Workshop. My comments follow, referencing the photos that are attached designated: **Photo A:** *"Back" of KJ Solar Field – Ground Level*; **Photo B**: *Ground Level Shot of KJ Array*, and; **Photo C**: *Aerial Shot of KJ Array*.

Photo A shows the back of several rows of mirrors in the left hand portion of the shot – the backs of the mirrors are not reflective. The reflections visible in the middle of the photo are from mirrors that are generally facing the photographer (I.e., the fronts). These reflections are from the glass-encased metal receiver tubes containing the heat transfer fluid (Receiver tubes) and <u>not</u> the mirrored surfaces themselves. As such the reflections are greatly diminished in intensity from those that would be associated with a reflection of the sun in a mirror. These reflections are similar to the reflections one would observe from a body of water with waves on it – if the viewer is in the right spot, incident rays from the sun will reflect directly off the curved glass surface of the receiver tube where the vertex of the incidental and reflected rays hits the tiny spot that is momentarily exactly perpendicular to the viewer's eye. In the photo, the three apparent areas of glare bursts or concentrations are the result of the metal receiver tube joint assemblies creating additional reflective surfaces which augment the glare. Again, in this case, no direct reflection of the sun from a mirror is involved.

This phenomenon is further demonstrated in Photo B: If you look to the left hand side of the photo (where the building provides a backdrop), you can see that the position of the mirror is nearly straight up (i.e., such as might be expected at mid-day when tracking the sun) – this is indicated by the fact that the receiver tube is plainly visible above the edges of the mirrors. Then, if you look to the

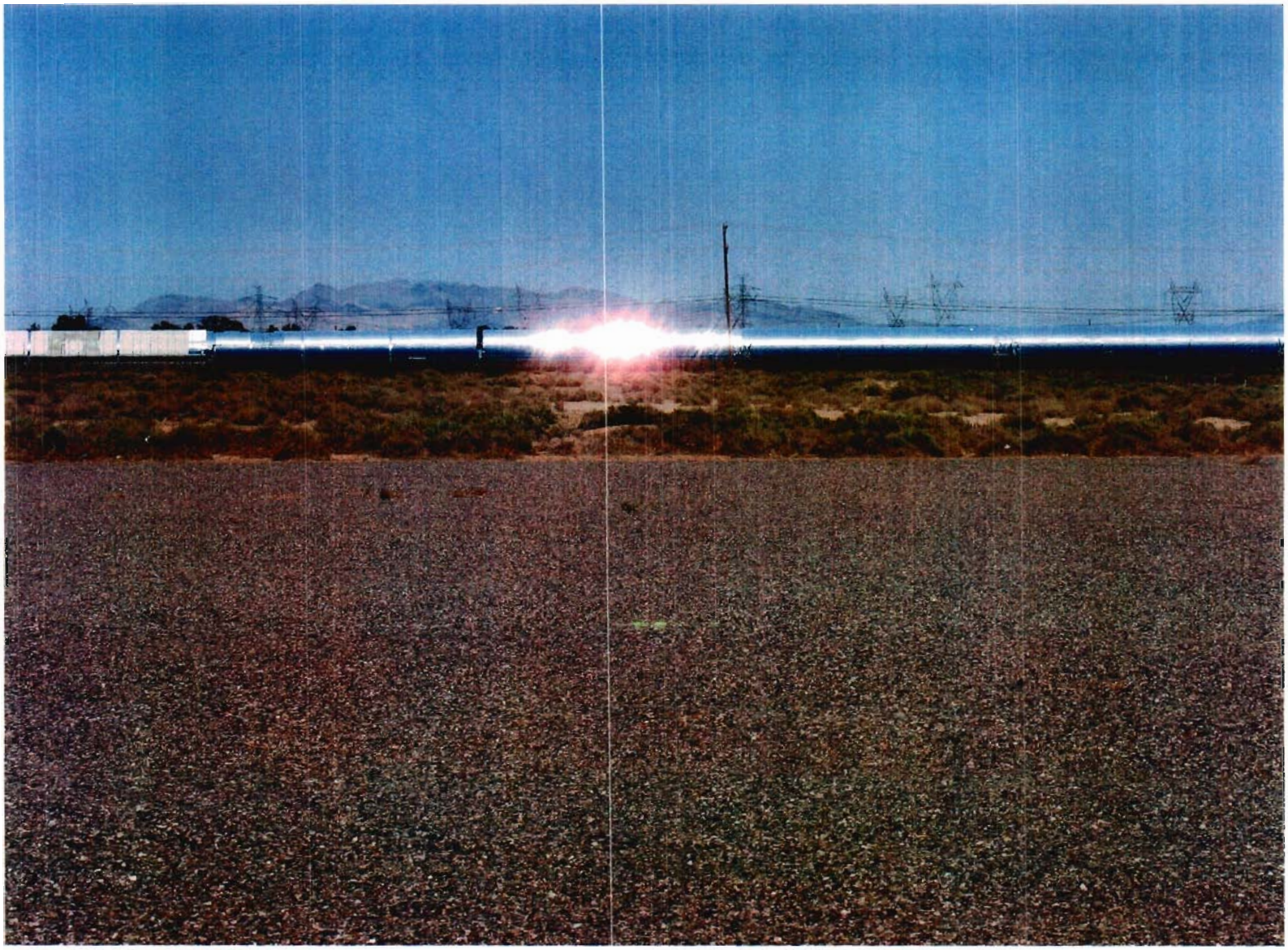
source of the reflected light in the photo, it is easy to see that it results entirely from the receiver tube and does not involve the mirrors at all.

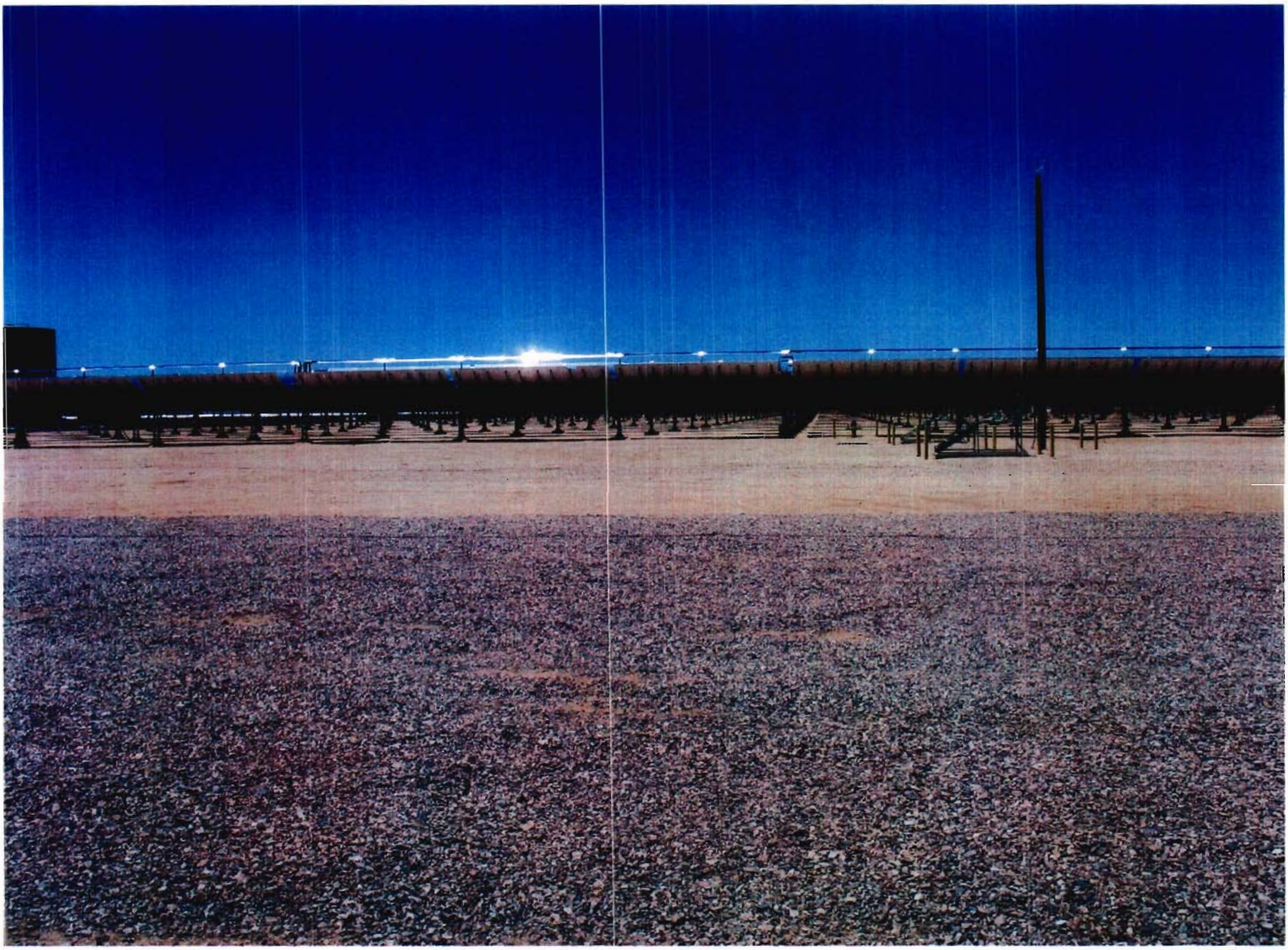
With regard to the glare shown in Photo C, this phenomenon is what we refer to as Columnar Illumination (CI); it too is related to reflections from the receiver tube and not reflections of direct incident rays of the sun. The glass envelope covering the receiver tube glows as direct incident and reflected rays of sunlight strike it and are diffused and refracted by the numerous curved glass and metal surfaces of the tube apparatus; this glowing tube acts somewhat like the filament in a car headlight, and a portion of the glowing light strikes the mirrored surface of the parabolic mirror and is reflected back out into space, like an elongated headlight. Since the mirrors are in long rows, an elongated rectangle of light generated from the glowing receiver tube is produced in columns so that if (and only if) the observer passes through one of the columns (i.e., if the mirrors are pointed at the observer – the sun would therefore be more or less directly behind the viewer), it will be visible. If the observer passes overhead in a parallel direction, the illumination will remain visible for the length of the row; if the direction of the observer is perpendicular to the alignment of mirrors, the rows will illuminate one by one as they are traversed. As with a group of side by side headlights, the light from more than one row of mirrors at a time can be seen from a given vantage point, but the intensity will diminish the further the row is from the one that the observer is directly in the path of. Again, this light is <u>not</u> from direct reflection of the sun, but from the greatly diminished reflected light from the illuminated receiver tube.

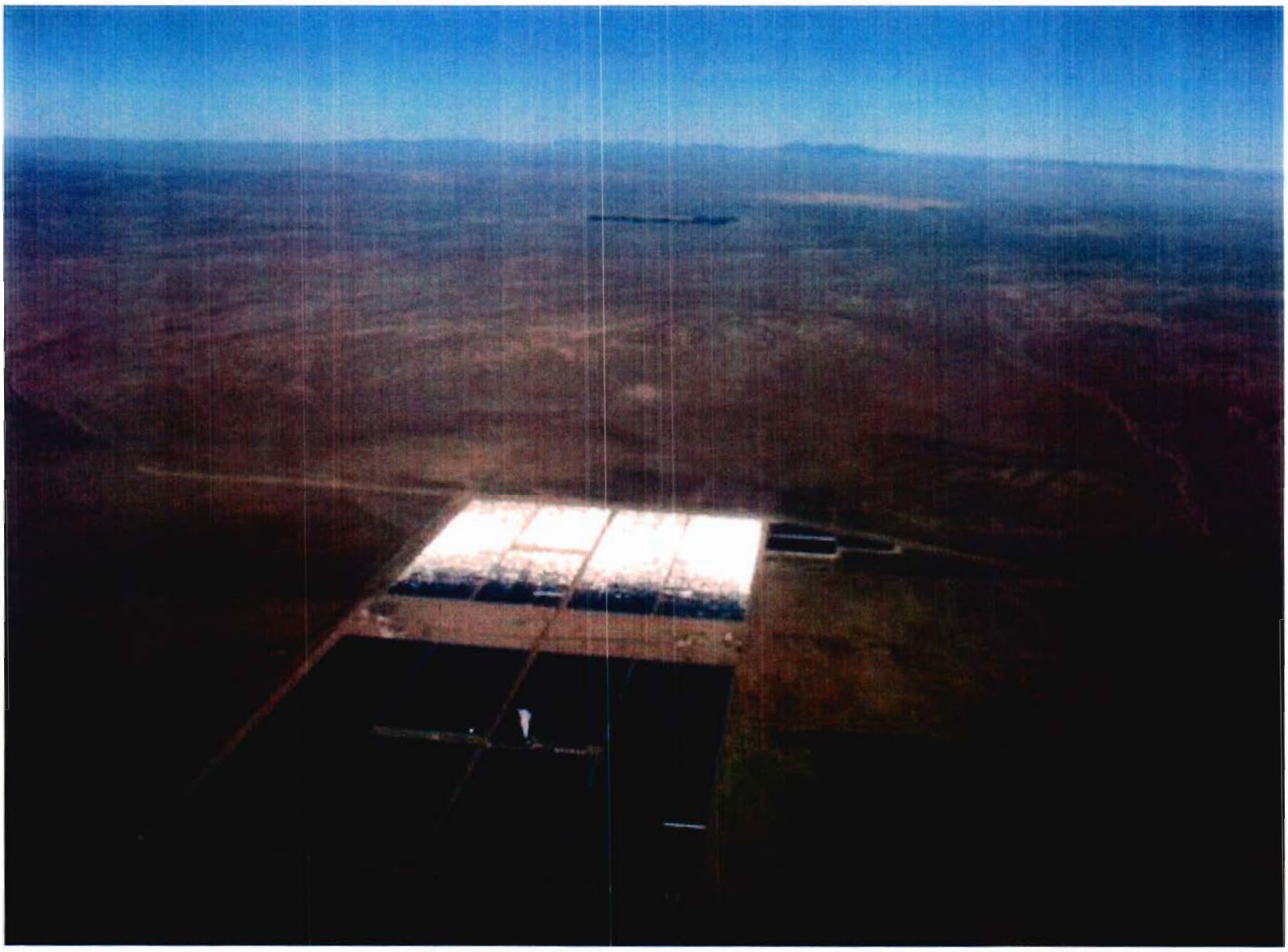
In summary, just as the CEC representative observed himself when flying over the Kramer Junction facility, the glare is not a distraction to pilots; this fact has been verified over the nearly 20 years the Kramer Junction and Harper Lake facilities have been in operation. As mentioned above – I ran the Kramer SEGS facility, maintained long-term relationships with Edwards Air Force Base command and public relations personnel and the crop dusting service who maintains and air strip adjacent to the Kramer site, and I would have been the first to know if there were any complaints or problems.

Best regards,

Scott Frier
COO, ABENGOA SOLAR INC.
(760) 617-2570







DR-WASTE-239

Information Required:

Please provide a map depicting the location and acreage for the accumulation site (for soil with HTF concentrations above 10,000 mg/kg), bioremediation unit (for concentrations between 1,000 and 10,000 mg/kg), land farming area (for concentrations between 100 and 1,000 mg/kg), and stockpile area, respectively.

Response:

There is one Land Treatment Unit (LTU) for soil on site and there will be no separate bioremediation unit or stockpile area. The LTU is located in the portion of the site north of Brown Road and east of the warehouse (Figure DR-Waste-239, provided at the end of this section). The LTU comprises approximately eight acres and measures 500 feet in the north/south direction and 350 feet in the east/west direction. This unit will utilize indigenous bacteria to digest the hydrocarbon contamination (from HTF) in non-hazardous soils with hydrocarbon concentrations less than 10,000 milligrams per kilogram (mg/kg). The contaminated soils may be dosed with nitrogen and phosphorous fertilizers to provide nutrients to stimulate consumption of HTF by natural bacteria. If the soils are lightly contaminated, with about 1,000 mg/kg or less of HTF in the soil, the soils may be managed in the same manner as soils with higher concentrations of HTF, or they may just be placed in the land treatment unit, spread to an appropriate thickness, and left to naturally attenuate without the addition of nutrients. Soils will remain in the land treatment unit until concentrations are reduced to less than an average concentration of 100 mg/kg. The remediated soil will then be used as fill material on site.

When an HTF release occurs, the soil will either be placed on a 60-mil thick high-density polyethylene (HDPE) liner near the HTF release area or taken to the LTU for stock pile storage. Small amounts of such impacted soil may be placed in 20 cubic yard roll-off bins or directly into end dump trailers to be held for characterization Impacted soil will be temporarily staged until the level of contamination is determined. If soil has less than 10,000 mg/kg of HTF contamination, it will be moved to the LTU. Soil that contains more than 10,000 mg/kg of HTF is not suitable for land treatment and will be characterized to determine if it is hazardous waste. A waste profile will then be prepared based on the characterization and submitted for acceptance by an appropriate off-site facility. While the soil is being staged and characterized, the Applicant will follow the requirements for hazardous and other materials in the California Health and Safety Code (if a hazardous waste), the Water Code (for a designated waste), and applicable implementing regulations. From here, the soils will be loaded into roll-off bins or end dump trailers for transport to the designated hazardous waste receiving facility such as a landfill. If the soil is not a hazardous waste, it may also be transported to or to a thermal treatment facility to be treated before reuse. (See DR-240).

The LTU will be permitted through a Report of Waste Discharge with the Lahontan Regional Water Quality Control Board. The LTU will be constructed to be above the level of a 100-year storm event and designed to meet seismic hazard criteria. In addition, the base of the LTU will have a greater than 5-foot separation between it and the underlying groundwater. The LTU will be constructed with a prepared base consisting of two feet of compacted, low permeability, lime-treated material. This base will serve as a competent platform for land treatment activities, and will serve to slow the rate of surface water infiltration in the treatment area. The compacted lime-treated and native soil beneath the LTU is designated as a “treatment zone” to a depth of five feet. Although the LTU will be taking vehicle traffic, no hard surface will be required, as there is no liner system to protect. A staging area is allocated in the LTU for storage of HTF-impacted soils while they are being characterized. Soil characterized as hazardous will be removed from the site; therefore, no additional liner system is required in the LTU to cater for the hazardous waste.

The LTU will be surrounded on all sides by a 2-foot high compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run on) of surface stormwater into the LTU or runoff of stormwater from the unit.

DR-WASTE-240

Information Required:

Please provide the name and address of the soil thermal treatment facility where soils with HTF concentrations above 10,000 mg/kg would be sent.

Response:

TPST Soil Recyclers of California (TPST), owned by Soil Safe Inc., is located approximately 75 miles south of the proposed RSPP at 12328 Hibiscus Road in Adelanto, California. TPST's phone number is (760) 246-8001. TPST takes non-hazardous soils with petroleum contamination and thermally treats the soil to drive off and destroy the hydrocarbons, leaving soil suitable for recycling. The facility is operated with permits from the Regional Water Quality Control Board - Lahontan Region and the Mojave Desert Air Quality Management District.

There are other suitable facilities, but they are located further away, for example in Azusa, California. Additionally, there are mobile treatment units that could be brought on site to thermally treat large quantities of hydrocarbon impacted soils that would exceed the ability of the LTU to process them. However, based on the release history from the NextEra LLC Kramer Junction Facility, which is a parabolic trough solar power plant that employs HTF in the same fashion as the RSPP it is not expected that mobile treatment facilities would be required.

DR-WASTE-241

Information Required:

Please provide a copy of the Report of Waste Discharge (ROWD) submitted to the Lahontan Regional Water Quality Control Board regarding the HTF land treatment units.

Response:

The ROWD is provided in Attachment DR-WASTE-241, at the end of this section.

DR-WASTE-242

Information Required:

Please provide information on the waste transport, recycling, and waste transfer facilities/services that may be used to transport, recycle or otherwise manage project wastes. The information provided should include, as appropriate, the following:

a. Facility/company name;
b. Phone number;
c. Location;
d. Class and/or type of service;
e. Materials accepted;
f. Permit or license for activity;
g. Recycling methods used;
h. Which project wastes will potentially be managed by the facility/service;
i. Permitted capacity;
j. Annual usage;
k. Remaining capacity;
l. Estimated closure date;
m. Expiration date for permit or license;
n. Approximate distance from site (in miles); and
o. Any special conditions or other comments pertinent to the facility or service.

Response:

Please refer to Tables DR-242-1 through DR-242-3 below. Table DR-242-1 assigns a code to the RSPP Project wastes using “C” for construction wastes and “O” for operational wastes. Table DR-242-2 provides the requested information for proposed hazardous waste treatment facilities and Table DR-242-3 provides the requested information for non-hazardous waste landfills.

Table DR-242-1 – Listing of Wastes Generated During Construction and Operation

Construction Wastes		Operational Wastes			
Code	**Description**	**Code**	**Description**	**Code**	**Description**
C-1	Construction waste – Hazardous - Empty hazardous material containers	O-1	Used hydraulic fluid, oils and grease – Non-RCRA hazardous	O-9	Spent exempt lead acid batteries
C-2	Construction waste – Hazardous - Solvents, used oil, paint, oily rags	O-2	Effluent from oily water separation system – Non-RCRA hazardous	O-10	Spent fluorescent bulbs or high-intensity discharge lamps – Universal waste
C-3	Heat exchanger cleaning waste – Hazardous - Chelant-type solution	O-3	Oil absorbent, and oil filters – Non-RCRA hazardous	O-11	Spent demineralizer resin – Non-hazardous
C-4	Spent batteries – Universal Waste - Batteries	O-4	Dirty shop rags – recyclable material	O-12	Reverse Osmosis (RO) Membrane Cleaning Waste – Non-hazardous
C-5	Aerosol cans – Universal Waste	O-5	Spent carbon – RCRA hazardous	O-13	RO system concentrate – Inert or liquid-designated waste
C-6	Non-hazardous construction waste – Scrap wood, concrete, steel, glass, plastic, paper, and insulating materials	O-6	Soil contaminated with HTF (> 10,000 milligrams per kilogram [mg/kg]) – Non-RCRA hazardous	O-14	Auxiliary cooling tower basin sludge – Non-hazardous
C-7	Sanitary waste – Non-hazardous - Portable chemical toilets	O-7	Soil contaminated with HTF (< 10,000 mg/kg) – Non-hazardous	O-15	Spent softener resin – Non-hazardous
C-8	Office waste – Non-hazardous - Paper, aluminum, food	O-8	Spent batteries – Universal Waste – Batteries	O-16	Damaged parabolic mirrors – Non-hazardous
C-9	Construction waste – Hazardous - Contaminated soil				
C-10	Construction waste – Hazardous - Flushing and cleaning wash water				

Table DR-242-2 - Potential Hazardous Waste Disposal/Treatment Facilities

a. Facility/company name	**Clean Harbors Buttonwillow, LLC /Clean Harbors**[1]	**Kettleman Hills Landfill MSW / Waste Management Inc.**	**Filter Recycling Services, Inc.**	**Siemen's Water Technology Carbon Regeneration Facility**
b. Phone number	661.762.6200	559.386.9711	909.873.4141	928.669.5758
c. Location	2500 West Lokern Road; Buttonwillow, CA 93206	35251 Old Skyline Rd. Kettleman City, CA 93239	180 W. Monte Ave., Unit A Rialto, CA 92376	2523 Mutahar Street, Parker AZ 85344
d. Class and/or type of service	Class I Landfill	Class I Landfill	Hazardous Waste Facility - Standardized Hazardous Waste Permit for Treatment and Recycling of certain non-RCRA hazardous wastes and transfer of RCRA hazardous wastes	Hazardous waste facility for thermal reactivation of activated carbon
e. Materials accepted	• Non-hazardous soil • California hazardous soil • Hazardous soil for direct landfill • Hazardous waste for treatment of metals • Plating waste • Hazardous and non-hazardous liquids • Debris for microencapsulation	The Facility accepts solid, semi-solid, and liquid hazardous and extremely hazardous wastes, <u>except</u>: Class 1, Division 1.1 or 1.2, or forbidden explosives; compressed gas cylinders (excluding aerosol cans); radioactive waste that is not exempt from regulation and licensing; biological agents or infectious wastes. The Facility also has a permit, issued by the California Integrated Waste Management Board, to receive municipal/solid wastes (i.e., non-hazardous wastes) into landfill Unit B-19. The Facility conducts the following activities: solar evaporation in three surface impoundments; disposal into two hazardous waste landfills; and stabilization, solidification and storage of bulk and drummed wastes. The Facility is also permitted to operate a drum decant unit and to construct and operate a neutralization/filtration unit and eight one-million gallon above ground evaporation tanks.	• Oily Debris • Used Oil • Used Oil Filters • Oil contaminated containers • Aerosol cans • Paint debris • Oily water • Hydrocarbon contaminated soil • Resin • Lab Pack	Spent activated carbon
f. Permit or license for activity	Part B Hazardous Waste Operating Permit ID No. CAD980675276 issued by Department of Toxic Substance Control April 6, 1996. Renewal application under agency review.	Part B Hazardous Waste Operating Permit No. 02-SAC-03; Facility ID No. CAT000646117	Series A Standardized Hazardous Waste Permit; Facility ID No. CAD98244481 Effective January 21, 2002	Interim Status pending final permit decision by US EPA Region 9 AZD982441263

Table DR-242-2 - Potential Hazardous Waste Disposal/Treatment Facilities

a. Facility/company name	Clean Harbors Buttonwillow, LLC /Clean Harbors[1]	Kettleman Hills Landfill MSW / Waste Management Inc.	Filter Recycling Services, Inc.	Siemen's Water Technology Carbon Regeneration Facility
g. Recycling methods used	Certain non-hazardous soils may be used for daily cover.	Certain non-hazardous soils may be used for daily cover.	Shredding and separation and recovery of metals, oils, and non-hazardous paper;	Thermal reactivation of spent carbon
h. Which project wastes will potentially be managed by the facility/service[1]	C-1; C-2; C-9; O-6; O-7	C-1; C-2; C-3; C-9; C-10; O-1; O-6; O-7	C-4; C-5; C-10; O-1; O-2; O-3; O-8; O-10; O-16	O-5
i. Permitted capacity	14,293,760 cubic yards	10,700,000 cubic yards	As defined by Permit (varies by waste type and management method)	2,760 lbs/hr of spent carbon
j. Usage	10,482 tons/day	8,000 tons/day	Treats more than 50,000 gallons or 100,000 pounds of waste in a month	Up to 2,760 lbs/hr
k. Remaining capacity	9,500,000	6,000,000	Not Applicable	Not Applicable
l. Estimated closure date	2040	2037-2038	Not Applicable	Not Applicable
m. Expiration date for permit or license	April 6, 2006 extended indefinitely while permit review in process. When granted, permit will be for 10 years.	June 16, 2013; renewal anticipated	January 21, 2012 subject to renewal	Review of application pending
n. Approximate distance from site (in miles)	140	190	120	350
o. Any special conditions or other comments pertinent to the facility or service	No	Also has surface impoundments for aqueous wastes.	No	No

[1] Clean Harbors website: http://clark.cleanharbors.com/ttServerRoot/Download/12381_FINAL_Buttonwillow_CA_Facility_FS_030108.pdf

1. Refer to Code description in Table DR-242-1

Table DR-242-3 - Potential Non-Hazardous Waste Disposal Facilities

a. Facility/ company name	**Ridgecrest-Inyokern Sanitary Landfill**	**Bakersfield Metropolitan (Bena) SLF**	**Shafter-Wasco Sanitary Landfill**	**Taft Sanitary Landfill**
b. Phone number	661.862.8900	661.862.8900	661.862.8900	661.862.8900
c. Location	3301 Bowman Road Ridgecrest, CA 93555	2951 Neumarkel Road, Caliente, CA 93518	17621 Scofield Ave. Shafter, CA 93263	13351 Elk Hills Road Taft, CA 93268
d. Class and/or type of service	Class III Landfill	Class III Landfill	Class III Landfill	Class III Landfill
e. Materials accepted	Agricultural, Industrial, Mixed municipal, Ash, Construction/ demolition. Non-friable asbestos and dead animals. Except - hazardous, radioactive, medical (as defined in Chapter 6.1 Division 20 of HSC), liquid, designated or other waste requiring special treatment or handling.	Non-hazardous MSW including residential, commercial, industrial, and agricultural and construction/demolition waste. Non-friable asbestos, treated wood and dead animals. Used motor oil, used motor oil filters and used antifreeze may be accepted for recycling. Except - hazardous waste as defined under CCR Title 27, hot ashes/burning material, materials containing greater than 1% friable asbestos, biohazardous waste which have not been treated as required by Section 118215 et. seq. of the California HSC, Radioactive materials requiring state or federal license and regulation, DOT Class I explosive.	Non-hazardous, construction/demolition, dead animals, green materials, inert, metals, mixed municipal waste. Treated wood and dead animals. Used motor oil, used motor oil filters and used antifreeze may be accepted for recycling. Except - hazardous, radioactive, medical (as defined in Chapter 6.1 Division 20 of HSC), liquid, designated or other waste requiring special treatment or handling.	Ash, Construction/demolition, Dead Animals, Green Materials, Industrial, Inert, Metals, Mixed municipal, Tires. Except - hazardous, radioactive, medical (as defined in Chapter 6.1 Division 20 of HSC), liquid, designated or other waste requiring special treatment or handling.
f. Permit or license for activity	Facility/Permit No. 15-AA-0059 issued by County of Kern Environmental Health Services Dept. Permitted operation include landfill disposal.	Facility/Permit No. 15-AA-0273 issued by County of Kern Environmental Health Services Dept. Permitted operation include landfill disposal.	Facility/Permit No. 15-AA-0057 issued by County of Kern Environmental Health Services Dept. Permitted operation include landfill disposal and composting.	Facility/Permit No. 15-AA-0061 issued by County of Kern Environmental Health Services Dept. Permitted operation include landfill disposal.
g. Recycling methods used	Sorting, segregation and size reduction. Recyclable waste is then packaged and hauled to specific recyclers/composting facilities/cogen facilities or used onsite (concrete for slope stability and roads, wood as mulch for wind erosion prevention).	Sorting, segregation and size reduction. Recyclable waste is then packaged and hauled to specific recyclers/composting facilities/cogen facilities or used onsite (concrete for slope stability and roads, wood as mulch for wind erosion prevention).	Sorting, segregation and size reduction. Recyclable waste is then packaged and hauled to specific recyclers/composting facilities/cogen facilities or used onsite (concrete for slope stability and roads, wood as mulch for wind erosion prevention).	Sorting, segregation and size reduction. Recyclable waste is then packaged and hauled to specific recyclers/composting facilities/cogen facilities or used onsite (concrete for slope stability and roads, wood as mulch for wind erosion prevention).

Table DR-242-3 - Potential Non-Hazardous Waste Disposal Facilities

a. Facility/ company name	Ridgecrest-Inyokern Sanitary Landfill	Bakersfield Metropolitan (Bena) SLF	Shafter-Wasco Sanitary Landfill	Taft Sanitary Landfill
h. Which project wastes will potentially be managed by the facility/service[2]	C-6; C-7; C-8	C-6; C-7; C-8; O-7; O-11; O-12; O-14; O-15; O-16	C-6; C-7; C-8; O-7; O-11; O-12; O-14; O-15; O-16	C-6; C-7; C-8; O-7; O-11; O-12; O-14; O-15; O-16
i. Permitted capacity	5,992,700 Cubic Yards	53,000,000 Cubic Yards	11,635,500 Cubic Yards	8,787,547 Cubic Yards
j. Usage	701.00 Tons/day	4,500.00 Tons/day	888.00 Tons/day	419.00 Tons/day
k. Remaining capacity	5,000,898 Cubic Yards	44,818,958 Cubic Yards	7,901,339 Cubic Yards	6,679,433 Cubic Yards
l. Estimated closure date	2014	2038	2027	2123
m. Expiration date for permit or license	Next Permit review due by July 2, 2014	Next Permit review due by October 27, 2010	Next Permit review due by March 22, 2010	Next Permit review due by February 23, 2009
n. Approximate distance from site (in miles)	10	90	140	150
o. Any special conditions or other comments pertinent to the facility or service	Unless estimated closure date changes, can be used essentially only for Construction Wastes from RSPP.	No	No	No

2. Refer to Code description in Table DR-242-1

DR-WASTE-243

Information Required:

Please provide the historic aerial photographs and topographic maps referenced above.

Response:

The historical aerial photographs and topographic maps referenced in the Phase I Environmental Site Assessment are provided at the end of this section in Attachment DR-WASTE-243.

DR-WASTE-244

Information Required:

Please consult with the China Lake Naval Weapons Test Center, and/or applicable regulatory agencies, to locate the "orphan" sites and provide the Energy Commission staff the locations and aerial imagery compiled as a result of the orphan site study.

Response:

Table DR-Waste-244 below summarizes orphan sites near the RSPP ROW and provides a brief analysis of their concern level to the Project. None of the listed orphan sites are located within the RSPP survey area and thus do not have the potential to directly impact the RSPP. The orphan site study was not able to determine if activities from the China Lake Naval Weapons Test Center have left any Munitions and Explosives of Concern (MECs)[3] or Unexploded Ordnance (UXO) at the RSPP site. However, previous research performed by CH2MHill reported in *Reconnaissance-Level Geotechnical and Water Supply Assessment for Blythe Solar Projects* and dated October 2008) stated that "the BLM notes that many of the areas located at a distance from camps or established facilities were often used for live-fire training and … were also found to contain … unexploded ordnance." Therefore, it is reasonable to assume that the China Lake Naval Weapons Test Center may have impacted the RSPP site from various types of ground or airborne munitions. The possible presence of MEC or UXO and recommended procedures to detect and mitigate resultant hazards are described in response to Waste DR-245 through Waste DR-248.

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3. MEC is a broader term that includes UXO, discarded military munitions, and munitions constituents (e.g., TNT) present in high enough concentrations to pose an explosive hazard.

TABLE DR-WASTE-244 – SUMMARY OF ORPHAN SITES LISTED BY EDR

Site Name (as on EDR)	Site Address (as on EDR)	Direction from Site	Approx. distance from Site ROW	Database Listing(s)	Database Information	Concern Level and Analysis
Environmental Test Area	China LK Propulsion	Northwest	>5 miles	CA FID UST, SWEEPS UST	Reported with one 2,000-gallon tank of an unknown substance; both listings are taken from historical databases. Listing below indicates the site as a historical UST site.	None. Based on the historical database listing and the distance from RSPP (greater than 5 miles), this site is not expected to present a concern to the RSPP.
China Lake NWC	China Lake	Northwest	>5 miles	WMUDS/SWAT	Site is reported as part of the solid waste assessment test program and associated with the Environmental Branch of the Department of Public Works, located at China Lake, 93555.	None. Based on the distance from RSPP (greater than 5 miles), this site is not expected to present a concern to the RSPP.
NAWS, Naval Air Field (Site 27)	China Lake	Northwest	>5 miles	WMUDS/SWAT	Site is reported as part of the solid waste assessment test program and associated with the Environmental Branch of the Department of Public Works, located at China Lake, 93555.	None. Based on the distance from RSPP (greater than 5 miles), this site is not expected to present a concern to the RSPP.
NAWS, Lauritsen Road LF(Site 34)	China Lake	Northwest	Street located on and off China Lake >5 miles	WMUDS/SWAT	Site is reported as part of the solid waste assessment test program and associated with the Environmental Branch of the Department of Public Works, located at China Lake, 93555.	None. Based on the distance from RSPP (greater than 5 miles), this site is not expected to present a concern to the RSPP.
Environmental Test Area	China Lake Propulsion Lab Bldg	Northwest	>5 miles	HIST UST	Site is reported with one historic 2,000-gallon Product tank installed in 1945.	None. Based on the historical database listing and the distance from RSPP (greater than 5 miles), this site is not expected to present a concern to the RSPP.
CLPL Gas Station	China Lake NAWS	Northwest; 35.6055805 / -117.6776745	Cross Street Highway 178 (approximately 5 miles away)	LUST	A release of gasoline was reported to have impacted soils only. The case status is reported as No Action; closed case status is not reported. Responsible party reported as US Navy.	None. Based on impact to soils only, closed case status, and distance from RSPP (greater than 5 miles), this site is not expected to present a concern to the RSPP.
IOB Gas Station	China Lake NAWS	Northwest; 35.6055805 / -117.6776745	>5 miles	LUST	A release of gasoline was reported to have impacted a drinking water aquifer. The case status is reported as Post Remedial Action Monitoring; closed case status is not reported. Responsible party reported as US Navy.	Low. Based on the distance from the RSPP (greater than 5 miles), site is not expected to present a concern to the RSPP.
Randsburg Gas Station	China Lake NAWS	Northwest; 35.6055805 / -117.6776745	>5 miles	LUST	A release of gasoline was reported to have impacted soils only. The case is reported as closed. Responsible party reported as US Navy.	None. Based on impact to soils only, closed case status, and distance from RSPP (greater than 5 miles), this site is not expected to present a concern to the RSPP.

Site Name (as on EDR)	Site Address (as on EDR)	Direction from Site	Approx. distance from Site ROW	Database Listing(s)	Database Information	Concern Level and Analysis
Ridgecrest Sanitary Landfill	3301 Bowman Road	North	0.63 miles	CA WDS	The site is reported with an active NPDES permit, specifically regarding an active stormwater industrial (97-03-DWQ) permit. The waste facility is reported as a Class III (non-hazardous solid wastes) active solid waste site.	None. Based on the non-contamination related nature of the database listing, this site is not expected to present a concern to the RSPP.
Ridgecrest Sanitary Landfill	3301 Bowman Road	North	0.63 miles	FINDS	Listed on the National Emissions Inventory, California Solid Waste Integrating System, and California - Used Oil Recycling System databases. Reported with supplemental interests as Refuse Disposal and Used Oil Program. Alternative names reported to be Ridgecrest Sanitary Landfill and Ridgecrest-Inyokern Sanitary Landfill.	None. Based on the non-contamination related nature of the database listing, this site is not expected to present a concern to the RSPP.
Ridgecrest Justice Building	132 Cosoa Lake	Northeast	4.5 miles	Cortese	No pertinent information was provided in the database report.	None. Based on the distance from RSPP (4.5 miles) and that the site is not listed on additional contamination-related databases, this site is not expected to present a concern to the RSPP.
Ridgecrest Family Dentistry	815 N. Downs Ste. B	North-northeast	4.5 miles	HAZNET	Wastes disposed of from the site to transfer station(s) located in Kern County include other inorganic solid waste and liquids with mercury greater than 20 milligrams per liter.	None. Based on the distance from RSPP (4.5 miles) and non-contamination related nature of the database listing, this site is not expected to present a concern to the RSPP.
Located Downtown Ridgecrest Near China Lake Naval Weapons Center	100 Las Flores Avenue	Northeast	4.6 miles	FINDS	Listed on the US EPA Air Quality System database.	None. Based on the distance from RSPP (4.6 miles) and non-contamination related nature of the database listing, this site is not expected to present a concern to the RSPP.
Ridgecrest Sanitary Landfill	5M Southwest of Ridgecrest On	North	0.63 miles	FINDS	Database report did not load; specific database information not obtained.	None. Based on the non-contamination related nature of the database listing, this site is not expected to present a concern to the RSPP.
Ridgecrest Autoworks	1200 Ridgecrest Boulevard	North-northeast	3.4 miles	HAZNET	Wastes disposed of from the site to transfer station include aqueous solution with less than ten percent total organic residues.	None. Based on the distance from RSPP (3.4 miles) and non-contamination related nature of the database listing, this site is not expected to present a concern to the RSPP.

Site Name (as on EDR)	Site Address (as on EDR)	Direction from Site	Approx. distance from Site ROW	Database Listing(s)	Database Information	Concern Level and Analysis
PG&E Ridgecrest Service Center	126 Worjma	Unknown	Unknown	RCRA-SQG, FINDS	Listed on the RCRAInfo database. Site is listed as a small-quantity generator, and historically as a large-quantity generator. No violations were noted for its generator status.	None. Based on the non-contamination related nature of the database listings, no violations were noted, and that the site is not listed on other searched contamination-related databases this site is not expected to present a concern to the RSPP.
Oro LTD Mine/Mill	HWY 14 North of Mojave	West	8.2 miles	WMUDS/SWAT	Primary wastes at the site are reported as Process Waste (products as part of the industrial/manufacturing process), which include inert/influent or solid wastes types. The associated agency reported is ORO LTD at 1539 N China Lake Boulevard, Suite 561, Ridgecrest, CA 93555.	None. Based on the distance from RSPP, this site is not expected to present a concern to the RSPP.
Ridgecrest/ Inyokern Landfill	5 Mi SW of Ridgecrest	North	0.63 miles	WMUDS / SWAT, CA WDS, LDS	Site is reported as an open land disposal site, specifically a Class III solid waste landfill for non hazardous solid wastes. Primary wastes at the site are reported as Solid Wastes, which include nonhazardous solid waste/influent or solid wastes types. The associated agency reported is Kern County Department of Public Works located at 2700 M Street Suite 500, Bakersfield, CA 93301. Land owner is reported as the BLM.	None. Based on the non-contamination related nature of the database listings and the site not listed on other searched contamination-related databases, this site is not expected to present a concern to the RSPP.

** Request sent to Ms. Peggy Shoaf on Dec 16, 2009. Received a phone call that day indicated that she would forward the information to the real estate department.

DR-WASTE-245

Information Required:

Please identify any investigations or remedial actions underway as a result of the orphan site study.

Response:

Based on the response to DR-WASTE-244, no additional investigations or remedial actions are proposed. Investigations related to UXO or MECs are discussed below in DR-WASTE-246 through 248.

DR-WASTE-246

Information Required:

Please describe the timing and methodology for completing the geophysical surveys.

Response:

Some combination of on-call or onsite Construction Support and/or munitions response geophysical surveys will be provided for all intrusive activities at the planned sites approximately two to four weeks ahead of field work. For those construction areas where no MECs have been positively identified previously, but where MECs may be present, UXO Construction Support will be provided in accordance with guidance obtained by:

- USACE, 2004, *EP 75-1-2, Munitions and Explosives of Concern (MEC) Support during Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities*;
- USACE, 2007, *EM 1110-1-4009, Military Munitions Response Actions*;
- AECOM, 2009, *Program Safety Plan, Military Munitions Response Program (Draft Outline and Definitions attached)*, and
- AECOM, 2005, *Safe Work Procedure, Munitions and Explosives of Concern Construction Support (Example Site)*.

For those construction areas where MECs have previously been discovered, or where two or more MECs per acre were identified during Construction Support activities, Analog and/or Digital Geophysical Mapping surveys will be performed over the footprint of the planned construction area two to four weeks prior to initiation of ground-disturbing activities. Geophysical surveys will be followed-up by intrusive investigation of the 100 highest priority anomalies identified by the analog or digital mapping. If the geophysical anomalies are caused by MECs, the construction footprint will be cleared to depth of detection of the instrumentation of the most appropriate instrumentation deployed (as determined by the project design team). If the geophysical anomalies are not caused by MECs, i.e., anomalies are sourced by non-hazardous munitions debris or non-ordnance objects, then further development activities will be accompanied by the resumption of Construction Support, as provided above.

Analog Geophysical Mapping surveys will be provided in accordance with the most current version of AECOM *MRG-2009-003, Standard Operating Procedure for Analog Geophysical Mapping with Real-time Instrumentation and GPS anomaly Waypoint Mapping*.

Digital Geophysical Mapping surveys will be provided in accordance with the most current version of AECOM *MRG-2009-002, Standard Operating Procedure for Digital Geophysical Mapping, EM61 Mk2 and RTK GPS Navigation with Real-time Instrumentation and GPS anomaly Waypoint Mapping.*

UXO technician support during construction activities may require only MEC standby support or subsurface removal, depending on an assessment of the probability of encountering MEC and the level of confidence associated with the determination. If the probability of encountering MECs is low (e.g., current or previous land use leads to an initial determination that MECs may be present), only MEC standby support will be required. When a determination is made that the probability of encountering MECs is moderate to high (e.g., current or previous land use leads to a determination that MEC was employed or disposed of in the area of concern), qualified UXO technicians must conduct a subsurface removal of the known construction footprint and remove all encountered MEC.

For construction activities on sites with known or suspected MECs, a UXO team consisting of a minimum of two qualified UXO personnel (UXO Technician II or above) is required. The UXO team may include additional UXO-qualified personnel, depending on site- and task-specific conditions and requirements, and the number of UXO teams will vary depending on the total level of effort.

If subsurface removal is required in support of construction activities, UXO team(s) will consist of no more than seven UXO personnel including the team leader. A Senior UXO Supervisor will be on site during operations and will not supervise more than 10 UXO teams. A UXO Safety Officer (UXOSO) is required on site during operations. A UXO Quality Control Specialist (UXOQCS) may or may not be required to be on site full time, and may be in a dual role as the UXOSO/UXOQCS if there are fewer than 15 field personnel on site.

The UXO team members have the following responsibilities for MEC support during construction on a site with known or suspected MEC:

- Provide the MEC identification, location, and safety functions for the prime contractor during construction activities.
- Conduct MEC safety briefings and UXO recognition training for all site personnel and visitors.

The UXOSO, or the senior UXO-qualified person on site if a UXOSO is not assigned, will act as the UXOSO and has final on-site authority for MEC procedures and safety issues.

DR-WASTE-247

Information Required:

Please provide the expertise and qualifications of those conducting the geophysical surveys.

Response:

All geophysical mapping surveys will be conducted under the direction of a California-registered professional geophysicist with at least 10 years of experience, including prior work on military munitions response projects.

DR-WASTE-248

Information Required:

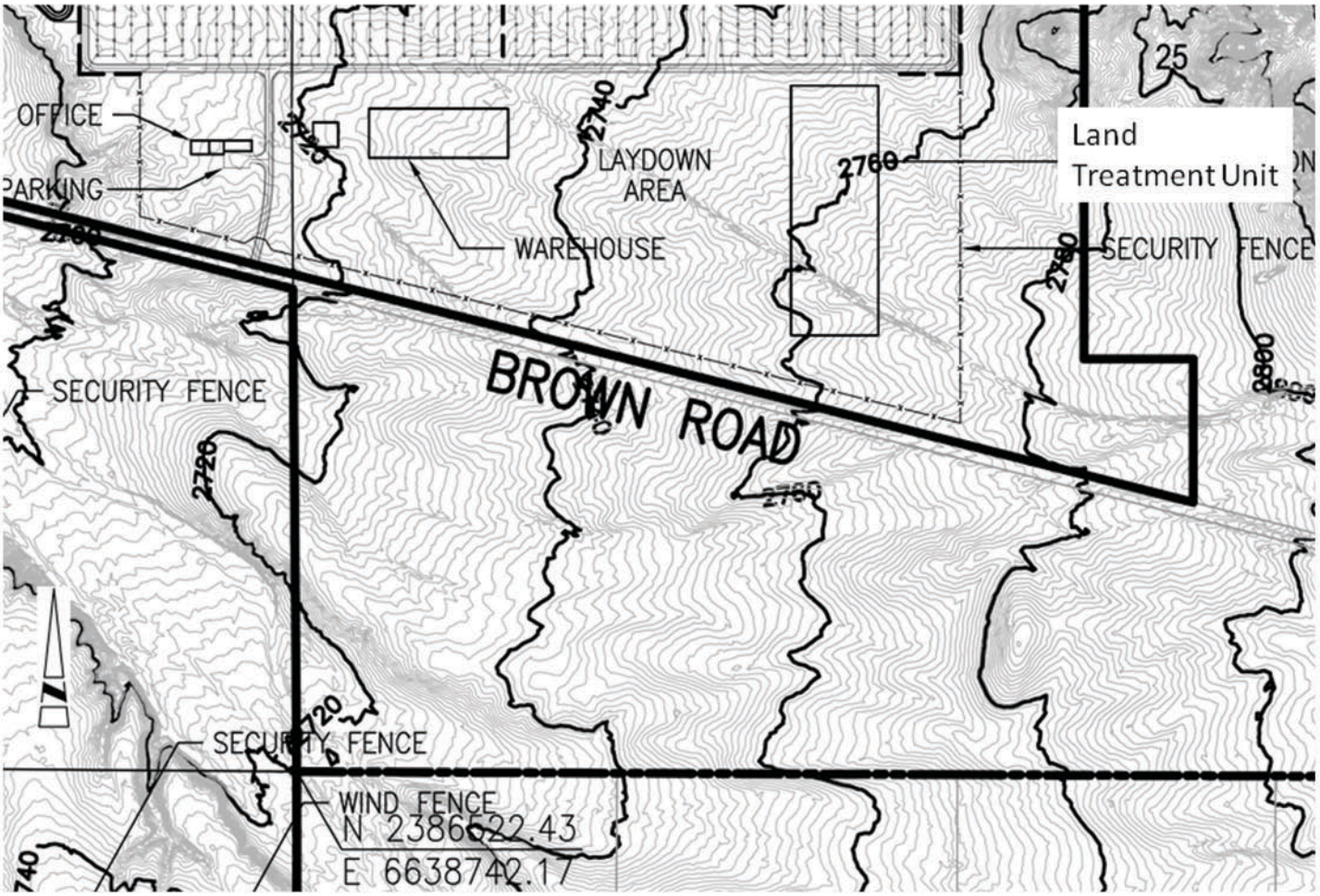
Please provide results of the geophysical survey.

Response:

Geophysical surveys, as appropriate, will be conducted two to four weeks prior to initiation of ground-disturbing activities. The geophysical survey results will be available within three to five days following actual data collection. A geophysical report documenting the survey activities and results will be provided 30 days after completion of the geophysical survey.

Attachment DR-WASTE-239

Land Treatment Unit Figure



Map Location

Not to Scale

Ridgecrest Solar Power Project
DR - Waste - 239
Land Treatment Unit

Solar Millennium

AECOM

Date: January 2010

Y:\Projects\Solar_Millennium\RSPP\MXD\Data_Adequacy\2010_01\DR-Waste-239_Land_Treatment_Unit.mxd

Attachment DR-WASTE-241

Report of Waste Discharge

AECOM
Environment

Prepared for:
Solar Millennium, LLC

RIDGECREST SOLAR POWER PROJECT
APPLICATION / REPORT OF WASTE DISCHARGE

January 2010

60139696-5450-ROWD

AECOM
Environment

Prepared for:
Solar Millennium, LLC

RIDGECREST SOLAR POWER PROJECT
APPLICATION / REPORT OF WASTE DISCHARGE

Prepared By Carmen Caceres-Schnell, PG

Reviewed By Mike Flack, PG, CEG

January 2010

60139696-5450-ROWD

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List of Acronyms

°F	degrees Fahrenheit
AC	Alternating Current
AFC	Application of Certification
AP	Alquist Priolo
ASTM	American Society for Testing and Materials
bgs	below ground surface
BMP	Best Management Practices
CCR	California Code of Regulations
CEC	California Energy Commission
CFR	Code of Federal Regulations
cm/sec	centimeters per second
COC	constituents of concern
CQA	Construction Quality Assurance
CWC	California Water Code
DC	Direct Current
DTSC	Department of Toxic Substances Control
ECM	Environmental Compliance Manager
USEPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
gpm	gallons per minute (rate)
HTF	heat transfer fluid
IWV	Indian Wells Valley
IWVWD	Indian Wells Valley Water District
LEA	Local Environmental Agency
LTU	Land Treatment Unit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mgd	million gallons per day
MSDS	Material Safety Data Sheets
MW	megawatts
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
RSI	Ridgecrest Solar I, LLC
RSPP	Ridgecrest Solar Power Project

ROWD	Report of Waste Discharge
RWQCB	Regional Water Quality Control Board
SPCC	Spill Prevention, Control and Countermeasures
SSG	solar steam generator
STG	steam turbine generator
SWRCB	State Water Resource Control Board
TDS	total dissolved solids
WDR	Waste Discharge Requirement

1.0 Application Form

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

☑ **A. WASTE DISCHARGE TO LAND** ☐ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

- ☐ Domestic/Municipal Wastewater Treatment and Disposal
- ☐ Cooling Water
- ☐ Mining
- ☐ Waste Pile
- ☐ Wastewater Reclamation
- ☐ Other, please describe: _____
- ☐ Animal Waste Solids
- ☑ Land Treatment Unit
- ☐ Dredge Material Disposal
- ☐ Surface Impoundment
- ☐ Industrial Process Wastewater
- ☐ Animal or Aquacultural Wastewater
- ☐ Biosolids/Residual
- ☐ Hazardous Waste (see instructions)
- ☐ Landfill (see instructions)
- ☐ Storm Water

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)	2. Latitude	3. Longitude
Facility:	Facility: 35 33' 21"	Facility: 117 43' 59"
Discharge Point:	Discharge Point:	Discharge Point:

IV. REASON FOR FILING

- ☑ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☐ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: California Energy Commision

Has a public agency determined that the proposed project is exempt from CEQA? ☐ **Yes** ☑ **No**

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: _____

Has a "Notice of Determination" been filed under CEQA? ☐ **Yes** ☑ **No**

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ **EIR** ☐ **Negative Declaration**

Expected CEQA Completion Date: _____

Form 200 (6/97)

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name: Ridgecrest Solar Power Plant			
Address: Southwest of US highway 395 and approximately 4.5 miles southwest of the City of Ridgecrest			
City: Ridgecrest	County: Kern	State: CA	Zip Code: 92226
Contact Person: Rachel Gold		Telephone Number: (510) 524-4517	

B. Facility Owner:

Name: Ridgecrest Solar I, LLC			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation
Address: 1625 Shattuck Ave., Suite 270			3. ☐ Governmental Agency 4. ☐ Partnership
City: Berkeley	State: CA	Zip Code: 94709-1611	5. ☑ Other: Limited liability company
Contact Person: Rachel Gold		Telephone Number: (510) 524-4517	Federal Tax ID: 26-2611825

C. Facility Operator (The agency or business, not the person):

Name: Ridgecrest Solar I, LLC			Operator Type (Check One) 1. ☐ Individual 2. ☐ Corporation
Address: 1625 Shattuck Ave., Suite 270			3. ☐ Governmental Agency 4. ☐ Partnership
City: Berkeley	State: CA	Zip Code: 94709-1611	5. ☑ Other: Limited liability company
Contact Person: Rachel Gold		Telephone Number: (510) 524-4517	

D. Owner of the Land:

Name: Bureau of Land Management			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation
Address: 300 S. Richmond Rd.			3. ☑ Governmental Agency 4. ☐ Partnership
City: Ridgecrest	State: CA	Zip Code: 93555	5. ☐ Other:
Contact Person: Hector Villalobos		Telephone Number: (760) 384-5405	

E. Address Where Legal Notice May Be Served:

Address: 1625 Shattuck Ave., Suite 270		
City: Berkeley	State: CA	Zip Code: 94709-1611
Contact Person: Rachel Gold		Telephone Number: (510) 524-4517

F. Billing Address:

Address: 1625 Shattuck Ave., Suite 270		
City: Berkeley	State: CA	Zip Code: 94709-1611
Contact Person: Rachel Gold		Telephone Number: (510) 524-4517

Form 200(6/97)

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

See attached document.

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated 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, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name: JOSEF EICHHAMMER **Title:** CEO

Signature: **Date:** 1/15/10

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

Form 200(6/97)

2.0 Introduction

This Report of Waste Discharge (ROWD) is presented to the California Regional Water Quality Control Board (RWQCB) – Lahontan Region for a proposed Land Treatment Unit (LTU) at the Ridgecrest Solar Power Project (RSPP or Project) in Kern County, California. The Project is proposed by Ridgecrest Solar I, LLC (RSI) a wholly owned subsidiary of Solar Millennium, LLC. The Project site is located southwest of U.S. Highway 395 and approximately five miles southwest of the City of Ridgecrest, California in northeastern Kern County.

It is RSI's understanding, based on prior projects of a similar nature and discussion with the California Energy Commission (CEC), that the RWQCB will not be issuing any permits (e.g., Waste Discharge Requirements [WDR]) for the Project. Rather, the CEC, pursuant to its authority under State law (Warren Alquist Act), will issue its permit/certification (and act as California Environmental Quality Act lead agency) for the Project in lieu of any RWQCB permits. Under the Warren-Alquist Act and the Governor's Executive Order S-14-08, the CEC has the authority to streamline permitting for renewable energy generation facilities. The CEC implements an "in lieu" permit process by incorporating the regulatory requirements and conditions of the various local and State agencies in its certification process. All necessary State and local permits for this facility, including those permits typically issued by the Water Board, are issued to the applicant through the CEC's certification process. This document is provided to the RWQCB to allow for Board input and to make sure that the CEC's Conditions of Certification (COCs) contain all substantive requirements that the RWQCB would otherwise have put into the WDRs.

To support the formulation of those substantive requirements, RSI is submitting the necessary information required for the RWQCB to support the preparation of COCs and issue what would otherwise be a draft WDR. The information has been provided in a ROWD format, including an application, and complies fully with the requirements set forth under the California Code of Regulation (CCR) and California Water Code (CWC) for non-hazardous LTUs. This ROWD application will also provide full compliance with the requirements of the Porter-Cologne Water Quality Control Act and relevant regulations established under the CWC.

As discussed in detail below, the Project will not cause or contribute to an exceedance of water quality standards established for surface water and groundwater under the Colorado River Basin Plan. An analysis showing compliance with the RWQCB anti-degradation objective is provided in **Appendix A**.

2.1 Purpose

RSI is proposing to construct, own, and operate the Project. The Project is a concentrated solar thermal electric generating facility located in the high northern Mojave Desert in northeastern Kern County, California, about five miles southwest of the City of Ridgecrest, California **(Figure 1)**. The Project right-of-way (ROW), for which RSI has applied to the Bureau of Land Management (BLM), will extend across approximately 3,995 acres of public lands owned by the Federal government and managed by BLM. The Project facilities will occupy 1,448 acres of the 3,995-acre site, and there will be a total disturbance area (including areas outside the facility fence line), of approximately 1,944 acres. The Project will use proven parabolic trough solar thermal technology to produce electrical power using a steam turbine generator (STG) fed from a solar steam generator (SSG). The SSG receives heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

RSI proposes to use an LTU as part of the Project to manage any release of HTF to the environment. The LTU is the facility that receives and temporarily stores any soil contaminated with HTF. This application fulfills the regulatory requirements to obtain the needed approvals for this Project component.

2.2 Project Description

The Project will have a nominal electrical output of 250 megawatts (MW) consisting of two solar fields, Southern Field and Northern Field **(Figure 2)**. Commercial operation is planned to commence by the third quarter of 2013, subject to timing of regulatory approvals and RSI achievement of project equipment procurement and construction milestones. The solar thermal technology will provide 100 percent of the power generated by the Project; no supplementary energy source (e.g., natural gas to generate electricity at night) is proposed to be used for electric energy production. The Project will utilize an auxiliary boiler fueled by propane to reduce startup time and for HTF freeze protection. The auxiliary boiler will supply steam to the HTF freeze protection heat exchangers during nighttime hours to keep the HTF in a liquid state when ambient temperatures are not sufficient to keep the temperature of the HTF above its relatively high freezing point (54 degrees Fahrenheit [°F]). In order to fuel the boiler and HTF heat exchanger, propane will be delivered to the site via truck from a local distributor and stored in a 18,000 gallon above ground tank. The Project will also have one electric and one backup diesel-fueled fire water pump for fire protection.

The Project proposes to use a dry cooling condenser for power plant cooling. Water for the cooling tower makeup, process water makeup, and other industrial uses such as mirror washing will be supplied by the local municipal water district via a new pipeline. This source will also be used to supply water for employee use (e.g., drinking, showers, sinks, and toilets). Water received from the Indian Wells Valley Water District (IWVWD) will meet the requirements of the California Department of Health Services for potable water supplies and will not require further treatment for this purpose. Power cycle makeup, mirror washing water, and cooling of ancillary equipment will require onsite treatment for reduction of dissolved solids, and this treatment varies according to the quality required for each of these uses. A sanitary septic system and onsite leach field will be used to dispose of sanitary wastewater.

The power generation cycle will not produce cooling tower blow down because the plant will be dry cooled. A small auxiliary cooling tower will generate a small amount of blow down which will be reused onsite. No off-site backup cooling water supply is planned at this time.

A sanitary septic system and onsite leach field will be used to dispose of sanitary wastewater and will be permitted through the County of Kern. Based on a current estimate of 2,700 gallons of sanitary wastewater production per day, a total leach field area of approximately 5,500 square feet will be required. It is expected that the leach fields will satisfy the needs of the Project for its entire service life. There is no process or operational wastewaters that will be connected to the septic system and leach field.

The Project will include a LTU to treat soil contaminated with HTF. Based on the release history from the NextEra LLC Kramer Junction Facility, which is parabolic trough solar power plant that employs HTF in the same fashion as proposed for the RSPP and also has a LTU for treatment of HTF-contaminated soil, the LTU has been designed in accordance with CCR Title 27 requirements and designed to receive about 3,332 cubic yards of impacted soil on an annual basis. There is one LTU proposed for the Project. The LTU will cover about four acres and measures 500 feet in the north/south direction and 350 feet in the east/west direction **(Figure 2)**. The LTU will use indigenous bacteria and amendments to the soil to bioremediate HTF-affected soils to levels acceptable for reuse on the site. Characterization of the hazardous characteristics of HTF-affected soil will be established by the Department of Toxic Substances Control (DTSC) prior to operation and LTU use for soil remediation. Soils in excess of the criterion established by the DTSC will be removed from the site and transported to an appropriate treatment storage and disposal facility. Soil with HTF concentrations below this criterion will be managed in the LTU and remediated to acceptable levels for reuse as fill onsite.

The estimated project life for the Project is 30 years. Personnel will staff the facility 24 hours per day/seven days per week. Even when the solar power plant is not operating, personnel will be present as necessary for maintenance, to prepare the Project for startup, and/or for site security.

3.0 Physical Setting

3.1 Site Location

The Project site is located southwest of U.S. Highway 395 and approximately five miles southwest of the City of Ridgecrest, California in northeastern Kern County **(Figure 1)**. The Applicant-owned facilities will be entirely on public land, BLM ROW # CACA 49016, in Township 28 South, Range 39 East and Township 27 South, Range 39 East. Ridgecrest is at the southern boundary of the northernmost of two discrete sections of China Lake Naval Air Weapons Station (NAWS).

3.2 Floodplain

The Project site is located in the Indian Wells Valley in the southern end of the Basin and Range province. The Valley is east of the Sierra Nevada, south of the Caso range, north of the El Paso Mountains, and the west of the Argus Range. Topography at the RSPP site slopes gently away from the El Paso Mountains from the south to the north-northwest across the site **(Figure 3)**. The topography shows an average slope of about one foot in 80 feet (1.2 percent) on the west side of the central drainage (El Paso Wash) crossing the Project site. There are steeper grades east of the El Paso Wash on the Project site. Grades of 1.5 percent to 2.3 percent to the north and northwest are measured from an unnamed topographic high on the eastern boundary of the Project site.

Surface water in the Indian Wells Valley drains from the surrounding mountains toward China Lake just north of Ridgecrest, a dry lake or playa, which is located approximately 12 miles northeast of the RSPP site. There are no perennial surface water bodies in Indian Wells Valley. During wet years, some surface flow enters the Valley through the Little Lake Gap. The major watercourse in the project area is El Paso Wash which drains approximately 20 square miles from the El Paso Mountains and exits the mountains to the south of the site.

According to the Federal Emergency Management Agency (FEMA) flood insurance rate map, the Project Site contains areas predisposed for minimal flooding and areas within the 100-year flood zone (FEMA 2006). The 100-year flood zones onsite follows the trend of the El Paso Wash and other unnamed drainages through the Project site **(Figure 3).**

The proposed solar field improvements will not change the existing offsite drainage patterns. The El Paso Wash and an unnamed wash on the west will not be altered as a result of the Project. Storm Water Pollution Prevention Plans (SWPPPs) and a CEC-mandated Drainage, Erosion, and Sediment Control Plan (DESCP) were provided in the September 2009 RSPP Application for Certification (AFC), and contain Best Management Practices (BMPs) that will be implemented to avoid significant drainage/storm water runoff and water quality impacts to surface waters.

3.3 Climatology

The Project site is located in the Mojave Desert, which is classified as a “high desert”. It is a transition between the “hot” Sonoran Desert to the south and the “cold” Great Basin Desert to the north. Characteristic of a desert climate, the Mojave Desert has extreme daily temperature changes, low annual precipitation **(Figure 4)**, strong seasonal winds, and mostly clear skies. Evaporation rates tend to be higher than precipitation rates even in the wettest months, which last from November to March.

The area is characterized by very hot summer temperatures, with the mean maximum temperatures in July and August exceeding 100°F. Winter temperatures are more moderate, with mean maximum temperatures in the 60s and lows in the 30s. Minimum temperatures below freezing (32°F) occur on an average of about one day per year. **Table 1,** Site Climate Data, shows the site weather data based on the gauging station at Inyokern (Station 044278). The Ridgecrest area receives less than five inches of rainfall per year. The majority of the rainfall occurs during November and March, but rainfall during the late summer is not

uncommon. There is, however, a summer thunderstorm season from July to September with violent heavy precipitation that occasionally produces flash flooding.

Based on the data from the National Oceanic and Atmospheric Administration Atlas Precipitation Frequency Data Server, 24-hour design storm precipitation depth is as follows:

- 1.10 inches for the 2-year, 24-hour storm event;
- 1.97 inches for the 10-year, 24-hour storm event;
- 3.25 inches for the 100-year, 24-hour storm event;

Table 2, Site Evaporation and Precipitation Data shows the evaporation and precipitation data assumed for the site. The average annual precipitation for the Project area is shown on **Figure 4**. The storm conveyance system is designed to contain the 100-year, 24-hour storm event.

The most significant large-scale phenomena affecting air quality in the Project area are the transport winds from the southwest. These winds are responsible for bringing ozone and other pollutants through the Cajon Pass from the Los Angeles Basin. A wind rose for the Ridgecrest monitoring station for 2003 to 2007 is presented in **Figure 5**.

3.4 Seismicity

The Project site is located in seismically active Southern California, a region that has experienced numerous earthquakes in the past. A review of the Alquist-Priolo (AP) Earthquake Fault Zone maps, **Figure 6a** and **Figure 6b**, and the Kern County Online Mapping System Faults and Fault Zones layer indicate that there are no AP fault zones present within the Project boundaries.

An unnamed buried fault trace has been mapped as trending northwest-southeast across the center of the site. Based on personal communication with Glen Harris (BLM Ridgecrest office), site features, and observations made during a July 2009 field reconnaissance, the more probable location of the unnamed fault is just north of, and parallel to Brown Road, and trends roughly east-west. This fault has not been mapped by the United States Geological Survey (USGS) as a Quaternary (sufficiently active) fault, and is not listed by the EQFAULT program as a fault potentially affecting the site.

Regardless of whether there are faults across the site, because the Project is located in a seismically-active area, all Project structures must be designed to comply with the California Building Code (CBC) and US Building Code (UBC) Zone 4 requirements. The CBC and UBC are considered to be standard safeguards against major structural failures and loss of life. The goals of the Codes are to provide structures that will:

1) resist minor earthquakes without damage;

2) resist moderate earthquakes without structural damage but with some non-structural damage; and

3) resist major earthquakes without collapse but with some structural and non-structural damage.

The CBC and UBC base seismic design on minimum lateral seismic forces ("ground shaking"). The CBC and UBC requirements operate on the principle that providing appropriate foundations, among other aspects, helps to protect buildings from failure during earthquakes.

3.5 Hydrogeology

The Indian Wells Valley is composed of two broad geologic units, consolidated rocks and unconsolidated deposits **(Figure 6a** and **Figure 6b)**. The consolidated rocks consist of Mesozoic igneous and metamorphic rocks, which form the basement complex (Sierra Nevada Batholith); Tertiary continental deposits; and Miocene volcanic rocks. The Mesozoic basement complex exists below 2,000 feet to as much as 6,000 feet of alluvial fill, underlie the groundwater basin, and crop out in the surrounding hills. The Tertiary continental deposits overlie the basement complex and fill the valley to approximately 1,000 feet below ground surface.

Miocene volcanic rocks crop out along the perimeter of the basin, more specifically, near the El Paso and Coso Mountains. The consolidated rocks are nearly impermeable except for areas where fracturing or weathering has occurred. These rocks are believed to yield little water to the overlying alluvial aquifer system.

3.5.1 Hydrostratigraphy

Previous investigations have divided the unconsolidated Quaternary deposits into two main aquifers: the shallow aquifer and the deep aquifer. However, a recent study by Brown and Caldwell identified four hydrostratigraphic features in the IWV Groundwater Basin. The features are: 1) Fine-Grained Sediment Plug, 2) Gravel Zone, 3) High Gradient, and 4) Playa. **Figure 7** shows the location of these features.

- The Fine-Grained Sediment Plug located approximately three to four miles east of the Sierra Nevada mountain front and trends north-south. The upper contact of this feature begins at depth of approximately 340 feet bgs and sediments may be as much as 1,340 feet thick. The areal extent of this deposit is not well defined due to limited borehole data.
- The Gravel Zone is a west-east trending area of coarse-grained high permeability sediments. This area is located from the mouth of Indian Wells Canyon to approximately the northwest portion of Ridgecrest, extends approximately two miles north-south, and fines to the east. This region is referred to the Inyokern and Intermediate Areas and contains high volume production wells. Wells within the Ridgecrest city limits are believed to be associated with this Gravel Zone; however, wells in this area have a higher percentage of fines and, therefore, their groundwater production is lower than the wells to the west.
- The High Gradient area extends from the El Paso sub-Basin into the main IWV Groundwater Basin near the southwestern portion of the valley. Groundwater gradients in this area have been measured at approximately 100 feet per mile. Brown and Caldwell propose that the high gradient may be caused by a combination of a narrowing of the area available for flow and the influx of recharge from Freeman Canyon. In addition, the high hydraulic gradient could be related to the contrast in aquifer transmissivity from the narrows to the high permeability zone to the north.

The Playa feature identified by Brown and Caldwell is located in the area of China Lake. The thickness of these sediments is not known, but are likely several tens of feet thick. Deposits are highly micaceous, silt sandy silt, and fine sand with occasional plastic clays. Shallow water beneath China Lake is highly saline and unfit for most uses.

3.5.2 Aquifer Characteristics

In the development of a groundwater flow model and hydorgologic study for the IWV Groundwater Basin, Brown and Caldwell used hydraulic conductivity values ranging from 0.1 ft/d to 100 ft/d. These values were based on geologic logs, pre-existing groundwater modeling studies, and interpretations based on local geology, depositional environments, and groundwater flow regime. The model showed that the areas with the highest hydraulic conductivities are generally located immediately east of the Sierra Nevada. Areas of the IWV Groundwater Basin with lower hydraulic conductivities are localized and distributed throughout the Basin.

Published aquifer testing data reports transmissivity values from less than 1,400 ft^2/d to 36,800 and 44,000 ft^2/d to 155,000 ft^2/d. Both sets of values were based on aquifer testing and geologic data. The Brown and Caldwell (2009) model used specific yield ranges of 0.05 to 0.15. Reported well yields in the lower aquifer are more than 1,000 gpm and some wells consistently yield more than 2,000 gpm. The IWV Groundwater Basin has an estimated storage capacity of about 2,200,000 acre-feet (af) and 5,120,000 af. The calculated storage of 2,200,000 af is based on 1921 water levels as a steady state limit and 200 feet below this level as the economically feasible limit to extract groundwater.

3.6 Water Supply

The Project will be dry cooled. The Project's various water uses include water for solar collector mirror washing, makeup for the SSG feed water, dust control, water for cooling plant auxiliary equipment, potable water and fire protection. Water needs for the Project will be met by the Indian Wells Valley Water District (IWVWD). The estimated water supply need for the Project is 150 af per year. Details of expected operational water use for the Project by month are provided below:

Estimated Water Usage

Month	Approximate Water Usage Acre-Feet (gpm)[1]	Month	Approximate Water Usage Acre-Feet (gpm)[1]
January	3.67 (28.25)	July	16.24 (118.55)
February	8.29 (60.48)	August	16.23 (118.48)
March	11.34 (82.80)	September	14.35 (104.73)
April	15.58 (113.71)	October	10.24 (74.75)
May	17.43 (127.20)	November	7.94 (57.95)
June	17.54 (128.07)	December	6.67 (48.68)

1. The estimated groundwater usage gpm is based on average daily consumption and assumes continuous pumping. Peak groundwater pumping rates during summer months will be up to 128 gpm.

Water provided from the IWVWD for process and cooling water needs will be stored in a 1,500,000 gallon permeate tank, which will provide enough storage capacity for a five-day total interruption of water supply to the facility as well as water for fire protection. Water for domestic uses by Project employees will also be provided by IWVWD and will be treated to potable water standards by an RO water treatment unit and chlorination. The typical quality of ground water that will be supplied by IWVWD is shown in **Table 3**. Water received from IWVWD will meet the requirements of the California Department of Health Services for potable water supplies and will not require further treatment for this purpose. Water used for power cycle makeup, mirror washing water, and cooling of ancillary equipment will require onsite treatment for reduction of dissolved solids.

4.0 Waste Classification and Management

The Project HTF (Therminol VP-1 or equivalent) is an oil that consists of a mixture of biphenyl and diphenyl oxide and that is solid at temperatures below 54°F, is relatively insoluble in water (solubility of approximately 25 miliigrams per liter [mg/L]), combustible, and has relatively low volatility (Solutia 2006). The components of HTF biodegrade relatively rapidly in the environment, have slight toxicity to tested terrestrial species, higher toxicity to tested aquatic species, and a potential to bio-accumulate (IPCS 1999; JECFA 2003; SOCMA Biphenyl Working Group 2003). Material Safety Data Sheets (MSDS) for HTF are provided in **Appendix B**.

4.1 Heat Transfer Fluid – Physical, Chemical and Toxicological Characteristics

HTF is composed of approximately 76.5 percent biphenyl and 23.5 percent diphenyl ether (**Appendix B**). Specific information requested on HTF or each of these compounds as available is as follows:

4.1.1 Degradation Rates

- Complete Product: An online MSDS reports aqueous biodegradation (elimination of dissolved organic carbon) of Solutia VP1 in OECD test 302A (inoculated with sewage) in 28 days.
- Biphenyl: Biphenyl has a soil half-life of 32 to 168 hours (Howard and Printup 1991). In a silt loam soil, 86% of originally applied biphenyl mineralized to carbon dioxide in 98 days (Fries and Morrow 1984). In another soil, 81% of biphenyl initially applied was mineralized after 24 days (Focht and Brunner 1985).
- Diphenyl ether: structurally similar 4,4' diaminodiphenyl ether has a soil biodegradation half life of 672 hours to 6 months (Howard and Printup 1991). Although biodegradation can occur, as discussed below, photodegradation is expected to drive the half-life of diphenyl ether in soil.
- At the Kramer Junction facility, HTF-contaminated soils with concentrations between 1,000 and 10,000 milligrams per kilogram (mg/kg) have treatment times that vary between one and four months. The variation in treatment times varies with ambient air and soil temperature.

4.1.2 Potential Breakdown Products

A study with a pure culture inoculum showed that the metabolites of biphenyl degradation are 2,3-dihydro-2,3-dihydroxybiphenyl, alpha-hydroxy-beta-phenylmuconic semi-aldehyde, phenyl pyruvate and benzoic acid (Tucker et al. 1975). Each of these compounds is more readily biodegraded than biphenyl, and biological transformations are expected to occur intracellularly. Similar information is not available for diphenyl ether.

4.1.3 Toxicity

- Complete Product: Acute animal toxicity data.
- Oral: LD50, rat, 2,050 mg/kg, No more than slightly toxic.
- Dermal: LD50, rabbit, > 5,010 mg/kg, Practically nontoxic after skin application in animal studies.
- Inhalation: LC50, rat, 2.66 mg/l, 4 h, Toxic based on animal inhalation exposure studies.
- Skin irritation: rabbit, Slightly irritating to skin, 24 h.
- Repeat dose toxicity: rat, inhalation, 13 weeks, produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies.

- Repeat dose toxicity: rat, gavage, 26 weeks, produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Effects only observed at very high dose levels. Target organs affected kidneys, liver, spleen.
- Repeat dose toxicity: rat, diet, subchronic, repeated oral exposure produced liver and kidney changes in animal models. Target organs affected liver and kidneys.
- Developmental toxicity: rat, gavage, no effects on offspring observed in laboratory animals in the presence of maternal toxicity (**Appendix B**).

4.1.4 Fate and Transport Information

- Biphenyl: Based on K_{oc} values as high as 3,300 (Briggs 1981), biphenyl is expected to have low to slight mobility in soil and adsorption to soil is expected to attenuate volatilization. Biphenyl is not expected to volatilize from dry soil surfaces based upon a vapor pressure of $8.93X10^{-3}$ millimeters of mercury (Southward and Keller 1986). As previously discussed, biodegradation is the expected fate for biphenyl in soil.
- Diphenyl ether: An experimental K_{oc} value of 1950 (Burkhard et al. 1984) suggests that diphenyl ether will have low mobility in soil (Swann et al. 1983). Transport from terrestrial surfaces to air via evaporation (Bauer et al. 1988) is expected to occur, attenuated by sorption to soil. The rate constant for the vapor phase reaction of diphenyl ether with photochemically produced hydroxyl radicals has been estimated to be $1.9X10^{-11}$ cu cm/molecule-sec at 25 degrees Celsius, which corresponds to an atmospheric half-life of about 20 hours (Meylan and Howard 1993).

4.2 Waste Classification

The HTF-affected soils will be characterized as hazardous or nonhazardous waste prior to determination of whether the material can be treated at the LTU or must be removed for off-site disposal. Therefore, HTF-affected soils will be relocated to a temporary staging area in the LTU and characterized consistent with California Department of Toxic Substances Control (DTSC) protocols. Soil sample of excavated HTF-affected soil will be collected in accordance with the EPA's current version of the manual "Test Methods for Evaluating Solid Waste" (SW-846) and the waste material will be characterized in accordance with State and Federal requirements. Soil samples will be analyzed for HTF constituents (biphenyl and diphenyl ether) using modified EPA Method Modified 8015.

Prior to operation of the LTU and initiation of any onsite remediation of HTF, the waste stream will be characterized and a waste classification determination rendered by the DTSC. Initially, in addition to sampling for HTF, soil samples will also be analyzed for ignitability and toxicity using appropriate State and Federal methods to characterize the waste as hazardous or non-hazardous. Once a sufficient data set has been accumulated to allow characterization of the material as hazardous or non-hazardous waste based on HTF content and generator knowledge, the DTSC will be petitioned for a determination of waste classification for HTF-affected soils generated at the facility. Following this determination, subsequent samples will only be analyzed for HTF to determine disposition of the waste either for remediation or for transportation and disposal off site. If the soil is characterized as a hazardous waste, the impacted soils will be transported from the site by a licensed hazardous waste hauler for disposal at a licensed hazardous waste landfill or treatment storage and disposal facility (TSDF).

Based on the classification practice and management of similar waste stream at the Kramer Junction Solar Electric Generating System (SEGS) facility in Kern County, it is anticipated that soil containing 10,000 mg/kg HTF or more will be managed as hazardous waste, and that soil containing less than 10,000 mg/kg HTF will be non-hazardous waste and thus can be managed at the site. At the Kramer Junction facility, the DTSC issued a letter dated April 4, 1995, stating that soil contaminated with HTF "poses an insignificant hazard" and classifies the waste as non-hazardous for soils with a concentration of less than 10,000 mg/kg HTF pursuant to CCR Title 22, Section 66260.200(f) (**Appendix C**). Given that the formulation of HTF has not changed significantly since this determination, it is anticipated that future waste characterization at RSPP will yield a similar result, although the DTSC has indicated that this decision must be made on a project

specific basis (i.e., the Kramer Junction classification does not necessarily ensure the same classification for the RSPP).

All HTF-affected soil classified as a hazardous waste will be removed for the site for proper off-site disposal. Therefore, the material in the LTU will be managed as a non-hazardous “designated waste” as defined in CCR Title 23, Chapter 15, Section 2522. Based on waste discharge requirements for similar sites, soil containing HTF in concentrations less than 100 mg/kg will not be regulated as a waste and could be reused as fill onsite.

4.3 Waste Management

The LTU will be used to treat HTF-affected soil at various concentrations. A process flow diagram showing the management and treatment of the HTF-affected soil is presented in **Figure 8**. Spills of HTF will be cleaned up within 48 hours and affected soil will be moved to a temporary staging area in the LTU where it will be placed on 60-mil plastic and covered with plastic sheeting pending receipt of analytical results and characterization of the waste material. As possible, free liquids will be removed using a vacuum truck. The liquids will be filtered and reused to the extent possible and reintroduced into the process. Filtrate will be characterized though will likely be managed as hazardous waste, as the concentration in the filtrate will likely be more than 10,000 mg/kg HTF.

No HTF-affected soils characterized as hazardous waste will be disposed or treated onsite. As stated previously, it is anticipated that soil containing 10,000 mg/kg HTF or more will be managed as hazardous waste, and that soil containing less than 10,000 mg/kg HTF will be managed at the site as non-hazardous waste. If the soil is characterized as a non-hazardous waste, it will be spread in the LTU for bioremediation treatment. If soil containing 10,000 mg/kg HTF or more is characterized and determined to be non-hazardous in accordance with California regulations, the soil will be sent off site either to a Class II landfill or a soil thermal treatment facility. In general, within the LTU, more highly contaminated soil will be covered with plastic sheeting to prevent contact with storm water and to control potential odors and emissions, as well as for moisture and temperature retention. Once the soil has been treated to a concentration of less than 100 mg/kg HTF, it will be moved from the LTU to another portion of the site until it is reused at the Project site as fill material.

Based on available operation data from other sites, it is anticipated that approximately 833 cubic yards (on average) of HTF-affected soil may be treated per year. Larger or smaller quantities could be generated during some years, depending on the frequency and size of leaks and spills.

A Spill Prevention, Control, and Countermeasure (SPCC) plan will be undertaken for the Project. Periodically, equipment failures in and around mirror fields are expected at the Project that may result in spills of HTF onto soil.

Excess wastewater or rain fall may occasionally accumulate in an LTU. The LTUs have been constructed with 2-foot high berms such that storm water will not drain into or from the LTU. Storm water that falls within the LTU berms will be collected in a sump located at the lowest point of the LTU. Any standing liquids in the LTU or sump will be removed within 48 hours. Based on the frequency of storms in the area, it is anticipated accumulation of rainwater within the containment would occur on a yearly basis. Water that accumulates within the LTUs will be removed using a vacuum truck and sampled for HTF and amendments as described in Section 12. If HTF is not detected above the practical quantitation limit (PQL) and amendment concentrations (i.e., nitrate, phosphate, TDS) are at or near background groundwater concentrations and below State of California primary or secondary maximum contaminant levels the water may be reused in the plant process. If HTF is detected and amendment concentrations exceed background or drinking water standards the waste will be properly disposed of at a licensed TSDF.

5.0 Monitoring and Reporting Requirements

The suggested monitoring and reporting requirements for the LTU is described below.

5.1 Heat Transfer Fluid-Affected Soil

Representative soil samples will be collected for every batch of HTF contaminated soil undergoing treatment in the LTU and composited according to methods specified in USEPA SW-846. The samples will be analyzed for HTF constituents using USEPA Method 8015. The results will be used to segregate the soils for treatment or direct disposal to an appropriate hazardous waste landfill or treatment storage and disposal facility.

5.2 Land Treatment Unit Detection Monitoring

Inspection of the LTU will be conducted monthly. The inspection will involve visual observation to identify the potential presence of cracks or subsidence in the base soil layer and perimeter berms that could allow penetration or migration of contaminants. Inspection of the effectiveness of general housekeeping, run-on controls, and the soil piles for odors and fugitive dust may be required for regular maintenance.

Annually, soil samples will be collected using a hand auger or GeoProbe™ at a depth of 1 foot below the compacted soil base at the LTU (approximately 6 feet bgs) and analyzed for HTF using modified USEPA Method 8015 to verify that HTF is not migrating below the 2 foot compacted clay liner and 3 foot compacted native material. If the laboratory results indicate that the HTF concentrations are greater than the laboratory detection limit, additional soil samples will be collected at successively deeper depths (using 1-foot intervals) until laboratory analytical results show that concentrations are less than the laboratory detection limit. If HTF concentrations above the laboratory detection limit are found below the 5-foot treatment zone, the facility will implement the Corrective Action Plan and submit a letter to the RWQCB highlighting the "evidence of a release."

Ground water beneath the LTU is approximately 480 feet or greater below the ground surface. The HTF material is oil that is solid at temperatures below 54°F and has relatively low solubility and a high sorption potential. The components of HTF are reported and have been demonstrated at Kramer Junction to biodegrade relatively rapidly within a four- to six-month period. Given the great distance to groundwater, the physicochemical properties of HTF showing a limited potential to migrate within the environment and the propensity to biodegrade, the proposed detection monitoring is sufficient to protect ground water resources beneath the site. Additional detection monitoring beyond these efforts does not appear to be warranted.

6.0 Record Keeping and Reporting Program

6.1 General Reporting

By January 31 and July 31 of each year, a report will be provided to the RWQCB including the following information for the period from January through June:

- HTF spill volumes of 20 gallons or greater,
- Locations of spilled HTF, and
- Dates of spills.

The report shall include:

- Total volume of contaminated soil resulting from spills regardless of the volume of HTF spilled,
- Analytical results of the HTF contaminated soil,
- Disposition of the contaminated soil,
- Total volume of contaminated soil, and
- Breakdown of the total volume by disposition location (e.g., hauled off site as hazardous waste, discharged to the LTU, or re-used onsite).

By January 31 of each year, an annual report will be provided to the RWQCB including the preceding semi-annual information and with the following information:

- Evidence that adequate financial assurance for closure, post-closure, and reasonably foreseeable releases is still in effect and may be verified by including a copy of the renewed financial instrument or a copy of the receipt for payment of the financial instrument;
- Evidence that the amount is still adequate or if not, that the amount of financial assurance has been increased by the appropriate amount, due to inflation, a change in the approved closure plan, or other unforeseen events;
- A review of the closure plan and a statement that the closure activities described are still accurate or an updated closure plan; and

6.2 Unscheduled Reports to be Filed with the Regional Board

Incidents that result in implementation of SPCC Plan response procedures will be reported to the appropriate agencies under the timelines provided below. If such incidents threaten to result in an off-site discharge, or may present a potential threat to human health or the environment, immediate verbal notification shall be made as specified in the SPCC Plan. A record of such verbal communications will be maintained in the operating record. As specified by State and Federal regulations, a written report describing the incident and the implementation of the SPCC Plan will be prepared and submitted to the Office of Emergency Services and, as required, to the USEPA and RWQCB. Additional reporting may be required under the WDRs and Monitoring and Reporting Program established by the RWQCB. Further discharge situations are outlined in the following subsections.

6.2.1 Release Reporting

The RWQCB will be immediately notified (verbally) whenever a determination is made that there is physical evidence of a release. This verbal notification will be followed by written notification via certified mail within seven days of such determination. Upon such notification, verification procedures may be initiated or RSI

may demonstrate that another source caused evidence of a release (see below). The notification will include the following information:

- LTU that may have released or be releasing;
- General information including the date, time, location, and cause of the release;
- An estimate of the flow rate and volume of waste involved;
- A procedure for collecting samples and description of laboratory tests to be conducted;
- Identification of any water-bearing media affected or threatened;
- A summary of proposed corrective actions; and
- For physical evidence of a release – physical factors that indicate physical evidence of a release; or

6.2.2 Heat Transfer Fluid Spill or Leak

HTF spill or leak reporting requirements will be incorporated into the SPCC Plan for the Project as follows:

- Project personnel will be required to submit an internal report detailing a HTF spill, regardless of size;
- Project personnel will be required to verbally report to the State of California, Office of Emergency Services and to the National Response Center a spill greater than reportable quantities (42 gallons) and outside of a containment; and
- Project personnel will be required to submit a report (Form 304) detailing a spill of 42 gallons or more to the State of California, Office of Emergency Services within 30 days.

7.0 Design and Construction Standards

7.1 Land Treatment Unit

In compliance with Table 2.1 in CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20210, solid designated wastes will be managed in full containment in a Class II LTU with a single liner system. The LTU will be constructed to be above the level of a 100-year storm event and designed to meet seismic hazard criteria. In addition, the base of the LTU will have a greater than 5-foot separation between it and the underlying groundwater.

The location of the LTU is shown on **Figure 2**. Cross section details and layout of the LTU is shown on **Figure 9** and **Figure 10**.

The LTU will not incorporate a liner containment system or leak detection and removal system, but will be constructed with a prepared base consisting of two feet of compacted, low permeability, lime-treated material. This base will serve as a competent platform for land treatment activities, and will serve to slow the rate of surface water infiltration in the treatment area. The compacted lime-treated and native soil beneath the LTU is designated as a “treatment zone” to a depth of five feet. Although the LTU will be taking vehicle traffic, no hard surface will be required, as there is no liner system to protect. A staging area is allocated in the LTU for storage of HTF-impacted soils while they are being characterized. Soil characterized as hazardous will be removed from the site; therefore, no additional liner system is required in the LTU to cater for the hazardous waste.

The LTU will be surrounded on all sides by a 2-foot high compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run on) of surface storm water into the LTU or runoff of storm water from the unit.

The Project LTU is sized based on data from an existing solar farm that uses a LTU to bioremediate HTF-impacted soil. The basis is summarized below.

1. HTF-impacted soil is generated at a rate consistent with existing solar farm experience. Kramer Junction is a 150 MW facility that generates an average of 500 cubic yards (cyd) of HTF-impacted soil per year (DTSC correspondence, 1995). This rate is ~ 3.3 cyd/year/MW.
2. Applying the Kramer Junction experience to the 250 MW Ridgecrest facility, the Ridgecrest facility is estimated to generate ~833 cyd/year of HTF-impacted soil.
3. HTF-impacted soil is treated in 6-inches thicknesses, so, on average, 45,000 square feet, or 1.1 acres, is needed for HTF-impacted generated per year.
4. The LTU will be used for either placement of HTF-impacted soil or treatment of HTF-impacted soil. That is at any one time the LTU is used to place material to be treated as it is generated or being used for soil treatment. HTF-impacted soil treatment is estimated to take 1 to 4 months to complete bioremediation; however, the design of the LTU will allow soil placed at the beginning of the year to have up to twelve months to complete bioremediation and removal.

To address above average spill events, Kramer Junction has additional capacity in the LTU or a factor of safety for HTF-impacted soil treatment. Kramer Junction has a capacity to treat 1,944 cyd/year and generates an average of 500 cyd/year of HTF-impacted soil, so the facility has an ~ 3.9 factor of safety. Applying this factor of safety to Ridgecrest, the total area estimated for LTU is ~175,000 square feet, or 4 acres.

7.1.1 Heat Transfer Fluid Treatment Process

Treatment of HTF-impacted soil in the LTU will involve moisture conditioning and may involve addition of nitrogen and phosphorous nutrients (i.e., fertilizers) as needed to stimulate consumption of HTF by the indigenous bacteria. The HTF-impacted soil will be moisture conditioned and turned periodically as needed to enhance aeration, promote breakdown of HTF by the indigenous bacteria and/or to control dust emissions. The amount of water required for moisture conditioning of the HTF-impacted soils will not cause pooling of water on the surface of the LTU. Permanent or portable irrigation sprinklers will supply water to the area for dust control and to assist in treatment.

Treatment piles may be covered by plastic sheeting as needed to enhance temperature and moisture retention characteristics, and as needed to control storm water contact, odors and dust emissions.

7.1.2 LTU Construction Process

The base layer construction process will follow these general steps:

a. Prior to construction, the LTU will be stripped, grubbed and cleared of topsoil;

b. General excavation and grading to sub grade will take place as needed;

c. Scarification and moisture conditioning of sub grade materials will take place; and

d. Placement, moisture conditioning, lime treatment, and compaction of native clayey silt material to form the base and perimeter berms will be completed before proof rolling after finish grading.

7.1.3 Site Preparation, Excavation and Grading

The LTU pad and berm construction will use standard cut and fill techniques. Native clayey silt material will be used to construct the pad and berms. The clayey silt material will be moisture conditioned and treated with at least 2 percent quicklime to achieve an R-Value of at least 40 to 50. Treatment and compaction of the material will be conducted using standard commercial lime treatment methods and equipment and compacted in lifts using a sheepsfoot roller. The lime treated layer will be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Field testing of the density of the soil will be performed at regular intervals. Compaction results will be recorded. After finish grading, the surface of the LTU pad and berms will be proof rolled.

7.2 Grading Plans

One LTU is proposed for the RSPP and will be located in the east-central portion of the solar plant site. This location is adjacent to a constructed drainage channel and south of the northern solar field. The LTU is accessible from facility roads. Generally surface drainage in this area is anticipated to be within the drainage channel to the east of the LTU and will include sheet flow around the LTU.

The LTU will be constructed so that the entire interior working surface drains to a single sump in the lowest corner. Overall dimensions and finished grades for the Ridgecrest facility LTU with sumps are shown on **Figure 10**.

7.3 Relevant Specifications

The following specifications from the Construction Specification Institute will be developed, as a minimum:

- Soil Stripping and Stockpiling;
- Earthwork and Related Work; and
- Fencing.

8.0 Construction Quality Assurance

8.1 Introduction

The quality assurance program is based on the SWRCB – Construction Quality Assurance (CQA) Requirements under CCR, Title 27. The requirements themselves will be highlighted and an explanation of how the requirements will be met will follow immediately afterwards.

The LTU will be constructed as per the construction specifications that will be developed in accordance with the CQA plan provided herein. The CQA program will be implemented to ensure that construction is completed in accordance with design specifications.

For the LTU, CQA testing will be performed on the sub grade, compacted lime-treated base, and the berm fill.

Construction inspection requirements will include approval of each layer to ensure that there are no deficiencies in that layer prior to the placement of the next material, based on field observations and field tests. This will also include review of other CQA results to ensure that they are within the project's specifications.

Change authorization will flow through the onsite construction manager and will ensure that the Engineer of Record, as well as other required personnel, have input in the decision of any change. Daily reports will be kept to ensure that activities are documented and personnel involved in the project are updated daily.

8.2 Performance Standard

Quoting from the SWRCB CQA requirements section (a):

> *The construction quality assurance (CQA) program, including all relevant aspects of construction quality control (CQC), shall provide evidence that materials and procedures utilized in the placement of the any containment feature at a waste management unit (Unit) will be tested and monitored to assure the structure is constructed in accordance with the design specifications approved by the RWQCB.*

The project will implement QC procedures that incorporate inspection and test procedures to make sure that the containment facilities are constructed properly and that they are monitored appropriately throughout the life of the project. These tests and procedures will be documented in detail throughout the project.

8.2.1 Professional Qualifications

Quoting from the SWRCB CQA requirements section (b):

> *(1) The design professional who prepares the CQA plan shall be a registered civil engineer or certified engineering geologist; and*
>
> *(2) The construction quality assurance program shall be supervised by a registered civil engineer or certified engineering geologist who shall be designated the CQA officer.*

RSI will ensure that a qualified design professional prepare the CQA plan and act as a CQA officer whose responsibility is to supervise the CQA program.

Construction activities and operations will be directed and supervised by qualified individuals and the design will be conceived and presented in accordance with recognized civil, mechanical and electrical engineering procedures and practices.

8.2.2 CQA Reports

Quoting from the SWRCB CQA requirements section (c):

> *(1) The project's CQA report shall address the construction requirements, including any vegetation procedures, set forth in the design plan for the containment system. For each specified phase of construction, this report shall include, but not be limited to:*
>
> > *(A) A delineation of the CQA management organization, including the chain of command of the CQA inspectors and contractors;*
> >
> > *(B) A detailed description of the level of experience and training for the contractor, the work crew, and CQA inspectors for every major phase of construction in order to ensure that the installation methods and procedures required in the containment system design will be properly implemented;*
> >
> > *(C) A description of the CQA testing protocols for preconstruction, construction, and post-construction which shall include:*
> >
> > > *1. the frequency of inspections by the operator;*
> > >
> > > *2. the sampling and field testing procedures and equipment to be utilized, and the calibration of field testing equipment;*
> > >
> > > *3. the frequency of performance audits determined by the design professional and examined by the CQA officer;*
> > >
> > > *4. the size, method, location and frequency of sampling, sampling procedures for laboratory testing, the soils or geotechnical laboratory to be used, the laboratory procedures to be utilized, the calibration of laboratory equipment and quality assurance and quality control of laboratory procedures;*
> > >
> > > *5. the pass/fail criteria for sampling and testing methods used to achieve containment system design; and*
> > >
> > > *6. a description of the corrective procedures in the event of test failure.*

The Project will provide the following:

- An outline of the chain of command of the CQA inspectors and contractors in the CQA management organization.
- A description of the CQA testing procedures for the preconstruction, construction, and post construction phases of the project.
- A CQA report that includes construction QC requirements included in the design plan for each specified phase of construction.

8.2.3 Documentation

CQA documentation requirements shall include, at a minimum: reports bearing unique identifying sheet numbers for cross referencing and document control, the date, project name, location, descriptive remarks, data sheets, inspection activities, and signatures of designated authorities with concurrence of the CQA officer.

> *(1) The documentation shall include:*

(A) Daily Summary Reports — daily record keeping, which shall include preparation of a summary report with supporting inspection data sheets, problem identification and corrective measures reports. Daily summary reports shall provide a chronological framework for identifying and recording all other reports. Inspection data sheets shall contain all observations (i.e., notes, charts, sketches, or photographs), and a record of field and/or laboratory tests. Problem identification and corrective measures reports shall include detailed descriptions of materials and/or workmanship that do not meet a specified design and shall be cross referenced to specific inspection data sheets where the problem was identified and corrected;

(B) Acceptance Reports — all reports shall be assembled and summarized into Acceptance Reports in order to verify that the materials and construction processes comply with the specified design. This report shall include, at a minimum, inspection summary reports, inspection data sheets, problem identification, and corrective measures reports;

(C) Final Documentation — at the completion of the project, the operator shall prepare a Final Documentation which contains all reports submitted concerning the placement of the containment system. This document shall provide evidence that the CQA plan was implemented as proposed and that the construction proceeded in accordance with design criteria, plans, and specifications. The discharger shall submit copies of the Final Documentation report to the RWQCB as prepared by the CQA officer.

(2) Once construction is complete, the document originals shall be stored by the discharger in a manner that will allow for easy access while still protecting them from any damage. All documentation shall be maintained throughout the post closure maintenance period.

These documents will include daily summary reports with supporting inspection data sheets that contain all observations. A record of field and laboratory tests will also be kept. Acceptance report documents will ensure construction and materials comply with the original design and specifications. At the completion of the project, project closure documentation will be submitted to provide evidence that the CQA plan was implemented as proposed and that construction met design criteria, plans, and specifications.

8.2.4 Laboratory Testing Requirements

Quoting from the SWRCB CQA requirements section (e):

(1) Analysis of earthen materials shall be performed prior to their incorporation into any containment system component. Representative samples for each layer within the containment system shall be evaluated. The following minimum laboratory testing procedures shall be performed:

(A) ASTM Designation: D 1557 91 [1/91], "Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m3)" which is incorporated by reference;

(B) ASTM Designation: D 422 63 (Reapproved) [9/90], "Standard Method for Particle Size Analysis of Soils," which is incorporated by reference; and

(C) ASTM Designation: D 2487 93 [11/93], "Standard Classification of Soils for Engineering Purposes," which is incorporated by reference.

(2) In addition to the tests listed in (e and f), the following minimum laboratory tests shall be performed on low-hydraulic-conductivity layer components constructed from soil:

(A) ASTM Designation: D 4318 93 [11/93], "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils," which is incorporated by reference; and

The Project will send materials proposed for construction to the lab to an accredited laboratory so that the quality and characteristics can be confirmed and compared to project specifications.

The laboratory tests will be performed as specified in section (e) of the SWRCB CQA requirements above and will include the following:

- ASTM Designation: D 1557 91 [1/91], "Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m3);"
- ASTM Designation: D 422 63 (Reapproved) [9/90], "Standard Method for Particle Size Analysis of Soils;" and
- ASTM Designation: D 2487 93 [11/93], "Standard Classification of Soils for Engineering Purposes."

Periodic laboratory and in-situ analysis may be completed to supplement the CQA.

8.2.5 Field Testing Requirements

Quoting from the SWRCB CQA requirements section (f):

> *The following minimum field test procedure shall be performed for each layer in the containment system: ASTM Designation: D 2488 93 [9/93], Standard Practice for Description and Identification of Soils (Visual Manual Procedure), which is incorporated by reference.*

The following tests will be performed on each layer of the containment system associated with the LTU pad:

- ASTM Designation: D 2488 93 [9/93], Standard Practice for Description and Identification of Soils (Visual Manual Procedure)
- ASTM D2922 and D3017 for using a nuclear density/moisture gauge (densitometer) to determine compaction percentage and moisture content.

8.2.6 Earthen Material Requirements

Quoting from the SWRCB CQA requirements section (h):

> *(1) The following minimum tests shall include, but not be limited to:*
>
> > *(A) Laboratory tests as specified in State Water Resources Control Board CQA requirements subsection (e); and*
> >
> > *(B) Field tests as specified in State Water Resources Control Board CQA requirements subsections (f and g).*
>
> *(2) The following minimum testing frequencies shall be performed:*
>
> > (*A) Four (4) field density tests shall be performed for each 1,000 cubic yards of material placed, or at a minimum of four (4) tests per day;*
> >
> > *(B) Compaction curve data (ASTM Designation: D 1557 91) graphically represented, and Atterberg limits (ASTM Designation: D 4318 93) shall be performed on the barrier layer material once a week and/or every 5,000 cubic yards of material placed;*

When testing any of the soils used during construction, as a minimum the tests referenced in SWRCB CQA requirements section (e) will be performed. There will be four field density tests performed per 1,000 cubic yards of material placed, or a minimum of four tests per day. Compaction curve data, including Atterberg Limits, will be performed at least once per week or every 5,000 cubic yards of material placed. For field

hydraulic conductivity tests (critical for the onsite material used in the base layer), the frequency of testing will be based on the pass/failure status of previous tests. They will be performed for the amount of time necessary to make sure steady conditions for the design hydraulic conductivity are met. The equation $I = Q /(tA)$ will be used to determine design hydraulic conductivity.

During construction, all compacted soils and granular material will be tested using a nuclear density/moisture gauge (densitometer) (ASTM D2922 and D3017) to determine compaction percentage and moisture content. Nuclear densitometer testing will be performed to ensure compaction and moisture condition requirements, as outlined in the project specifications, are being achieved. Each material will be tested following compaction in multiple locations to ensure compliance to Project specifications prior to proceeding with placement of the next material.

9.0 Storm Water Management

A conceptual drainage study was performed by AECOM to evaluate site hydrologic conditions and provide a preliminary design basis for onsite drainage structures and the rerouting of an unnamed wash located on the north eastern portion of the site. The evaluation was designed following guidance provided in the Riverside County Hydrology Manual and the Riverside County Division Four – Standards for Drainage. The objective of the drainage studies was to investigate the hydraulic and hydrologic conditions associated with the development of the Project site and provide mitigation requirements for the anticipated increase in storm water runoff due to development.

9.1.1 Offsite Drainage

Runoff from local topographic highs located south of the Project site discharges onto the Project site northward to relatively more gradual-sloped areas at the southern and northern solar fields **(Figure 3)**. The location of the watershed in the El Paso Mountains and the existing drainage flow paths on the Project site are shown in AFC Figure 5.17-11. There are three major watercourses that run through the Project site. The El Paso Wash drains 22 square miles upstream of the Project and runs approximately through the center of the site. This wash drains water from the south hills and crosses Brown Road inside the property boundary.

The second major watercourse consists of an unnamed watercourse that drains an area of four square miles southwest of the Project site. This watercourse crosses the southwest section of the Project area continuing in the northwest direction toward Brown Road.

The third major watercourse consists of the eastern drainage area, which extends east and west of the U.S. Highway 395 (Three Flags Highway) covering about 10 square miles. Drained water crosses U.S. Highway 395 at several points in both east-west and west-east directions, hydraulically connecting all the catchments in this drainage area. Water collected in this eastern drainage area flows westward toward the Project site from near the intersection of Brown Road and U.S. Highway 395. This watercourse crosses the Project site changing flow direction from the westward direction to a more northward direction midway through the Project site.

An elevated railroad grade is located south of the Project site. The railroad grade interrupts several natural drainage paths connecting flows to several watercourses that cross the railroad grade through pipes, concrete culverts, and timber bridges. Aerial photography and vegetation patterns indicate that the overall drainage pattern inside the Project area concentrates flows in several well-defined washes through the area. Storm flow generated by the existing site itself generally sheet to washes in the northeast and northwest directions. Existing flow patterns in the Project site drainage area and water crossings beneath the U.S. Highway 395 and the railroad are shown in AFC Figure 5.17-13.

9.1.2 Onsite Drainage

Proposed drainage modifications to the Project site seek to replicate the existing flow patterns as nearly as possible. Currently, the El Paso Wash flows through the center of the property and there are two unnamed tributaries of the El Paso Wash that flow near the eastern and western boundaries of the property. These tributaries connect to the El Paso Wash, off site and to north of the property. To replicate existing flow patterns, the solar fields are located so that the main flow lines of the El Paso Wash and the western tributary of the El Paso Wash remain the same. The eastern tributary of the El Paso Wash that enters the property from the east, near Brown Road will be intercepted by a new channel that will re-direct the flow from this tributary along the eastern boundary of the property and discharge into the existing eastern tributary flow line where the tributary exits the site **(Figure 3)**. The runoff from the solar fields is collected by perimeter drainage ditches that discharge into the El Paso Wash and the western tributary of the El Paso Wash.

Each of the proposed channels are being sized to contain the peak flow of the 100-year, 24-hour storm event. In general, each channel will also be allowed to naturally re-vegetate with native vegetation to a minor extent, but not so much as to affect the drainage function of these engineered channels. The calculations for each channel show that they may have an erosive effect at some locations in a 100-year event. Each channel will be designed with 3:1 side slopes to help mitigate the erosion of the banks. The channels will be constructed with native onsite soil material, and scour protection will be added in stress areas (i.e., locations where the erosion potential is greater than a straight, uniform channel reach, and includes junctions, transitions, and curves). No scour protection is proposed for the channel bottom in the straight sections of the channels. This is to allow the low flows to meander across the bottom replicating as nearly as possible the flow regimes under current conditions. The erosion control measures will be designed to maintain the infiltration characteristics of the channel reach similar to pre-construction conditions.

Each channel is designed as a trapezoidal channel with a transition (diffuser) at the discharge to return the storm water back to sheet flow at the edge of the Project site. The diffuser is designed with an expanding channel cross section to spread out the flow resulting in low-flow velocities. The purpose of the diffuser is to return the flood flows to the approximately location and depth that occur in the existing condition.

In summary, there are slight changes in peak flow rates in the channels between the existing condition and the proposed condition and slight shifting in contributing drainage areas from the existing to the proposed condition. These changes are attributed to the difference in the time of concentrations. The proposed flow rates leaving the site are generally lower than the existing flow rates, due to the fact that the time of concentrations for the proposed onsite drainage areas are longer than the existing times of concentrations for the existing overland flow.

9.1.3 Storm Water Design for Land Treatment Unit

The LTUs are surrounded by berms which will control and prevent potential inflow (run on) of surface storm water into the LTUs or runoff of storm water from the LTUs. The berms will protect storm water entering the LTUs in the 100-year, 24 hour storm event.

Precipitation that falls on the outer slopes of the berms will sheet flow following the drainage pattern for the area surrounding the LTU and enter the project drainage channels. The interior impermeable area of the LTU will accumulate with storm water and not contribute to peak runoff from the site as shown on **Figure 10**.

Precipitation that accumulates in the LTU will be observed to establish that the water is visibly free from HTF product, sheen or other evidence of contamination. Regardless of whether a sheen is observed, all storm water will be sampled and analyzed for HTF constituents to determine an appropriate disposal method. Liquids that accumulate in the LTU will be removed within 48 hours. Because significant precipitation events are relatively isolated, transfer of accumulated rainwater collected in the LTU is expected to be needed only every approximately three to five years.

9.1.4 Best Management Practices

Storm water BMPs will be provided onsite and will be included in the SWPPP in compliance with the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity and Operation of the site. BMPs also will be contained in the CEC-mandated Drainage, Erosion, and Sediment Control Plan (DESCP). The Project will not submit a Notice of Intent for the SWPPPs, as they are not legally required by the SWRCB as a 401 and 404 Permit is not required.

During construction, BMPs will include:

- Temporary Erosion Control Measures: Construction of berms and ditches re-vegetation, slope stabilizers (interior slopes of the berms in the LTUs are to be stabilized before the liner systems are placed), dust suppression and sediment barriers;
- Sediment Control: Silt fences, gravel bags, fiber rolls, check dams and street sweeping;

- Tracking Controls: Stabilizing entrance and exit;
- Wind Erosion Controls: Applying potable groundwater to disturbed areas and covering exposed stockpiles;
- Non-Stormwater Control: Inspecting vehicles for leaks and dispose of cement appropriately; and
- Waste Management and Materials Pollution Control: Using watertight containers, prevent runoff (with berm, trench etc), into the storage areas and clean up spills immediately after discovery.

Permanent BMPs shall also be provided to protect the LTU during operation of the Project. These BMPs will include the following erosion and sediment control measures:

- Berms around the LTU;
- Exterior slopes of the berms stabilized to prevent wind and water erosion after completion of the liner system placement (e.g., placement of stripped organics removed from the pond area during grading, track walking transverse to slopes);
- Monitoring of berm integrity monthly and after any runoff-producing storm event for erosion;
- Repair of the berms as needed (regrading and track walking for minor erosion (less than 6 inches depth), regrading and placement of coarse aggregate for deeper erosion;
- Maintenance of the drainage channel as needed to restore flow lines and bank integrity.

10.0 Operating Requirements

10.1 Site Records

In accordance with CCR Title 27, Section 20510, key site records will be kept in the office at the Project. Records will be available for inspection by authorized representatives of the Local Environmental Agency (LEA) and RWQCB during the facilities regular working hours. Alternatively, an inspection can be arranged by notifying the Facility Manager. All required records will be properly completed, filed for retention, and maintained throughout the operating life of the LTU.

10.1.1 Operating Record

The operating record maintained at the Project will include the following information:

- HTF Spill Records – These records shall include the time and location and estimated quantity of HTF leaked, and the estimated volume of soil affected.
- Monitoring Results – Results of monitoring, analyses, and testing of the soil at the LTU required by the waste discharge requirements (WDRs) or regulatory requirements.
- Inspection Forms – Inspection results including a description of required inspection, sampling, maintenance or remedial action at the LTU, and the date of implementation, including the dates of soil turnings. Special occurrences encountered during operation of each unit and methods used to resolve problems arising from these events, including details of incidents that required implementing emergency procedures, will be included in these forms.
- Waste Transmittal Forms – Identify date, source of waste, estimated volumes, operators, laboratory reports, and location in the LTU into which the HTF-impacted soils were placed.
- Waste Manifests – Completed non-hazardous or hazardous waste manifests for each shipment of HTF-impacted soil waste removed from the Facility for off-site disposal.
- Spill Response Plan – Written reports prepared in response to any incident requiring implementation of spill response (Section 13.4).
- Correspondence with Local Agencies – Correspondence associated with emergency arrangements agreed to or refused by local authorities.
- Employee Information Records – Records documenting employee information such as job title for each position, job description, names of employees in each job, and introductory and continuing training received.
- Notifications of Violations – Notices of deficiency, abatement orders or any other notification of violation by any regulatory agency.
- Complaints – The Facility manager will record public complaints received regarding operation of the LTU, including:
  - The nature of the complaint;
  - The date the complaint was received;
  - If available, the name, address, and telephone number of the person or persons making the complaint; and
  - Actions taken to respond to the complaint.

10.1.2 Waste Discharge Volumes

In accordance with CCR Title 27, Section 21720(f), all discharges into the LTU will be recorded in the Operating Record. The following items will be recorded include:

- Volume in cubic yards of HTF-affected soil introduced into and removed from the LTU on a monthly basis;
- Cumulative total of HTF-affected soil introduced into and removed from the LTU.

10.1.3 Waste Manifests

Upon delivering a load of hazardous or non-hazardous HTF-impacted soil from the Project to a landfill, the accompanying waste manifest will be signed and dated by the truck-receiving operator to verify receipt and the driver/hauler will be given a signed copy of the manifest. As necessary, a copy of the Waste Transmittal Form or equivalent will be attached to the manifest. Within 30 days of receipt of hazardous waste, a signed copy of the hazardous waste manifest will be sent by the landfill to the generator and to the DTSC. This return manifest will be maintained at the Project Site with the original manifest. If a return manifest is not received within 30 days, the landfill will be contacted to determine the reason why the return manifest has not been received. If a return manifest is not received within 15 days after the due date, a discrepancy report shall be filed with the DTSC. Manifests, related documents, and corresponding daily delivery logs for wastes leaving the Project will be collected and reviewed.

10.1.4 Monitoring and Sampling Plan Results

Monitoring and sampling plan results will be retained at the Project as part of the operating record.

10.1.5 Inspection and Operating Records

Site personnel will complete the inspection logs and other required operation documentation and the facility management will review the applicable documents for completeness and accuracy. Completed inspection logs and notations of needed repairs will be maintained for a minimum of three years.

Further information regarding inspection and maintenance requirements are outlined in Section 12.

10.1.6 Record of Corrective Action Plan Implementation

Following any incident that requires implementation of the Project's Corrective Action Plan, a report will be prepared containing the information described in CCR Title 27, Section 21760(b)(2). At a minimum, the report will be submitted to the LEA and the RWQCB. In addition, a copy will be retained on filed at the Project Site as part of the operating record.

Further information regarding the Corrective Action Plan requirements is outlined in Appendix I.

10.1.7 Correspondence Regarding Arrangements with Local Authorities

Copies of all correspondence with local authorities regarding emergency response arrangements and revisions of the SPCC Plan will be maintained at the Project Site.

10.1.8 Training Records

In accordance with CCR Title 27, Section 20610, the following records will be retained for each position related to waste management as part of the operating record:

- A job title and written job description including assigned duties and required qualifications;
- Name of the employee filling each job;
- Description of initial and continuing training; and
- Documentation of initial and continuing training received.

Whenever a training course is conducted, the records for each employee who completed the course will be updated. When a new employee is hired, a training record file will be initiated for the new employee.

Personnel training records on current employees are retained until final closure of the Project. Records on former employees are retained for three years after the employee's leave date.

10.1.9 Design Documents

In accordance with the requirements of CCR Title 27, Section 21760, design, as-built, and operating documentation related to the LTU will be retained at the Project as part of the operating records.

10.1.10 Other Required Technical Documents

In accordance with CCR Title 27, Section 20510 and 20517, all other technical records associated with the LTU will be retained at the Project as part of the operating record.

10.1.11 Excavation Records

Records of excavations that may affect the safe and proper operation of the LTU, or cause damage to adjoining properties, as required by CCR Title 27, Section 20510(b), will be kept in the operating record.

10.1.12 Operator/Responsible Party Records

Records of written notification to the LEA, local health agency, and fire authority of names, addresses and telephone number of the operator or responsible party at the Site, as required by CCR Title 27, Section 20510(e), will be kept in the operating record.

10.2 Security

In accordance with CCR Title 27, Section 21600(b)(5)(B) and 20530, security measures will be provided to ensure the safest environment for employee working at the Project. Security measures include barriers and warning signs.

10.2.1 Barriers

The Project solar fields and support facilities' perimeter will be secured with a combination of chain link and wind fencing. Chain link metal fabric security fencing consists of eight-foot tall fencing with one-foot barbed wire or razor wire on top along the north and south sides of the facilities. Thirty-foot tall wind fencing, comprised of A-frames and wire mesh, will be installed along the east and west sides of each solar field.

Controlled access gates will be located at the site entrance. Access through the main gate will require an electronic swipe card, preventing unaccompanied visitors from accessing the Project. All Project personnel, contractors, and visitors will be logged in and out of the Project at the main office during normal business hours. Visitors will be allowed entry only with approval from a staff member at the Project. Visitors will be issued visitor passes that are worn during their visit and returned at the main office when leaving.

10.2.2 Warning Signs

Each point of access from a public road shall be posted with an easily visible sign indicating the facility name, and other pertinent information as required by the WDR.

10.3 Sanitary Facilities

In accordance with CCR Title 27, Section 21600(b)(5)(C), sanitary facilities will be provided at the site for Project office employees. RSI will maintain all sanitary and hand-washing facilities that may be required, by applicable state or local requirements, in a reasonably clean and adequately supplied condition.

10.4 Communication Systems

Communication facilities will be provided at the site for Project employees that meet the requirements specified in the AFC and CCR Title 27, Section 21600(b)(5)(D).

10.4.1 Internal Communication

The internal communication system for the Project will include the following devices:

- Alarm system;
- Two-way radios;
- Telephones; and
- Intercoms.

Each Project building will also be equipped with telephones. Operations supervisors and other key personnel may carry hand-held two-way radios that can be used to contact the Project office or other site personnel in an emergency.

10.4.2 External Communication

Twenty-four hour access to outside emergency services, including police and fire departments and emergency response teams, is available through the commercial telephone system at the Project.

10.5 Lighting

Lighting will be provided at the Project Site to ensure the safety of employees during nighttime activities, and will meet the requirements of CCR Title 27, Section 21600(b)(5)(E). The lighting system will provide operations and maintenance personnel with illumination in both normal and emergency conditions. The system will consist primarily of Alternating Current (AC) lighting, but will include Direct Current (DC) lighting for activities or emergency egress required during an outage of the Project's AC electrical system. The lighting system will also provide AC convenience outlets for portable lamps and tools. Permanent lighting will be provided primarily along the paved access road to the Project Site and in the power block area. Lighting in the LTU area will be provided when needed using portable light stands shielded to minimize impacts to night skies.

10.6 Safety Equipment

In accordance with CCR Title 27, Section 21600(b)(5)(F), safety equipment will be provided for the health and safety of employees at the Project Site. As specified in the AFC, a Personnel Protective Equipment (PPE) Program will be developed for the facility, which will apply to all contractor and subcontractor employees, as well as direct RSI employees during operation.

Specific requirements of the PPE Program include:

- Determining and providing personal protective devices for specific jobs;
- Providing proper head protection requirements;
- Establishing eye and face protection requirements;
- Identifying body protection equipment requirements;
- Implementing hand protection requirements;
- Defining proper foot protection;
- Providing proper sanitation facilities;
- Determining safety belts and life lines job requirements;
- Establishing procedures to prevent and protect personnel from electric shock;
- Identifying onsite and off-site medical services and first aid requirements; and
- Specifying respiratory protection requirements for jobs.

Required PPE will be approved for use and distinctly marked to facilitate identification. The type of PPE required to operate, maintain, and monitor the LTU will be described in the job safety analysis undertaken prior to the commencement of operations.

10.6.1 Required Equipment

The following equipment shall be available at the Project Site to minimize hazards associated with operations:

- Alarm systems and internal communications;
- Radio and telephone systems;
- Emergency equipment for fires and spills; and
- Water supplies for fire fighting.

10.6.2 Emergency Equipment

In accordance with the Emergency Action Plan as specified in the AFC, RSI will obtain emergency response equipment. This equipment will be strategically located throughout the facility in order to respond to emergencies in a timely fashion.

10.6.3 Water Supplies for Fire Equipment

In accordance with the Fire Protection and Prevention Plan as specified in the AFC, the Facility will be equipped with water at adequate volume and pressure to supply water hose streams. The primary source of water for fire fighting is a 1,500,000 -gallon permeate storage tank. Only a portion of that tank (360,000 gallons) is dedicated to the Project's fire protection water system.

10.6.4 Equipment Testing and Maintenance

In accordance with the Emergency Action Plan as specified in the AFC, all emergency equipment at the Facility, including communications and alarm systems and fire and spill prevention equipment, will be tested and maintained.

10.7 Personnel Requirements

In accordance with CCR Title 27 ,Section 21600(b)(5)(G), written job descriptions will be maintained for each position at the facility related to management of waste in the permitted LTU at the Facility. These descriptions will be updated periodically by facility managers and supervisors to reflect the changing needs of the facility. Job descriptions will be kept on file at the facility and include the following information:

- Job title/position;
- Duties/responsibilities; and
- Job prerequisites and qualifications.

All Project employees will receive training in general procedures and operations, and in emergency response procedures. Personnel receive job-specific training during on-the-job training as required. This training ensures that personnel are sufficiently proficient in the particular skills required to perform their assigned duties and that they are aware of the inherent hazards. The management, planning, and operations personnel will have varying backgrounds with respect to the management and operation of the LTU at the Project Site. Technical staff will gain experience with these systems mainly through on-the-job training. A record of training and experience of each employee will be maintained at the Project office.

10.8 Personnel Training

An Operations Safety Training Program for employees and contractors will be developed for the Project as specified in the AFC that will meet the requirements of CCR Title 27, Section 21600(b)(5)(H). The Operations Safety Training Program will be revised as required to include any additional training necessary as equipment or operations change. Additional job-specific training may be completed by personnel as needed.

The staff person overseeing the portion of the training program pertinent to the LTU will be experienced in the operation of such units, waste management procedures and applicable regulations, emergency response, and SPCC Plan implementation.

All employees will be required to receive training in the following areas:

- Injury and Illness Prevention;
- Emergency Action Plan;
- PPE;
- Fall Protection;
- Fire Protection and Prevention;
- Confined Space Entry Program;
- Hazard Communication;
- Hand and Portable Power Tool Safety;
- Heat Stress and Cold Stress Safety;
- Hearing Conservation;
- UXO training: and
- Back Injury Prevention.

The topics applicable to operation of the LTU may include:

- Land Treatment Operation;
- Forklift Operation;
- Front-End Loader Operation;
- Mobile Equipment Safety;
- Inspection and Monitoring Program;
- HTF Material Safety Data Sheet Training;
- Soil Sampling;
- Equipment Inspections;
- Employee Exposure Monitoring Program; and
- Housekeeping and Material Handling.

10.9 Supervisory Structure

In accordance with CCR Title 27, Section 21600(b)(5)(I), the facility supervisor will be experienced in solar facilities operations and maintenance to ensure that the facility is properly operated in accordance with all applicable laws, regulations, permit conditions and other requirements. All shift managers and equipment operators will report to the facility supervisor.

11.0 Environmental Controls

11.1 Nuisance Controls

As defined by Rule 419 of the Kern County Air Pollution Control District, the definition of a nuisance is:

> *"A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property."*

In accordance with CCR Title 27, Section 21600(b)(8)(A), the LTU will be operated in compliance with all applicable permits and regulatory conditions to prevent creating environmental hazards and public nuisance. Given compliance with permits and conditions and the nature of the LTU, nuisance conditions are unlikely to arise. In addition, the LTU is located in a relatively isolated area away from potential receptors, so the public is unlikely to be impacted by these operations. If complaints are generated, they will be reported to the LEA within 24 hours.

11.2 Fire Control

A Fire Protection and Prevention Program will be prepared for the Project as specified in the AFC and will meet the requirements of CCR Title 27, Section 21600(b)(8)(B). The plan will include measures relating to safeguarding human life, preventing personnel injury, preservation of property and minimizing downtime due to fire or explosion. Fire protection measures will include fire prevention methods to prevent the inception of fires. Of concern are adequate exits, fire-safe construction, reduction of ignition sources, control of fuel sources, and proper maintenance of fire water supply and sprinkler systems.

The Fire Protection and Prevention Plan for the Project will include the following sections:

- Scope, purpose, and applicability;
- Potential fire hazards;
- Proper handling and storage of potential fire hazards;
- Potential ignition sources;
- Control of potential ignition sources;
- Persons responsible for equipment and systems maintenance;
- Portable fire extinguishers;
- Automatic sprinkler fire suppression system;
- Water-spray fire system;
- Local fire department;
- Training;
- Housekeeping procedures; and
- Record keeping requirements.

The Project's fire protection water system will be supplied from a dedicated 360,000-gallon portion of the 1,500,000-gallon permeate storage tank located onsite. One electric and one diesel fueled backup fire water pump, each with a capacity of 1,500 gpm, will deliver water to the fire protection water piping network. A smaller electric motor-driven jockey pump will maintain pressure in the piping network. If the jockey pump

is unable to maintain a set operating pressure in the piping network, the diesel fire pump starts automatically.

The piping network will be configured in a loop so that a piping failure can be quickly isolated with shutoff valves without interrupting water supply to other areas in the loop. Fire hydrants will be placed at intervals throughout the plant site that will be supplied with water from the supply loop. The water supply loop will also supply firewater to a sprinkler deluge system at each unit transformer, HTF expansion tank, and circulating pump area and sprinkler systems at the steam turbine generator and in the administration building.

Fire protection for the solar field will be provided by zoned isolation of the HTF lines in the event of a rupture that results in a fire.

11.3 Dust Control

An Operations Dust Control Plan will be prepared for the Project as specified in the AFC to manage fugitive dust emissions and comply with the requirements of CCR Title 27, Section 21600(b)(8)(D). BMPs for dust control from the LTU will be implemented as necessary and will include the following:

- Adherence to speed limits during travel on dirt roads for monitoring and maintenance of the LTU; and
- Tarping of any truck loads of HTF contaminated soil to be removed from the Project Site for off-site disposal.

Wastewater from the water from the Reverse Osmosis (RO) system will be used for dust control onsite.

11.4 Vector Control

In accordance with CCR Title 27, Section 21600(b)(8)(E), a vector control program will be implemented at the Project as needed.

11.5 Drainage and Erosion Control

A Drainage, Erosion and Sediment Control Plan (DESCP) will be prepared for the Project as specified in the AFC and will address the requirements of CCR Title 27,Section 21600(b)(8)(F). The plan will describe the management and control of stormwater runoff at the site and will specify site-specific BMPs for erosion and sediment control that will include side slope protection of the berms surrounding the LTUs. An outline of the drainage design and BMPs is provided in Section 9.

11.6 Noise Control

Noise control requirements for the Project have been investigated in the AFC and will comply with the requirements of CCR Title 27, Section 21600(b)(8)(H). Due to the remoteness of the site and operating procedures of the treatment units, noise is not anticipated to be a problem. Off-site noise levels for the operation of the entire Project diminish to the point of being indistinguishable from ambient levels before reaching the off-site noise sensitive or residential receptors. The Project operator will comply with local, State, and Federal requirements and regulations regarding noise control.

Onsite mobile equipment used for pond maintenance will be equipped with approved mufflers and will conform to applicable Occupational Safety and Health Administration (OSHA) and CAL OSHA noise requirements. In addition, hearing protection will be available to facility personnel.

11.7 Traffic Control

Traffic control requirements for the Project have been investigated in the AFC and will meet the requirements of CCR Title 27, Section 21600(b)(8)(I) for the LTU. The proposed access to the LTU will be off the main paved entrance roadway for the Project. Traffic is expected to be limited to trucks and mobile equipment used in occasional inspection and maintenance activities. Control measures to mitigate onsite safety hazards and interference with site operations will include signs, paint markings, mirrors, and imposition of speed limits as needed.

The Project site is located southwest of U.S. Highway 395 on the north and south sides of Brown Road, approximately five miles southwest of Ridgecrest, California. Regional access is provided to the Project site and the surrounding Ridgecrest area by U.S. Highway 395. U.S. Highway 395 is a primary north/south regional arterial that extends northerly along the eastern side of the Sierra Nevada Mountain Range to Bishop. It extends southerly to I-15 approximately 10 miles south of Victorville. In the Project vicinity, U.S. Highway 395 is a two-lane facility with two, 12-foot travel lanes with approximately 6-foot paved shoulders and 6- to 8-foot graded shoulders on each side. The site is linked to U.S. Highway 395 via Brown Road, an existing two-lane paved road, approximately 24-feet wide, with variable graded shoulders from 4 to 10 feet on each side.

Additionally, the Project can be accessed from West Inyokern Road (SR-178), which extends westerly from the City of Ridgecrest as a four lane road to Inyokern and crosses Brown Road approximately nine miles north of the Project site. Between Ridgecrest and Brown Road, SR-178 is about 72 feet wide, including an approximately 24-foot wide unpaved median strip. It typically includes 4-foot paved shoulders with an additional 4-foot graded shoulder on each side. SR-178 is the northern-most boundary of the city of Ridgecrest.

Proposed traffic mitigation for the Project include the development and implementation of a construction phase Traffic Management Plan (TMP) in consultation with Caltrans and Kern County for the roadway network potentially affected by construction activities at the plant site and offsite linear facilities. In addition, RSI may split the arrival of the workforce in the morning into two parts arriving one hour or more apart when the total number of workers onsite will exceed 300.

12.0 Inspection, Sampling and Maintenance Programs

The following section outlines the inspection and maintenance requirements for the LTU. Records of inspections, sampling and monitoring shall be retained as part of the operating record as required under Section 10.0.

On the first day of operation, the pump, piping, and control switches will be checked to ensure they are in proper working condition per the manufacturers' specifications.

12.1 Inspection Program

Inspection of the LTU will be conducted monthly. The inspection will involve visual observation to identify the potential presence of cracks or subsidence in the base soil layer and perimeter berms that could allow penetration or migration of contaminants. Inspection of the effectiveness of general housekeeping, run-on controls, and the soil piles for odors and fugitive dust may be required for regular maintenance.

12.2 Sampling Program

Samples are to be properly documented and a written record of the chain-of-custody recorded. The chain-of-custody record will track the samples from the field to the laboratory. This form documents the time, date, location, person collecting the sample, and names and signatures of all persons handling the samples from the field to the laboratory.

12.2.1 Land Treatment Unit – Wastewater

Water that accumulates in the LTU that needs to be removed to maintain the operation of the LTU will be sampled to assess the HTF and amendment content. Samples will be analyzed by a state-certified laboratory to determine the concentration of the parameters in **Table 4** to determine an appropriate off-site disposal facility. If HTF is not detected above the PQL and amendment concentrations (i.e., nitrate, phosphate, TDS) are at or near background groundwater concentrations and below State of California primary or secondary maximum contaminant levels the water may be reused in the plant process. If HTF is detected and amendment concentrations exceed background or drinking water standards the waste will be properly disposed of at a licensed TSDF.

12.2.2 Land Treatment Unit – Soil

As described in Section 7, representative soil samples will be collected for every batch of HTF-contaminated soil undergoing treatment in the LTU and composited according to methods specified in USEPA SW-846. Results of the samples will be reported semi-annually. **Table 5** presents the analyte suite and their associated practical quantitation limits, and lists the chemical constituents for LTU soil sampling.

Annually, soil samples will be collected at a depth of one foot below the compacted soil base at the LTU (approximately six feet bgs) and analyzed for HTF using modified USEPA Method 8015 to verify that HTF is not migrating below the 5-foot treatment zone underlying the unit. Soil samples will be collected in handling and treatment areas at a spacing of one to two samples per acre. The samples will be randomly located within the one-acre area.

If results of sample analysis indicate HTF concentrations are greater than the laboratory detection limit, soil sample collection will be repeated at one-foot intervals until laboratory analytical results show that concentrations are less than the laboratory detection limit. If HTF concentrations above the laboratory detection limit are found below the five-foot treatment zone, the SPCC Plan will be implemented and a letter highlighting the "evidence of a release" will be submitted to the RWQCB. Results of integrity sampling program will be reported annually.

12.3 Maintenance Program

12.3.1 Land Treatment Unit

Maintenance involved with the LTU will include general housekeeping and drainage system maintenance. General housekeeping within the LTU includes the following:

- Keeping soil piles tidy and contained;
- Clearing the unit of debris that may have been accumulated during operation;
- Re-applying plastic sheeting on soil piles; and
- Moisture conditioning and fertilizing the soil piles as needed.

Drainage system maintenance will include the following:

- Re-grading of the base of the LTU; and
- Clearing the sump of accumulated debris or soil; and
- Repair/replacement of earth berms as needed.

13.0 Required Plans

13.1 Detection Monitoring Plan

A detection and evaluation monitoring program has been incorporated into **Appendix E**, Detection Monitoring Program, pursuant to Section 20425 of Title 27. The Corrective Action Plan will be triggered when detection or evaluation monitoring data indicates that there exists statistically significant evidence of a release to groundwater from the LTU. The requirements for establishing a statistically significant release are provided in the Detection Monitoring Program. **Appendix D**, Corrective Action Plan, has been incorporated pursuant to CCR Title 27, Section 20430 and establishes the specific corrective actions in the event of a documented release to groundwater.

13.2 Corrective Action

A Corrective Action Plan has been incorporated into **Appendix D** of this Application pursuant to CCR Title 27, Section 20430 and establishes the specific corrective actions in the event of a documented release to groundwater. The Corrective Action Plan will be triggered when detection or evaluation monitoring data indicates that there exists statistically significant evidence of a release to groundwater from the LTU. The requirements for establishing a statistically significant release are provided in the Detection Monitoring Program.

13.3 Closure and Post-Closure

Six months prior to the proposed date of closure, RSI will notify the RWQCB of the proposed closure and submit a ROWD application for closure. The requirements for facility closure at the Project site are provided in **Appendix F**, Preliminary Closure Plan.

The site will undergo clean closure; therefore, the requirement for post-closure monitoring and maintenance is not necessary. After clean closure is completed, all potential sources of contamination will be removed from the LTU site. A Preliminary Post-Closure Maintenance Plan is not included as part of the required plans for this ROWD.

13.4 Spill Prevention and Response Measures

This section presents the Spill Prevention and Response Plan for the LTU. Incorporated into this plan will be the requirements of the SPCC Plan that will be undertaken for the Project pursuant to CFR Title 40, Part 112, as required based on the volume of HTF storage. An SPCC Plan will be undertaken for the Project. The SPCC will include, but will not be limited to, the following:

- Secondary containment around the tanks storing HTF, capable of containing 110 percent of the storage tank capacity and/or sufficient freeboard to contain precipitation from a 25-year, 24-hour storm event.
- Daily inspections of all infrastructure containing HTF because it is not practicable to provide secondary containment around HTF-product piping as it runs throughout the solar field.
- Isolation and clean up within 48 hours if spills or leaks are detected.
- Assessment of potential spills, system fill procedures and overfill protection, and training will be included in other sections of the SPCC.

13.4.1 Spill Reporting

Incidents that result in implementation of the measures described in the subsequent sections of this Spill Prevention and Response Plan will be reported to the appropriate agencies. If such incidents threaten to result in an off-site discharge or may present a potential threat to human health or the environment, immediate verbal notification of the appropriate agencies shall be made as specified in the SPCC Plan. A record of such verbal communications will be maintained in the operating record. As specified by State and Federal regulations, a written report describing the incident and the implementation of the SPCC Plan will be prepared and submitted to the Office of Emergency Services and as required to the USEPA and RWQCB.

Additional reporting may be required under the WDRs and Monitoring and Reporting Program established by the RWQCB.

13.4.1.1 Release from the Evaporation Ponds or Land Treatment Unit

The RWQCB will be immediately notified (verbally) whenever a determination is made that there is physical or statistically significant evidence of a release. This verbal notification will be followed by written notification via certified mail within seven days of such determination. Upon such notification, verification procedures may be initiated or RSI may demonstrate that another source caused evidence of a release. The notification will include the following information:

- The unit that may have released or be releasing (individual LTU);
- General information including the date, time, location, and cause of the release;
- An estimate of the flow rate and volume of waste involved;
- A procedure for collecting samples and description of laboratory tests to be conducted;
- Identification of any water-bearing media affected or threatened;
- A summary of proposed corrective actions; and
- For physical evidence of a release - physical factors that indicate physical evidence of a release.

Upon notification, RSI may initiate verification procedures or demonstrate that a source other than the permitted waste management unit caused the evidence of a release. A supporting technical report must be provided to the RWQCB within 90 days, demonstrating the different source of the discharge.

13.4.1.2 Heat Transfer Fluid Spill or Leak

HTF spill or leak reporting requirements will be incorporated into the SPCC Plan for the Project as follows:

- Project personnel will be required to submit an internal report detailing a HTF spill, regardless of size;
- A release of 20 gallons is reportable to the CEC within 48 hours.;
- Project personnel will be required to verbally report a spill greater than reportable quantities (42 gallons), and is outside of a containment, to the State of California Office of Emergency Services and to the National Response Center; and
- Project personnel will be required to submit a report (Form 304) detailing a spill of 42 gallons or more to the State of California, Office of Emergency Services within 30 days.

These records shall include the time, location, and estimated quantity of HTF leaked, and the estimated volume of soil affected and other information as required by the regulatory agency.

13.4.2 Spill Response Record Keeping

In accordance with CCR Title 27, Section 20510, spill response records will be kept in the office at the Project. Spill response records will be available for inspection by authorized representatives of the LEA and

RWQCB during the facilities regular working hours. Alternatively, an inspection can be arranged by notifying the Facility Manager. All required records will be properly completed, filed for retention and maintained throughout the operating life of the LTU.

13.4.2.1 Required Records

The following records must be maintained onsite as part of the operating record:

- Written summaries of all verbal communications and/or notifications to agencies of spills or leaks;
- All written reports submitted to the LEA or RWQCB documenting the spill incident;
- All required notification, documentation or follow-up reports as required under the SPCC Plan;
- All subsequent follow-up or technical reports submitted to the RWQCB, LEA or other agency, and
- Any other additional reporting required under the Waste Discharge Requirements and Monitoring and Reporting Program established by the RWQCB.

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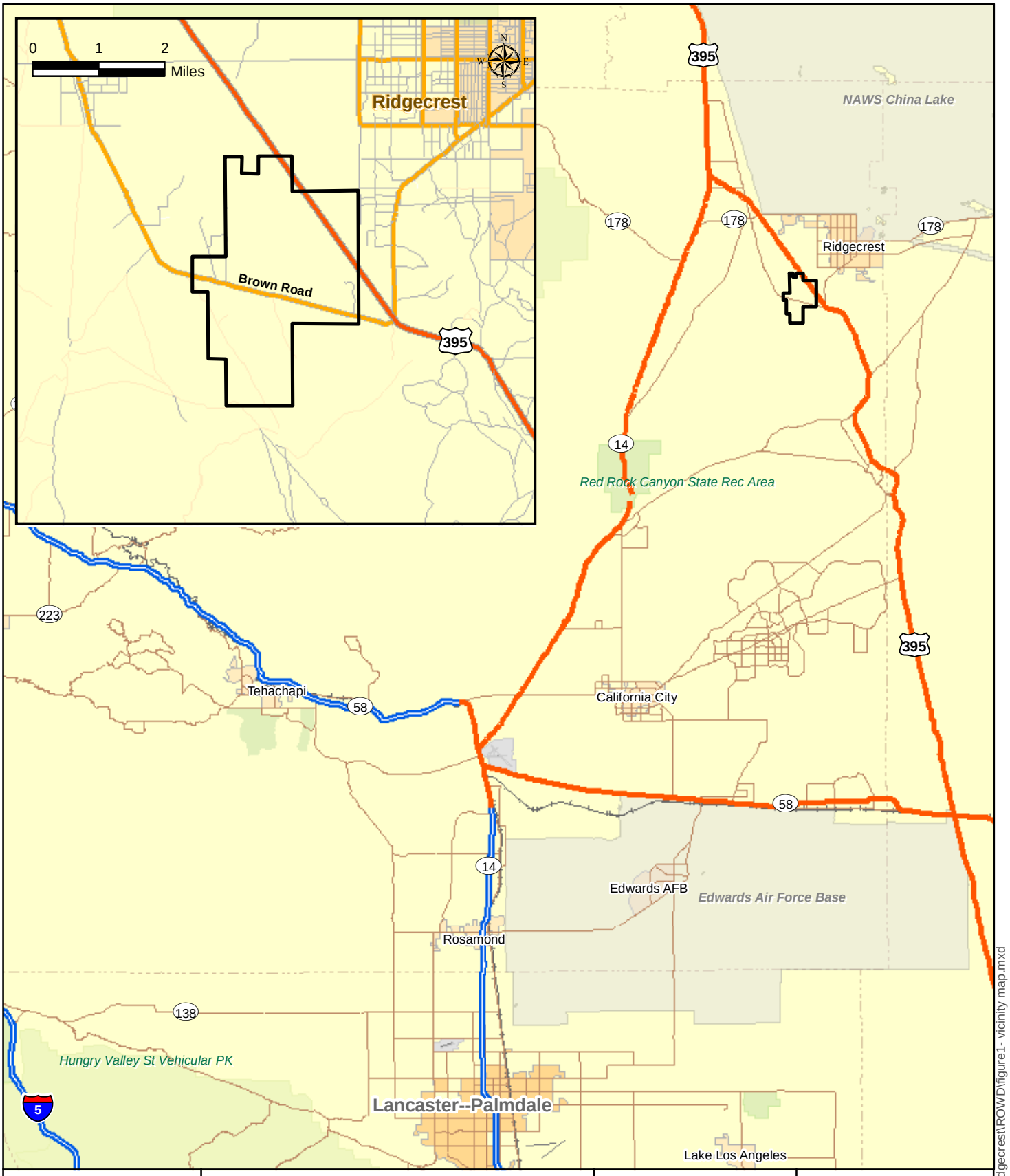

Map Location

0 5 10
Miles

Ridgecrest Solar Power Plant

Figure 1
Regional Location and Vicinity Map

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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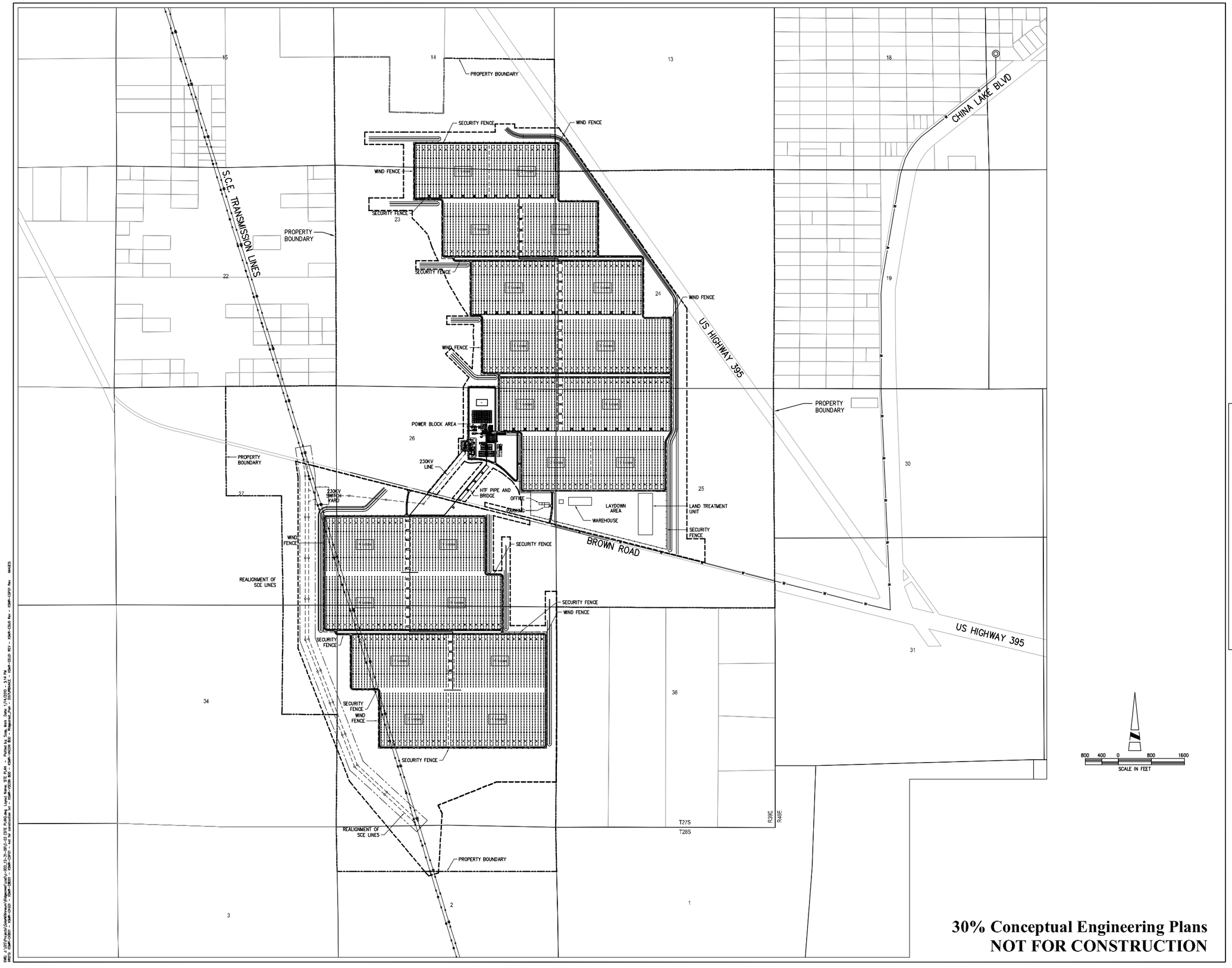

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM CHARLES BLACK
No. C31465
EXP. 12-31-10
CIVIL
STATE OF CALIFORNIA

Designed:	W. BLACK
Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- SOLAR FIELD PARABOLIC TROUGH
- BALANCE OF PLANT FACILITIES
- PROPOSED ACCESS ROAD (PAVED)
- PROPOSED ACCESS ROAD (GRAVEL)
- RAILROAD
- PROPOSED GAS
- PROPOSED WATER
- PROPOSED TELEPHONE
- PROPOSED ELECTRIC
- EXISTING ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED WIND FENCE
- EXISTING CONTOURS (10 FOOT INTERVALS)
- PROPOSED DRAINAGE CHANNEL/FLOW DIRECTION
- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- HEADER PIPING
- ACCELERATION LANE

Ridgecrest Solar Power Project

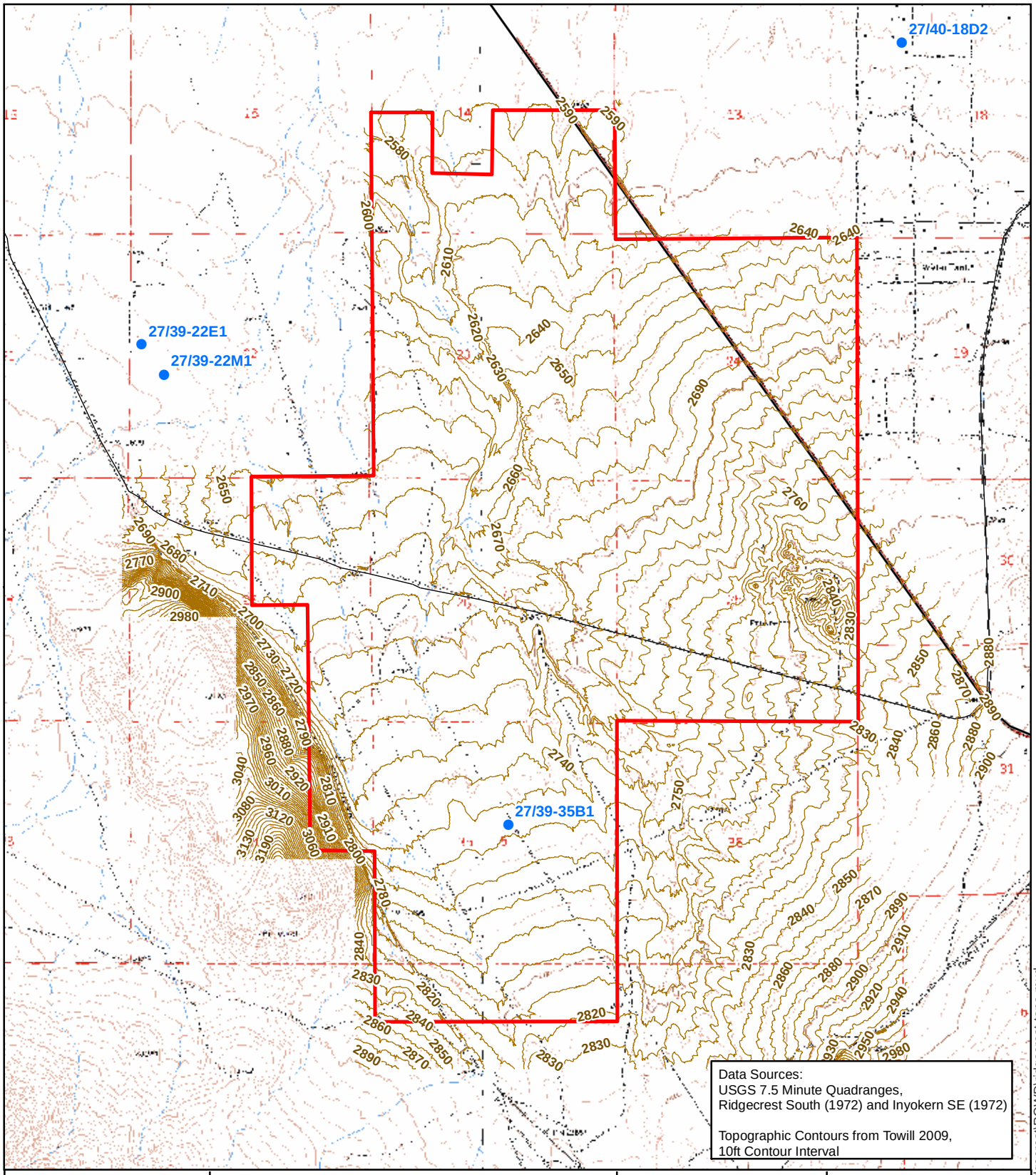
Kern County, California

Preliminary Site Plan

Figure 2

Date: 12/18/09

Sheet: .



Map Location

Legend

Project Right-of-Way

Groundwater Well Location based on Latitude and Longitude in USGS Database

0 3,000 6,000 Feet

N W E S

Ridgecrest Solar Power Plant

Figure 3
Site Topographic Map

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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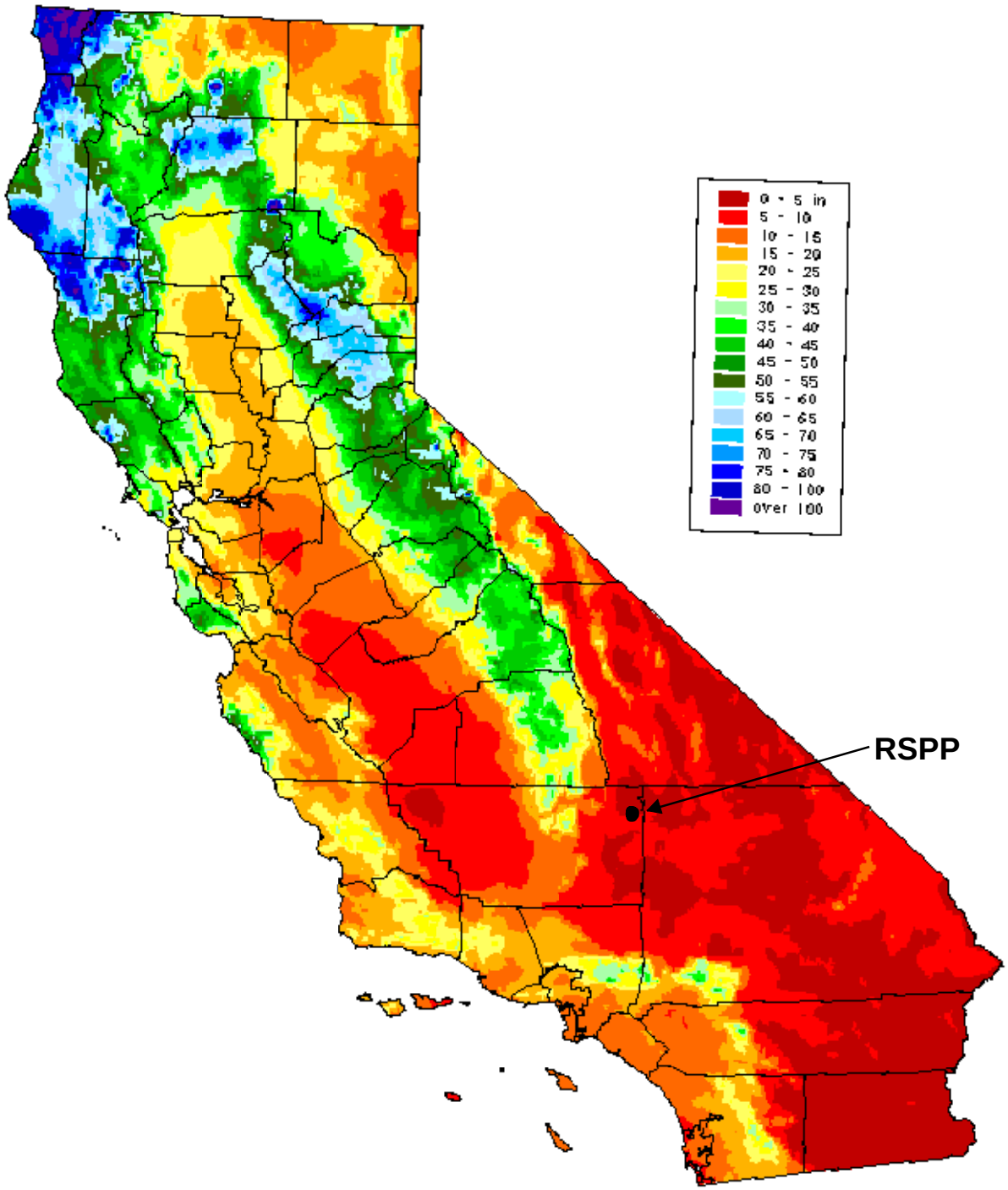

Source:
http://www.wrcc.dri.edu/pcpn/ca.gif
Oregon Climate Service, 1995

Map Location

N
W
E
S

Ridgecrest Solar Power Project

Figure 4
Average Annual Precipitation (inches), California
Period: 1961-1990

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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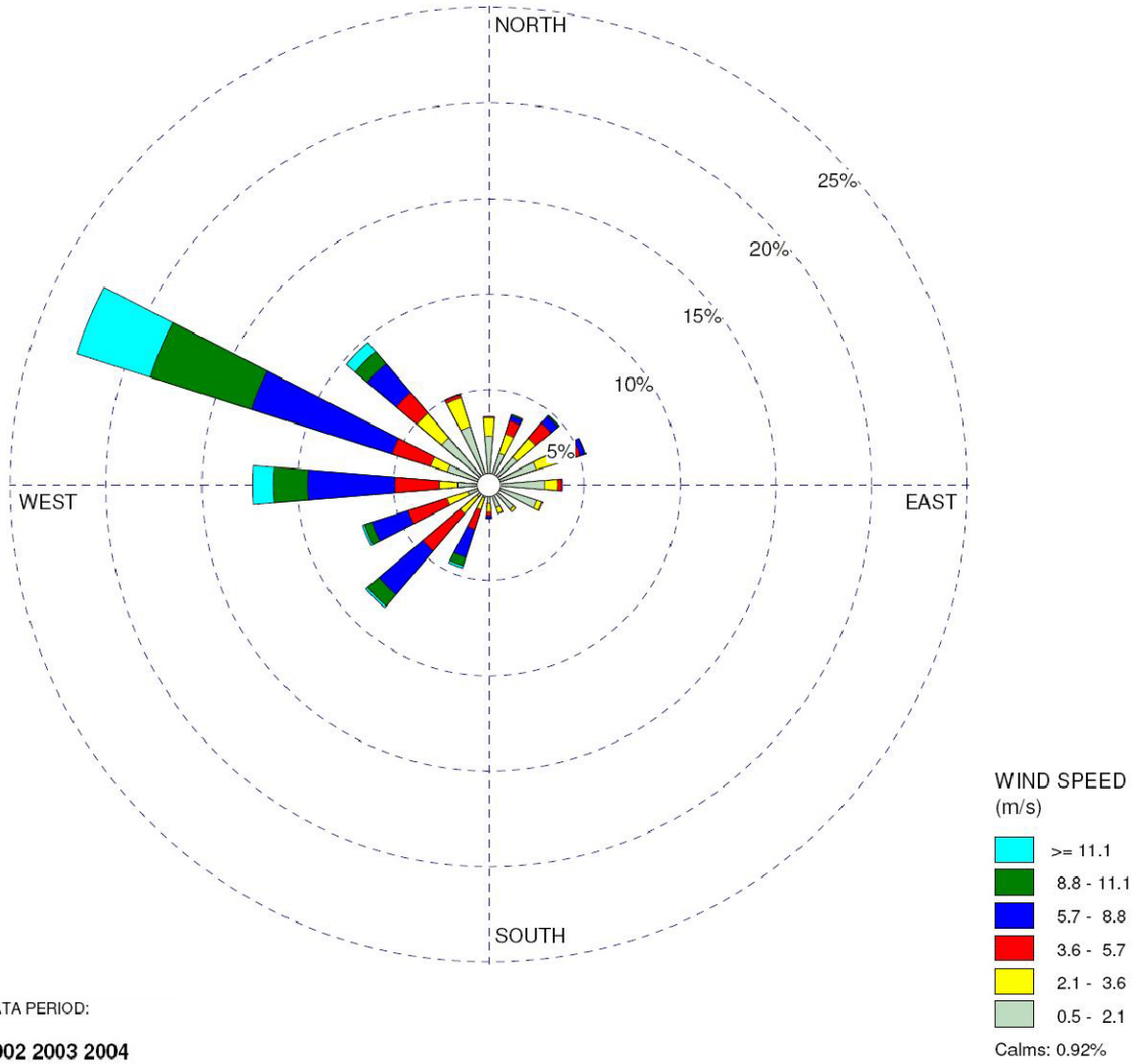
WIND ROSE PLOT:

Mojave ARB Monitoring Station, Mojave, CA
2002-2004 Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)



DATA PERIOD:

2002 2003 2004
Jan 1 - Dec 31
00:00 - 23:00

CALM WINDS:	TOTAL COUNT:
0.92%	**26304 hrs.**
AVG. WIND SPEED:	DATE:
5.03 m/s	**8/24/2009**

Map Location

Ridgecrest Solar Power Project

Figure 5
Wind Rose Plot
Mojave ARB Monitoring Station, Mojave, CA

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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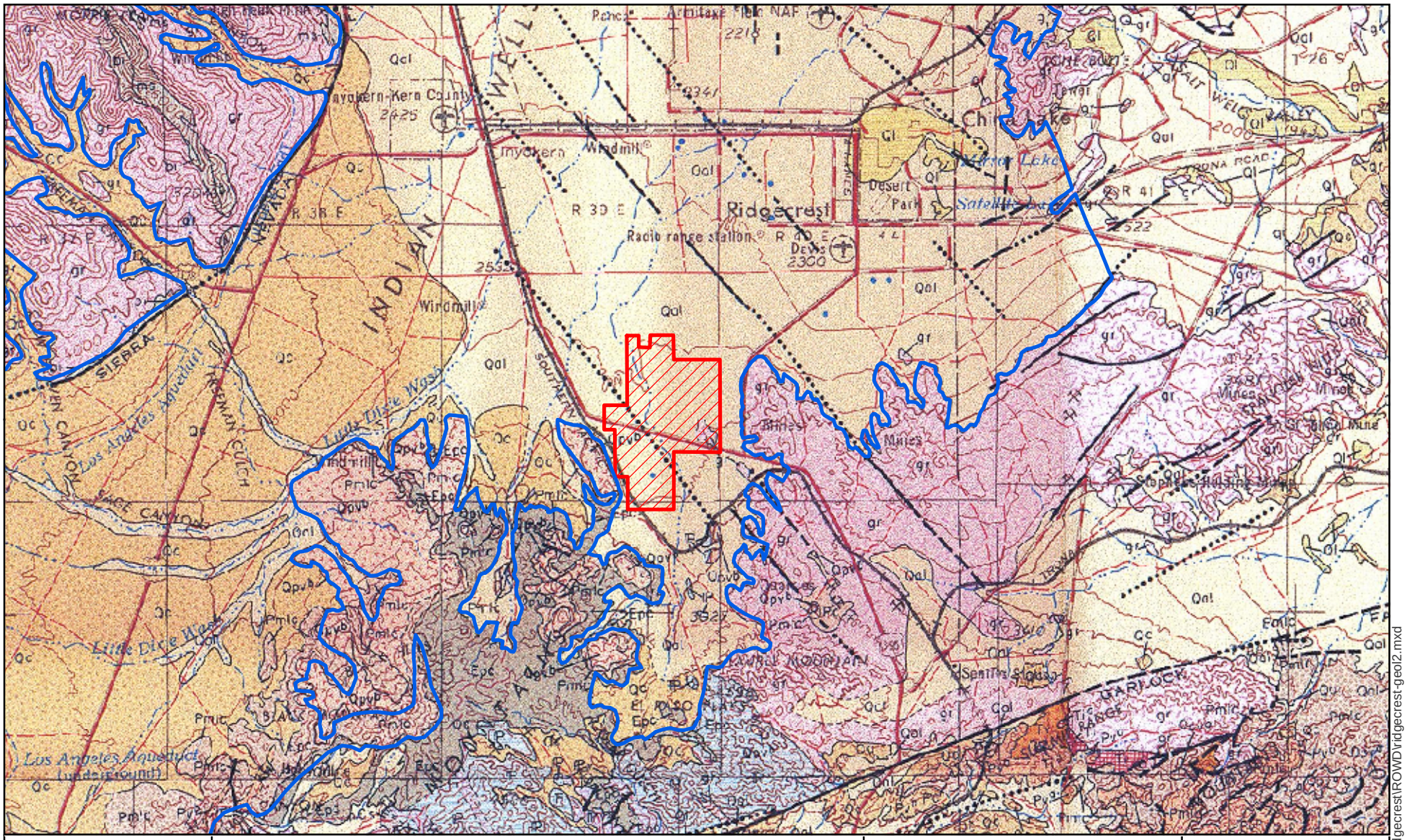

Map Location

Legend

Project Right-of-Way

Indian Wells Valley Groundwater Basin

See Figure 6b for Geologic Legend

Sources:
Division of Mines and Geology, Geologic Map of California, Trona Sheet, Scale 1:250,000, 1963

1 in = 3 miles

0 3 6 Miles

N W E S

Ridgecrest Solar Power Plant

Figure 6a
Regional Geologic Map

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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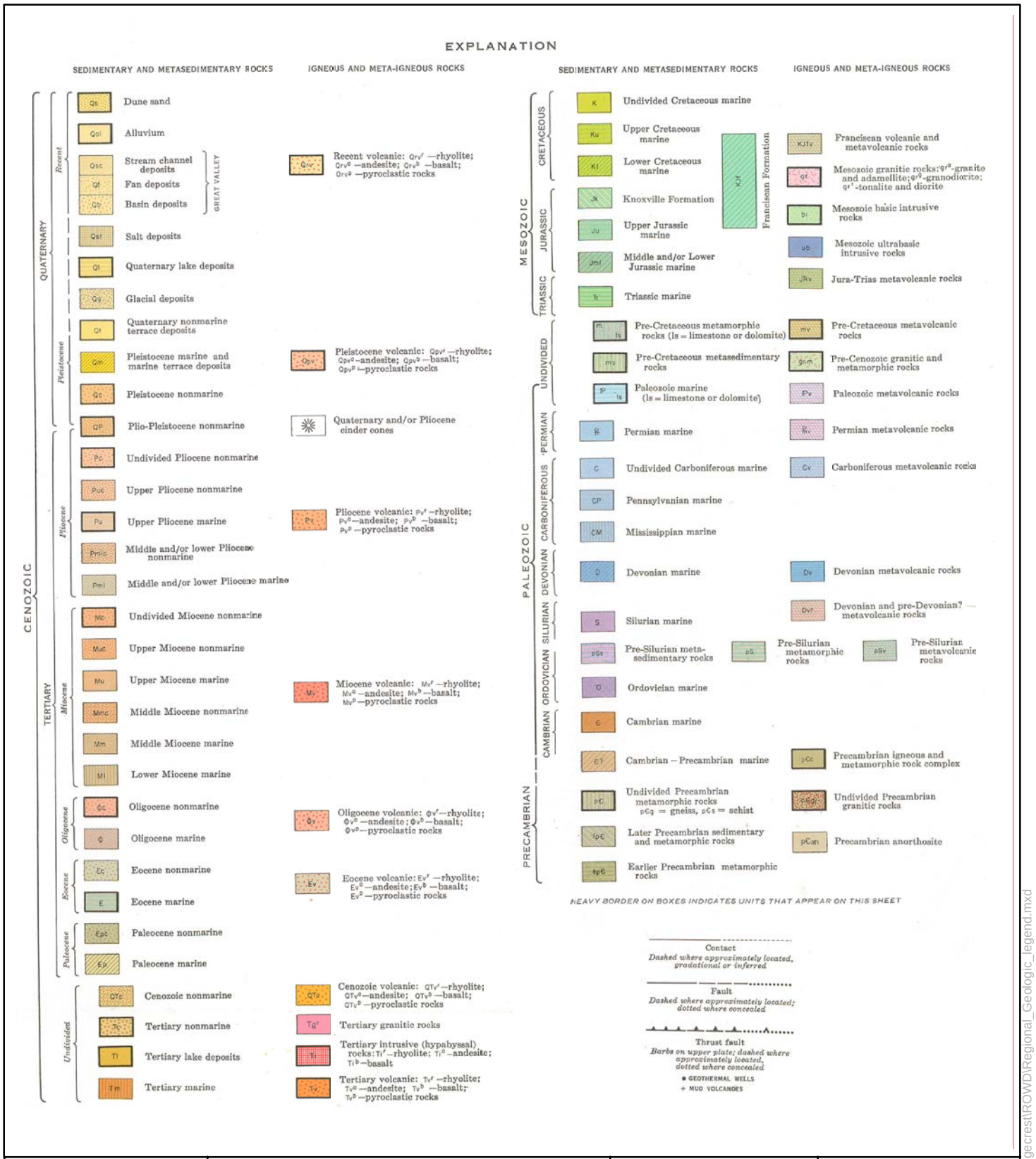

Map Location

Legend

Sources:
Division of Mines and Geology, Geologic Map of California, Trona, Scale 1:250,000, 1963

Ridgecrest Solar Power Project

Figure 6b
Regional Geologic Map Legend

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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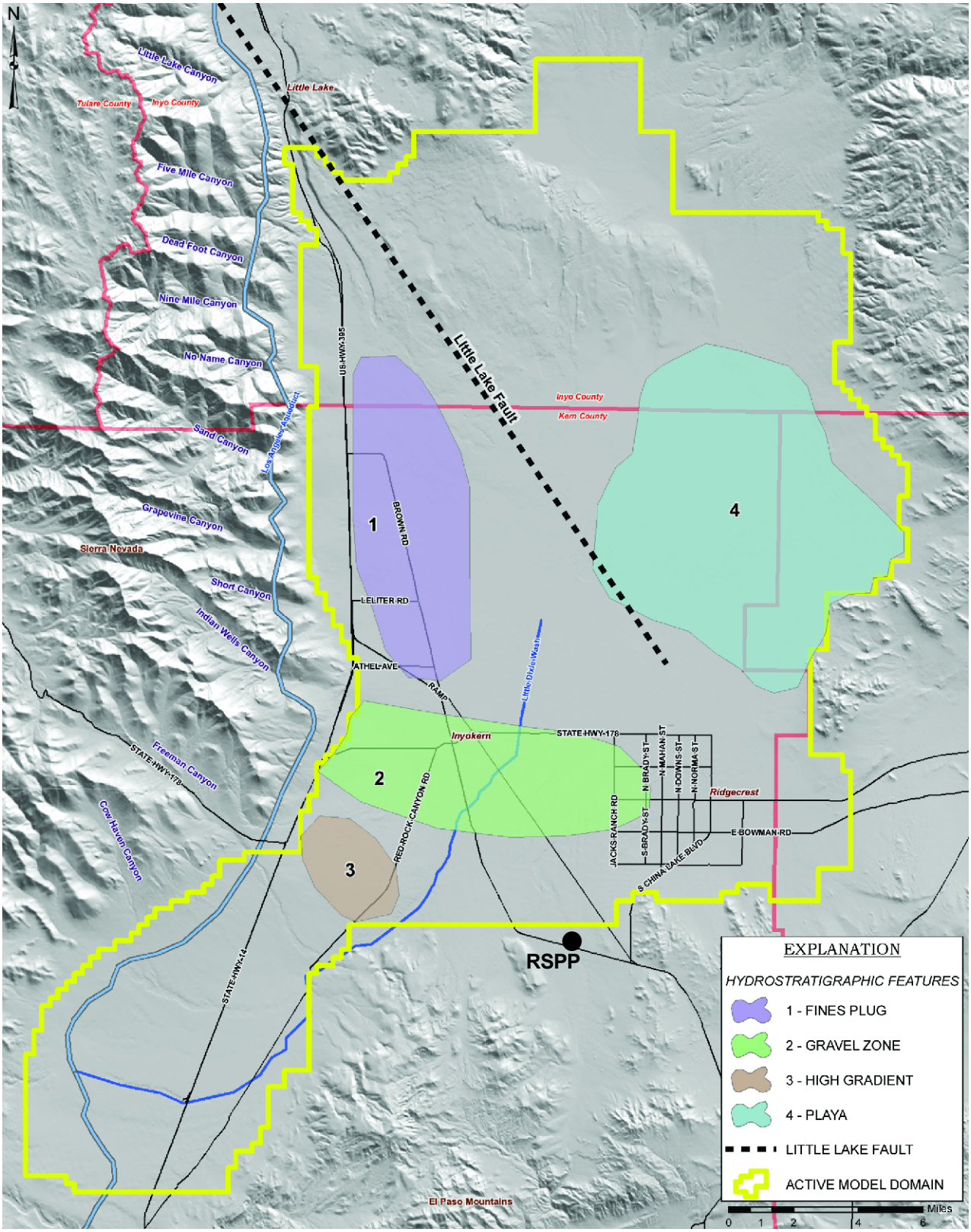

Map Location

Sources:
Modified from Brown and Caldwell Indian Wells Valley Basin Groundwater Flow Model and Hydrogeologic Study, March 27, 2009

Ridgecrest Solar Power Project

Figure 7 Hydrostratigraphic Features in the Indian Wells Valley Groundwater Basin

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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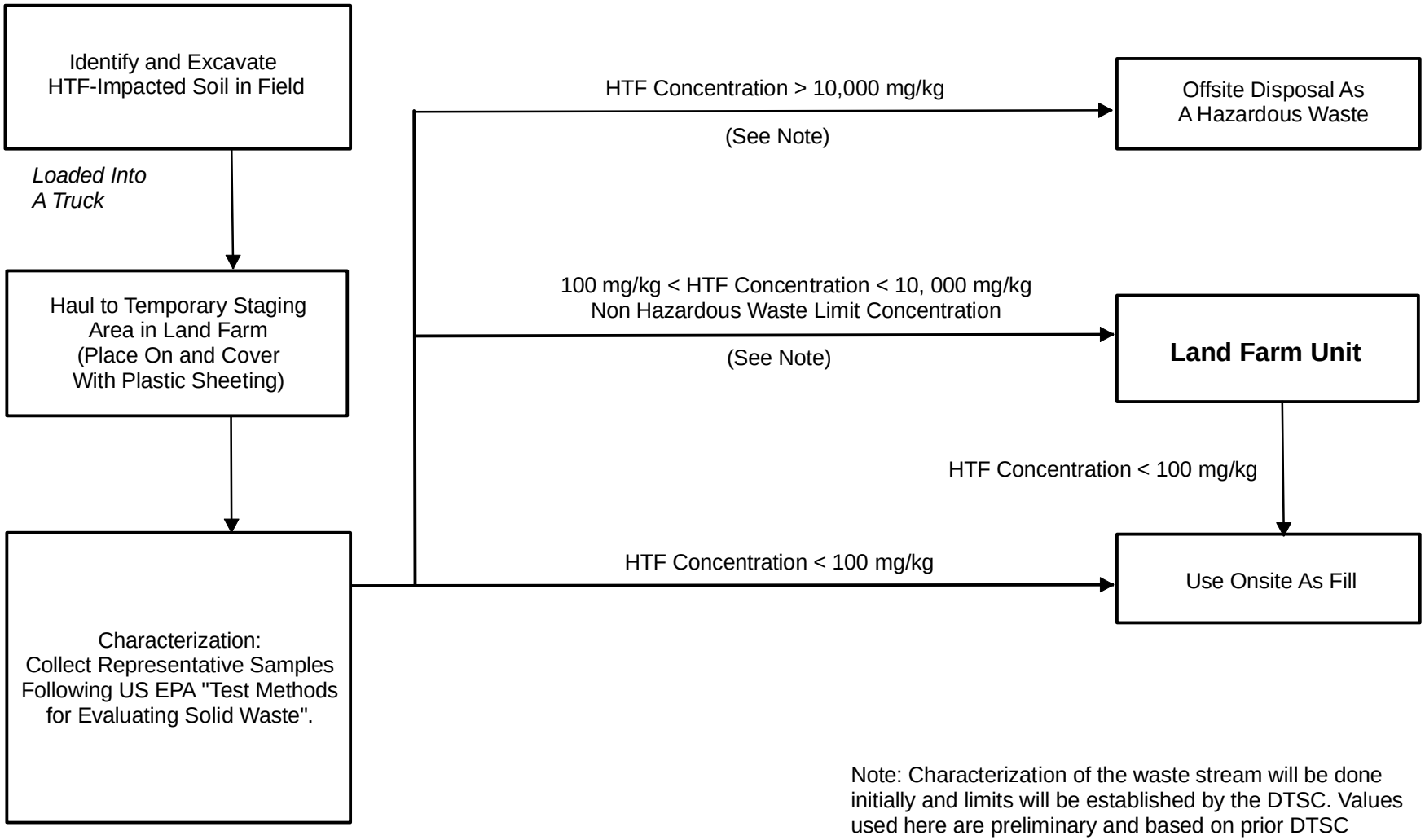

Note: Characterization of the waste stream will be done initially and limits will be established by the DTSC. Values used here are preliminary and based on prior DTSC determination.

Map Location

Ridgecrest Solar Power Project

Figure 8
Process Flow Diagram

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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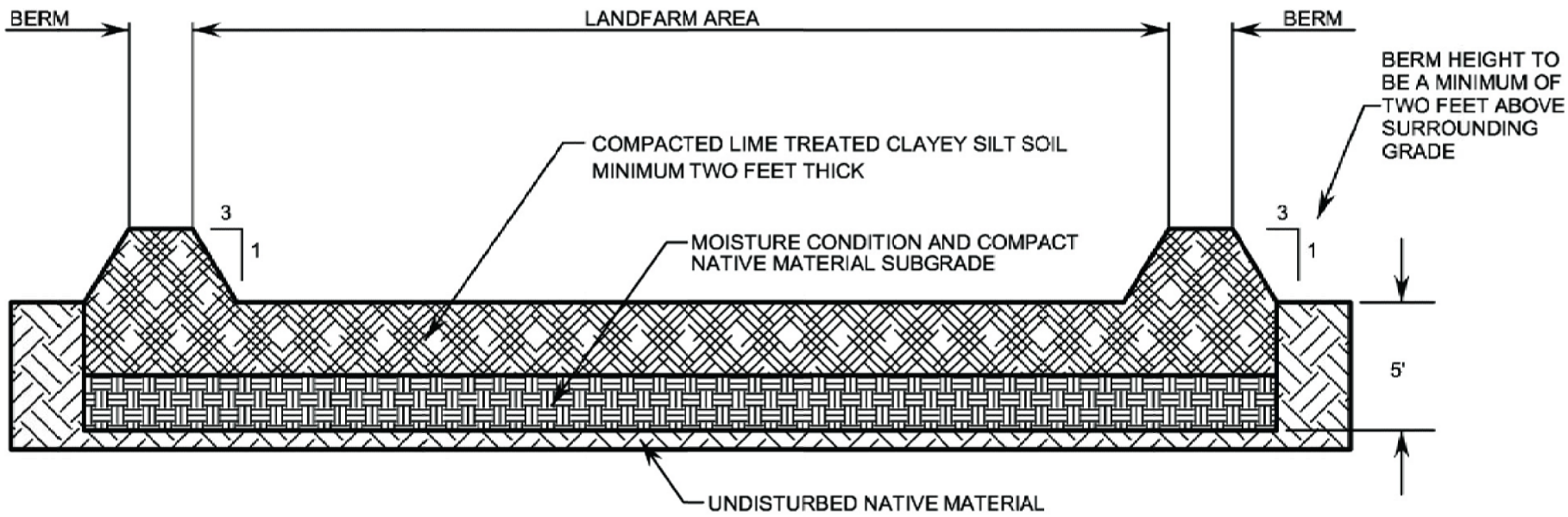

1 LANDFARM UNIT-SECTION
N.T.S.

NOTES:

1. THE COMPACTED AND NATIVE SOIL BENEATH THE LAND FARM UNIT IS DESIGNATED AS A "TREATMENT ZONE" TO A DEPTH OF 5 FEET.
2. THE LIME TREATED LAYER IS TO BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 AND HAVE A LOW PERMEABILITY (CLAYEY SILT) MATERIAL.
3. THE CROSS SECTION IS A TYPICAL SECTION.
4. SEE TEXT FOR FURTHER DETAILS.

Map Location

Rdgecrest Solar Power Project

Figure 9
Cross-Section Details of Land Treatment Unit

Solar Millennium

AECOM

Project: 60139696
Date: Januaryr 2010

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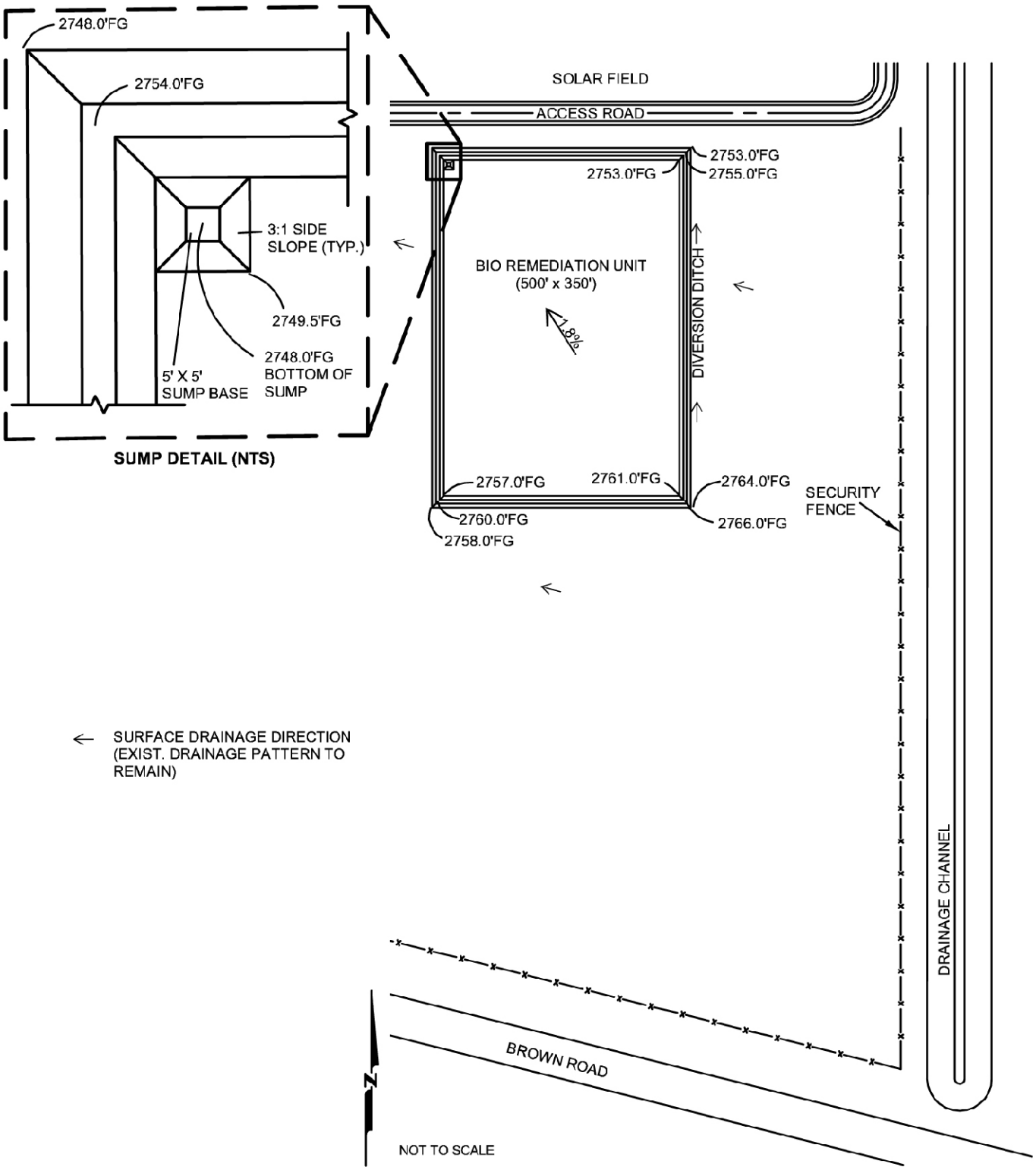

Map Location

Ridgecrest Solar Power Plant

Figure 10
Land Treatment Unit Details

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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Tables

Table 1: Site Climate Data

Month	Temperatures (1940 – 2008) (°F)					Number of Days			
	Monthly Averages			Record Extremes		Max. Temp.		Min. Temp.	
	Daily Max.	Daily Min.	Monthly	Record High	Record Low	90°F & Above	32°F & Below	32°F & Below	0°F & Below
Jan	59.6	30.7	45.2	80	1	0	0	18.5	0
Feb	64.9	34.6	49.7	86	9	0	0	11.4	0
Mar	70.4	38.8	54.6	93	15	0.1	0	5.5	0
Apr	77.8	44.5	61.2	100	24	2.9	0	1.6	0
May	87	52.9	69.9	108	26	13.3	0	0.1	0
Jun	96.8	60.5	78.6	117	38	25	0	0	0
Jul	102.7	66.2	84.5	119	46	30.8	0	0	0
Aug	101.3	64.6	82.9	114	45	30.2	0	0	0
Sep	94.2	58.1	76.2	110	35	22.9	0	0	0
Oct	83.3	48.2	65.8	105	20	7.8	0	0.4	0
Nov	69	37.3	53.1	88	14	0	0	7.8	0
Dec	59.7	30.3	45	84	5	0	0	20.3	0
Year[1]	80.6	47.2	63.9	119	1	1.77	0	0.87	0

1. Totals may not match the data in the columns due to rounding errors.
Source: WRCC 2009

Source Data Location: Inyokern, California

Table 2: Site Evaporation and Precipitation Data – Ridgecrest

Month	Rainfall (1940 – 2008) (Inches)			
	Mean	Highest Monthly	Lowest Monthly	Highest Daily
Jan	0.74	4.55	0	1.53
Feb	0.97	4.52	0	2.13
Mar	0.57	3.77	0	2.01
Apr	0.17	1.81	0	1.11
May	0.07	0.79	0	0.65
Jun	0.02	0.4	0	0.2
Jul	0.17	1.54	0	1.1
Aug	0.23	2.91	0	2.39
Sep	0.21	1.71	0	1.25
Oct	0.1	0.78	0	0.7
Nov	0.39	2.47	0	1.04
Dec	0.59	3.08	0	1.76
Year[1]	4.22	4.55	0.59	2.39

1. Totals may not match the data in the columns due to rounding errors.
Source: WRCC 2009.

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Published Evaporation (in)	0.00	4.65	6.45	9.97	13.59	15.33	17.21	16.00	11.83	8.28	4.76	3.52	111.59
Monthly Evaporation (in)	1.47	2.33	4.45	6.68	8.63	10.92	11.57	10.89	8.35	5.49	2.63	1.68	75.09

Notes:

Published evaporation is Class A Pan Evaporation
Source Data Location: Mojave, California (Evaporation) and Inyokern, California (Precipitation)

Table 3: Water Quality Data in the Indian Wells Valley Water District (all values reported in mg/L)

Analyte	IWVWD Wells[1]	Proposed Project Supply Wells[2]		
	General Water Quality	Well 18	Well 33	Well 34
Arsenic	0.0024 – 0.025	ND	ND	0.004
Bicarbonates (HCO_3)	87 – 150	150	140	140
Boron	0.180 – 1.20	0.26	0.29	0.29
Calcium	7.5 – 68	36	36	38
Chloride	21 – 210	25	30	31
Fluoride	0.43 – 1.20	0.94	0.73	0.62
Magnesium	ND	4.8	5.1	6.3
Nitrate (N)	6.5	1.7	1.8	2
Sodium	35 - 180	41	41	49
Sulfate	ND	43	43	46
Total Hardness ($CaCO_3$)	21 - 250	110	110	120
Total Dissolved Solids (TDS)	220 – 720	290	280	290
Uranium (in pCi/L)	2.1 – 6.1	NS	NS	NS
Gross Alpha Particle Activity (in pCi/L)	0.8 – 7.8	NS	NS	NS
Vanadium	ND - .04	0.014	0.012	0.016
pH	7.2 – 9.0	7.8	7.9	7.2

Key:
mg/L – milligrams per liter
ND – not detected at the practical quantitation limit shown
NS – not sampled
1. IWVWD, 2008.
2. Data provided by the IWVWD.

Table 4: Land Treatment Unit Runoff Sampling Parameters

Parameter	Unit
Biphenyl	mg/L
Diphenyl	mg/L

Table 5: Land Treatment Unit Soil Sample Analytical Parameters

Parameter	USEPA or Standard Method	Practical Quantitation Limit	Units
Biphenyl Oxide	8015M	1.0	mg/kg
Diphenyl Oxide	8015M	1.0	mg/kg

Table 6: Annual Groundwater Monitoring Parameters

Parameter	USEPA or Standard Method	PQL	Units
Arsenic	6020	0.5	mg/L
Boron	6020	0.5	mg/L
Calcium	200.7	0.5	mg/L
Chloride	300.0	0.5	mg/L
Fluoride	300.0	0.5	mg/L
Iron	200.7	0.5	mg/L
Magnesium	200.7	0.5	mg/L
Manganese	200.7	0.5	mg/L
Nitrate as Nitrogen	300.0	0.5	mg/L
Nitrite as Nitrogen	300.0	0.5	mg/L
Potassium	200.7	0.5	mg/L
Phosphate	365.3	0.03	mg/L
Selenium	200.7	0.5	mg/L
Sodium	200.7	0.5	mg/L
Sulfate	300.0	0.5	mg/L
TDS	SM 2450C	10	mg/L
Total Alkalinity (as CaCO3)	SM 2350B	1.0	mg/L
Biphenyl Oxide	8015M	1.0	mg/L
Diphenyl Oxide	8015M	1.0	mg/L

Key:
CaCO3 – calcium carbonate
mg/L – milligrams per liter
PQL – practical quantitation limit
SM – Standard Method
TDS – Total Dissolved Solids

Table 7: Quarterly Groundwater Monitoring Parameters

Parameter	USEPA or Standard Method	PQL	Units
Chloride	300.0	0.5	mg/L
Nitrate as Nitrogen	300.0	0.5	mg/L
Phosphate	365.3	0.03	mg/L
Sulfate	300.0	0.5	mg/L
Total Dissolved Solid	SM 2450C	10	mg/L
Biphenyl Oxide	8015M	1.0	mg/L
Diphenyl Oxide	8015M	1.0	mg/L
Static Water Depth	Field	+/- 0.1	feet bgs
pH reading	Field	+/- 0.1	pH units
Temperature	Field	+/- 0.1	°F or °C

Key:
mg/L – milligrams per liter
PQL – practical quantitation limit
SM – Standard Method

Appendix A

Basin Plan Compliance and Antidegradation Analysis

AECOM
Environment

Prepared for:
Solar Millennium, LLC

Basin Plan Compliance and Antidegradation Analysis

Ridgecrest Solar Power Project
Kern County, California

December 2009

60139694-5450-Antidegradation

AECOM
Environment

Prepared for:
Solar Millennium, LLC

Basin Plan Compliance and Antidegradation Analysis

Ridgecrest Solar Power Project
Kern County, California

Prepared By Carmen Caceres-Schnell

Reviewed By Michael Flack

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List of Acronyms

AFC	Application for Certification
Solar Millennium	Solar Millennium, LLC
BMP	Best Management Practice
RSPP	Ridgecrest Solar Power Project
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CFR	Code of Federal Regulations
CEC	California Energy Commission
cm/sec	centimeters per second
CQA	Construction Quality Assurance
CWC	California Water Code
DESCP	Drainage, Erosion and Sediment Control Plan
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
HDPE	high-density polyethylene
HTF	heat transfer fluid
LTU	land treatment units
MCL	Maximum Contaminant Levels
MDL	Method Detection Limit
mg/kg	milligrams per kilograms
mg/L	milligrams per liter
PQL	Practical Quantitation Level
PRG	Preliminary Remediation Goal
ROWD	Report of Waste Discharge Requirements
RWQCB	Regional Water Quality Control Board
SWPPP	Stormwater Pollution Prevention Plans
TDS	total dissolved solid

1.0 Introduction

A Report of Waste Discharge Requirements (ROWD) application for the Ridgecrest Solar Power Project (RSPP or Project) is being submitted to the Lahontan Regional Water Quality Control Board (RWQCB) as part of the Project permitting requirements through the California Energy Commission (CEC). The ROWD application addresses the construction, operation, closure, and post closure of the land treatment unit (LTU) proposed for the RSPP in compliance with the regulations under California Code of Regulations (CCR) Title 27.

The requirement found in CCR Title 27, Section 21750, states the following;

> *The ROWD must incorporate an analysis of … how the Unit, including how any waste, if it escapes from the Unit, could affect the beneficial uses of groundwater bodies (including, but not limited to, any aquifers underlying the facility) and surface water bodies.*

Under the California Water Code (CWC) Section 13241, each RWQCB is required to establish water-quality control plans (Basin Plans) to ensure the reasonable protection of beneficial uses for Waters of the State including surface waters and groundwater. The Lahontan Region Basin Plan designates beneficial uses for surface and groundwaters within the Lohantan Region and establishes water quality objectives, waste discharge prohibitions, and other implementation measures to protect those beneficial uses. In compliance with the State of California's Nondegradation Policy, the Lahontan Basin Plan incorporates antidegradation requirements for surface and groundwater. In interpreting the requirements of CCR Title 27, Section 21750, the ROWD for the RSPP must be adequate to ensure the Project's compliance with the objectives and criteria of the Lahontan Basin Plan including antidegradation.

2.0 State and Federal Antidegredation Policy

The U.S. Environmental Protection Agency (EPA), Region IX, has issued detailed guidelines for implementation of Federal antidegradation regulations for surface waters in 40 Code of Federal Regulations (CFR) Section 131.12. The State antidegradation policy is titled the Statement of Policy with Respect to Maintaining High Quality Waters in California, codified in CCR Title 23, Section 2900, and is commonly known as “Resolution 68-16.” The State and Federal antidegradation policies are independently enforceable requirements, despite being referred to as policies.

Both the State and Federal antidegradation policies require that where surface waters are of higher quality than necessary to protect the designated beneficial uses, the high quality of those waters be maintained unless otherwise provided by the policies. Both policies require that certain findings be made before any adverse change to water quality can be permitted. The State Water Board has concluded that Resolution No. 68-16 incorporates the Federal antidegradation policy (see State Water Board Order No. WQ 2001-16, p. 19, fn 83).

Both the State and Federal antidegradation policies have been incorporated into the Lahontan Basin Plan as the nondegradation objective. The nondegradation objective applies to all waters of the Lahontan Region (including surface waters, wetlands, and groundwaters) and requires continued maintenance of existing high-quality waters. Whenever the existing quality of water is better that the quality of water established in the Basin Plan as objectives (both narrative and numerical), such existing quality shall be maintained unless appropriate findings are made under the policy.

3.0 Application of the State Antidegradation Policy

Under the State Nondegradation Objective, whenever the existing quality of water is better than that needed to protect all existing and probable future beneficial uses, the existing high quality shall be maintained until or unless it has been demonstrated to the State that any change in water quality will be consistent with the maximum benefit of the people of the State, and will not unreasonably affect present and probable future beneficial uses of such water.

Therefore, unless these conditions are met, background water quality concentrations (the concentrations of substances in natural waters which are unaffected by waste management practices or contamination incidents) are appropriate water quality goals to be maintained. If it is determined that some degradation is in the best interest of the people of California, some increase in pollutant level may be appropriate. However, in no case may such increases cause adverse impacts to existing or probable future beneficial uses of Waters of the State.

The State policy establishes a two-step process to determine if discharges that will degrade water quality are allowed. The first step requires that where a discharge will degrade high-quality water, the discharge may be allowed if any change in water quality:

1. Will be consistent with the maximum benefit to the people of the State,

2. Will not unreasonably affect present and anticipated beneficial uses of such water, and

3. Will not result in water quality less than that prescribed (e.g., by water quality objectives).

The second step is that any activities that result in discharge to high-quality waters are required to use the best practicable treatment or control necessary to avoid a pollution or nuisance and to maintain the highest water quality consistent with the maximum benefit to the people of the State.

The State antidegradation policy further establishes that if the discharge, even after treatment, unreasonably affects beneficial uses or does not comply with applicable provisions of Basin Plans, the discharge would be prohibited.

4.0 Compliance with Basin Plan Requirements for Surface Water

The construction, operation, and closure of the LTU will have no impact to surface water quality within the Project Site. The LTU will not discharge treated or untreated waste to surface waters or result in the discharge of pollutants to surface waters via stormwater runoff.

Surface waters at the site consist of El Paso Wash, an ephemeral wash currently bisecting the Project Site. El Paso Wash trends generally from the southeast to the northwest through the Southern Solar Field, across South Brown Road, then over the Northern Solar Field. El Paso Wash is a Waters of the State as defined under Section 13260 of the CWC and subject to the water quality requirements in the Colorado River Basin Plan. The U.S. Army Corps of Engineers issued a determination that El Paso Wash is not a navigable waters as defined under Section 404 of the Clean Water Act. A Streambed Alteration Agreement application for the re-routing of the wash around the Project Site was submitted to the California Department of Fish and Game (CDFG) on November 25, 2009. As a result of the wash diversion, the LTU will be isolated from storm water flows originating upgradient from the Project Site. In addition, a construction general and industrial stormwater permit will require the implementation of Stormwater Pollution Prevention Plans (SWPPPs) during construction and operation of the LTU. In addition, a construction general and industrial storm water permit will require the implementation of Storm water Pollution Prevention Plans (SWPPPs) and a CEC-mandated Drainage, Erosion, and Sediment Control Plan (DESCP) during construction and operation of the LTU. The SWPPP and DESCP will require implementation of Best Management Practices (BMP) to prevent the discharge of pollutants to storm water and will ensure that storm water runoff from the LTU will not cause degradation of the surface flows diverted around the facilities.

A Drainage, Erosion and Sediment Control Plan (DESCP) has been prepared and attached as Appendix L to the RSPP Application for Certification (AFC) which will address the requirements of CCR Title 27, Section 21600(b)(8)(F). The plan will describe the management and control of stormwater runoff at the Project Site and will specify the site-specific BMPs for erosion and sediment control that will include side slope protection of the berms surrounding the evaporation ponds.

The DESCP and wash diversion will ensure that stormwater run on and runoff will not damage the evaporation ponds and that accidentally releases due to erosion will not occur. Therefore, the LTU does not have the potential to impact or degrade surface water quality and no further analysis is required.

5.0 Lahontan Basin Plan Groundwater Requirements

The Lahontan Basin Plan incorporates narrative and numerical water quality objectives that apply to all ground and surface waters within the Lahontan Region. In general, where more than one objective is applicable, the stricter objective applies. The only exception to this requirement is where a region-wide objective has been superseded by the adoption of a site-specific objective by the regional board.

Beneficial uses designated by the Lahontan Basin Plan as applicable to the Indian Wells Valley Groundwater Basin include: municipal and domestic water supply, industrial process supply, agricultural supply, and freshwater replenishment to surface waters.

The Nondegradation Objective (State Board Resolution No. 68-16, “Statement of Policy with Respect to Maintaining High Quality of Waters in California”) is described in Chapter 3 of the Basin Plan and applies to groundwaters. Other water quality objectives for groundwater consist primarily of narrative objectives combined with a limited number of numerical objectives and are included in Chapter 3 of the Lahontan Basin Plan. The Basin Plan states that groundwaters shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the groundwater objectives described in Chapter 3. These objectives define the upper concentration or other limit that the regional board considers protective of beneficial uses. These objectives apply to all groundwaters, rather than to groundwaters only at a wellhead, at a point of consumption, or at point of application of discharge.

6.0 Existing RSPP Groundwater Quality

The Project site is located within Indian Wells Valley, which is in the southern end of the Basin and Range Province east of the Sierra Nevada, south of the Caso range, north of the El Paso Mountains, and west of the Argus Range. The Valley is characterized by a broad alluvial basin of Cenozoic-age sedimentary and volcanic material overlying older plutonic and metamorphic rocks. Quaternary lacustrine deposits are also found in the region as a result of playas in the northeastern portion of the valley. Surface water in the Indian Wells Valley drains from the surrounding mountains toward China Lake, a dry lake, which is located about 12 miles northeast of the Project site.

Groundwater beneath the Project and surrounding area is contained within the Indian Wells Valley Groundwater Basin. This basin encompasses an area of about 597 square miles (DWR 2004).

The groundwater quality in Indian Wells Valley varies throughout the Basin. According to the DWR report, TDS ranges from less than 600 mg/L to more than 1,000 mg/L. Analyses of water from ten public supply wells in the IWV Groundwater Basin show that TDS content ranges from 220 to 720 mg/L. In general, the highest quality water is in the deep aquifer (Groundwater Management Group 2008). TDS concentrations for wells in the IWV Groundwater Basin were mapped by the Indian Wells Valley Cooperative Groundwater Management Group. Groundwater considered to have the best quality (TDS of 500 mg/L or lower) is found in the southwestern part of the Valley and the western part of the Valley along the area of recharge.

A review of the water quality data for the IWV Groundwater Basin show that eight major types of groundwater quality occur in the Basin:

- Alpine waters, characteristically calcium-sodium-magnesium-bicarbonate. These are characteristic of the Sierra Nevada.
- Sodium-chloride waters, characteristic of China Lake, southeastern parts of the City of Ridgecrest, and the Coso Geothermal Area.
- Sodium-carbonate waters, principally occurring in the southwestern part of Indian Wells Valley.
- Sodium-bicarbonate waters, occurs in an extensive horseshoe-shaped area in the north and southwestern parts of the basin.
- Sodium-bicarbonate-chloride waters, east of the horseshoe area and may represent mixing of easterly moving groundwater with the groundwater of the China Lake Playa.
- Sulfate waters from geothermal areas, mineralized areas, and sewage pond seepage.
- Calcium-(sodium-magnesium)-bicarbonate-chloride-sulfate waters, these water probably represent a mixture of Alpine and Coso geothermal waters.
- “Waters of the well fields. Usually sodium-calcium, but sometimes calcium-sodium-bicarbonate-chloride waters. These water could represent Alpine waters concentrated by ET mixed with sodium chloride geothermal leakage”.

A review of the water quality data for the ten wells pumped for the IWVWD water supply shows the following:

- TDS concentrations (280 to 5,640 mg/L) generally exceeded the recommended standard of 500 mg/L, for a drinking water resource in California.
- Arsenic was reported in general water quality data for 2008 at concentrations between 0.0024 – 0.025 mg/L. Some concentrations exceeded the primary State and Federal Maximum Contaminant

Level (MCL) for Arsenic (0.010 mg/L). The IWVWD began compliance testing for arsenic in December 2007. At that time, three wells were placed on quarterly monitoring. Two wells violated the MCL based on samples collected in March, July, and October 2008. Arsenic is a naturally occurring element commonly found in drinking water sources in California.

- Boron concentrations range from 0.18 mg/L to 1.2 mg/L. Boron was reported in two District wells at concentrations of 1.2 mg/L and 1.1 mg/L. The Action Level for boron is 1.0 mg/L. The Action Level is the concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

The IWVWD serves the City of Ridgecrest and the surrounding areas. Ten wells are pumped by the IWVWD for their water supply and these wells are tested on regularly for the presence of radioactive, biological, inorganic volatile organic, and synthetic organic compounds. The results of the 2008 Annual Water Quality Report are presented on Table 5.17-6. Table 5.17-6 also presents the analytical results for three wells that are proposed to be pumped for the Project water supply and are located approximately four miles from the center of the Project site. Given the long screen interval for these wells, these data likely represent an average water quality of the more permeable sediments over the screen interval.

Table 1 Summary of Water Quality Data
(all values reported in mg/L)

Analyte	IWVWD Wells[1]	Proposed Project Supply Wells[2]		
	General Water Quality	Well 18	Well 33	Well 34
Arsenic	0.0024 – 0.025	ND	ND	0.004
Bicarbonates (HCO_3)	87 – 150	150	140	140
Boron	0.180 – 1.20	0.26	0.29	0.29
Calcium	7.5 – 68	36	36	38
Chloride	21 – 210	25	30	31
Fluoride	0.43 – 1.20	0.94	0.73	0.62
Magnesium	ND	4.8	5.1	6.3
Nitrate (N)	6.5	1.7	1.8	2
Sodium	35 - 180	41	41	49
Sulfate	ND	43	43	46
Total Hardness ($CaCO_3$)	21 - 250	110	110	120
Total Dissolved Solids (TDS)	220 – 720	290	280	290
Uranium (in pCi/L)	2.1 – 6.1	NS	NS	NS
Gross Alpha Particle Activity (in pCi/L)	0.8 – 7.8	NS	NS	NS
Vanadium	ND - .04	0.014	0.012	0.016
pH	7.2 – 9.0	7.8	7.9	7.2

Key:
mg/L – milligrams per liter
ND – not detected at the practical quantitation limit shown
NS – not sampled
1. IWVWD, 2008.
2. Data provided by the IWVWD

7.0 Design and Operation of the RSPP Units

7.1 Land Treatment Unit

The LTU will cover an area of approximately 400 feet by 800 feet and will consist of a bioremediation unit and a land treatment unit. Bioremediation will be used for soils with concentrations less than 10,000 milligrams per kilogram (mg/kg) of heat transfer fluid (HTF) and land treatment for soils with concentrations below 1,000 mg/kg of HTF. The California Department of Toxics Substances Control (DTSC) has determined that soil contaminated with HTF is classified as a non-hazardous waste. A copy of the DTSC determination letter is included in Appendix D to the RSPP ROWD.

The LTU will not incorporate a liner containment system or leak detection and removal system, but will be constructed with a prepared base consisting of a minimum of 2 feet of compacted, low permeability, lime-treated native material. This base will serve as a competent platform for land treatment activities, and will serve to slow the rate of surface water infiltration in the treatment area. The compacted and native soil beneath the LTU is designated as a “treatment zone” to a depth of 5 feet. Although the land treatment will be taking vehicle traffic, no hard surface will be required, as there is no liner system to protect.

The LTU will be surrounded on all sides by a 2-foot high compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run on) of surface stormwater into the LTU or runoff of stormwater from the unit.

The design details, layout, and topography of the LTU are shown in Figures 8, 9, and 11 of the ROWD.

ROWD Figure 9, Land Treatment Area Section and Details, includes a cross section and construction details of the LTU. Additional details on the construction, operation, and maintenance of the LTU are provided in Section 7.4 of the ROWD. The LTU will be constructed in accordance with a CQA program in compliance with CCR Title 27 requirements.

The 2-foot thick compacted low permeability material and the 5 feet of “treatment zone” soil beneath the LTU will be adequate to prevent the migration of HTF to groundwater. In addition, implementation of the DESCP and storm water permit SWPPPs will prevent the discharge of contaminated soil to stormwater. Based on the proposed design, operation, and maintenance of the LTU, no degradation of surface or groundwater will occur.

7.2 Management of Stormwater

Releases or spills from damage caused by stormwater run on or runoff could result in degradation of surface and groundwater. However, measures to address the impacts of stormwater and erosion have been incorporated into the design of the Project. As part of the stormwater management for the site, Solar Millennium will re-route the current El Paso and two unnamed washes that run through the Project Site. The washes will be rerouted around the southern (Channel 1) and eastern (Channel 3) boundaries, and through the center of the Project (Channel 2), effectively diverting stormwater run on away from the LTU.

As described in the DESCP prepared for the Project, the diversions will be designed to handle a 100-year flood event and for flows of up to 6.7 feet per second (ft/s) for Channel 1, 10.1ft/s for Channel 2, and 11.7 ft/s for Channel 3. The constructed stormwater management facilities and BMPs are described in Section 9 of the ROWD.

7.3 Compliance with Basin Plan Groundwater Management Requirements

Releases from the LTUs in the form of leaks and spills would have the potential to impact groundwater quality in the underlying vadose zone or aquifers. The discharge of pollutants to the sub-surface would result in the degradation of potentially high-quality groundwaters and would be in violation of the antidegradation objective in the Lahontan Basin Plan. However, the compacted “treatment zone” of the LTU will be constructed and operated according to the CQA. Proper operation and maintenance of the facilities according to the CQA will prevent the discharge of pollutants to the vadose zone and underlying aquifer.

The ROWD application submitted by Solar Millennium complies with the groundwater management requirements for waste management units stated in Chapter 4 of the Basin Plan. Chapter 4 includes the specific requirements under CCR Title 27 and additional monitoring and reporting requirements to ensure compliance with Basin Plan groundwater quality objectives. As required under Chapter 4 of the Basin Plan, a Detection Monitoring Program that includes a groundwater monitoring plan has been submitted with the ROWD. The groundwater monitoring plan will provide sufficient lycimeters to provide the earliest possible detection of a release in the vadose zone from the LTUs. In addition, the ROWD incorporates preliminary closure plans and preliminary post-closure monitoring and maintenance plans in addition to a financial assurance that adequate funds will be irrevocably committed by Solar Millennium to ensure that the Project will be properly reclaimed and maintained.

8.0 Compliance with the Antidegradation Objective for Groundwater

Solar Millennium will meet the Step One demonstration requirements of the Basin Plan antidegradation objective in that operation of the Project:

1. Will be consistent with the maximum benefit to the people of the State in providing a clean, renewable source of energy;

2. Will not unreasonably affect the present and anticipated beneficial uses of groundwater within the Indian Wells Valley Groundwater Basin; and

3. Will not result in water quality less than that prescribed (e.g., by water quality objectives) based on the application of engineered liner systems, BMPs and the CQA program.

The Project has provided detailed information in the ROWD regarding the design of the compacted "treatment zone" underlying the LTU. The "treatment zone" will comply with Title 27 requirements to ensure that no releases occur to groundwater. Additionally, proper installation, operation, and maintenance of the Project will be assured by application of the CQA. Proper closure and post closure procedures will eliminate any long-term impacts to groundwater quality. This information is adequate to provide adequate documentation for Step 2 of the antidegradation demonstration.

9.0 Conclusion

Based on the above demonstrations, this analysis concludes that operation of the LTU will comply with the requirements of the Lahontan Basin Plan and will not result in degradation of existing high-quality groundwater.

10.0 References

Solar Millennium, LLC, 2009. Application for Certification, Ridgecrest Solar Power Project (RSPP). Submitted to the California Energy Commission. September.

California Department of Water Resources (DWR), 2009. Groundwater Level Data and Water Quality Data. Accessed at http://well.water.ca.gov.

DWR, 2004. Indian Wells Valley Groundwater Basin, California's Groundwater Bulletin 118, 1975 (updated in February 2004).

RWQCB, 1994. Water Quality Control Plan for the Lahontan Region, North and South Basin: California Regional Quality Control Board, Lahontan Region, Victorville, California.

Appendix B

Material Safety Data Sheets for HTF

Solutia Inc.

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: THERMINOL® VP1 Heat transfer fluid

Reference Number: 000000000211 Date: 05/16/2006

Company Information:

United States:
Solutia Inc.
575 Maryville Center Drive, P.O. Box 66760
St. Louis, MO 63166-6760
Emergency telephone: Chemtrec: 1-800-424-9300
International Emergency telephone: Chemtrec: 703-527-3887
Non-Emergency telephone: 1-314-674-6661

Canada:
Solutia Canada Inc.
6800 St. Patrick Street
LaSalle, PQ H8N 2H3
Emergency telephone: CANUTEC: 1-613-996-6666
Non-Emergency telephone: 1-314-674-6661

Mexico:
Solutia MEXICO, S. DE R.L. DE C.V.
Prol. Paseo de la Reforma 2654
Local 501, Piso-5
Col. Lomas Altas
11950 Mexico, D.F.
Emergency telephone: SETIQ: (in Mexico) 01-800-002-1400
Non-Emergency telephone: (in Mexico) 01-55-5259-6800

Brazil:
Solutia Brazil Ltd.
Avenue Carlos Marcondes, 1200
CEP: 12241-420-São José dos Campos/SP-Brazil
Emergency telephone: 55 12 3932 7100 (PABX)
Non-Emergency telephone: 55 11 3365 1800 (PABX)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Form: liquid
Colour: clear to colourless
Odour: characteristic

WARNING STATEMENTS

WARNING!
Causes eye irritation
Causes skin irritation
Causes respiratory tract irritation
Contains material which can cause liver and nerve damage

POTENTIAL HEALTH EFFECTS

Likely routes of exposure:	eye and skin contact inhalation
Eye contact:	Highly irritating to eyes.
Skin contact:	Highly irritating to skin. Prolonged or repeated skin contact may result in irritant dermatitis.
Inhalation:	Severely irritating if inhaled. No more than slightly toxic if inhaled. Significant adverse health effects are not expected to develop under normal conditions of exposure.
Ingestion:	No more than slightly toxic if swallowed. Significant adverse health effects are not expected to develop if only small amounts (less than a mouthful) are swallowed.
Signs and symptoms of overexposure:	headache fatigue nausea/vomiting indigestion abdominal pain tremors
Target organs/systems:	May cause liver damage May cause nerve damage

Refer to Section 11 for toxicological information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS No.	Average concentration	Concentration range	Units
diphenyl ether	101-84-8	73.5		%
biphenyl	92-52-4	26.5		%

4. FIRST AID MEASURES

If in eyes:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.
If on skin:	Immediately flush the area with plenty of water. Remove contaminated clothing. Wash skin gently with soap as soon as it is available. Get medical attention. Wash clothing before reuse.
If inhaled:	Remove patient to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Remove material from eyes, skin and clothing.

If swallowed: Immediate first aid is not likely to be required.
A physician or Poison Control Center can be contacted for advice.
Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

Fire point: 127 C

Hazardous products of combustion: carbon monoxide (CO); carbon dioxide; hydrocarbons

Extinguishing media: Water spray, foam, dry chemical, or carbon dioxide

Unusual fire and explosion hazards: None known

Fire fighting equipment: Firefighters, and others exposed, wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

Miscellaneous advice: This product is not classified as a fire-resistant heat transfer fluid. Precautions to avoid sources of ignitions should be taken.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protection recommended in section 8.

Environmental precautions: Keep out of drains and water courses.

Methods for cleaning up: Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Flush spill area with water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling
Avoid contact with eyes, skin and clothing.
Avoid breathing vapour or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Precautions against ignitions and fire should be taken with this product.
Heat transfer fluids are intended for INDIRECT heating purposes ONLY.
This product has not been approved for food grade use.

Emptied containers retain vapour and product residue. Observe all recommended safety precautions until container is cleaned, reconditioned or destroyed. Do not cut, drill, grind or weld on or near this container. The reuse of this material's container for non industrial purposes is prohibited and any reuse must be in consideration of the data provided in this material safety data sheet.

Storage
General: Stable under normal conditions of handling and storage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits: (ml/m3 = ppm)

THERMINOL® VP1	No specific occupational exposure limit has been established.
biphenyl	ACGIH TLV: 0.2 ml/m3 ; mist ; 8-hr TWA OSHA PEL: 0.2 ml/m3 ; 1.0 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.2 ml/m3 ; 1.5 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.6 ml/m3 ; 4 mg/m3 ; ; 15-min STEL
diphenyl ether	ACGIH TLV: 1 ml/m3 ; ; 8-hr TWA ACGIH TLV: 2 ml/m3 ; ; 15-min STEL OSHA PEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 2 ml/m3 ; 14 mg/m3 ; ; 15-min STEL

Eye protection:	Wear safety goggles. Have eye flushing equipment available.
Hand protection:	Wear chemical resistant gloves. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. See Solutia Glove Facts for permeation data.
Body protection:	Wear suitable protective clothing. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. Wear full protective clothing if exposed to splashes. Wash contaminated skin promptly. Launder contaminated clothing and clean protective equipment before reuse. Wash thoroughly after handling. Have safety shower available at locations where skin contact can occur.
Respiratory protection:	Avoid breathing vapour or mist. Use approved respiratory protection equipment (full facepiece recommended) when airborne exposure limits are exceeded. If used, full facepiece replaces the need for face shield and/or chemical goggles. Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer.
Ventilation:	Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits. If practical, use local mechanical exhaust ventilation at sources of air contamination such as processing equipment.

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Flash point:	110 C	Pensky-Martens closed tester
	124 C	Cleveland Open Cup

Autoignition temperature:	612 C	ASTM D-2155
Density:	1.06 g/cm3 @ 25 C	
Boiling point :	257 C	
Crystallising point :	12 C	
Water solubility:	~25 mg/l	

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Conditions to avoid:	All sources of ignition.
Materials to avoid:	Contact with strong oxidizing agents.
Hazardous reactions:	Hazardous polymerization does not occur.
Hazardous decomposition products:	None known;

11. TOXICOLOGICAL INFORMATION

This product has been tested for toxicity. Results from Solutia sponsored studies or from the available public literature are described below.

Acute animal toxicity data

Oral:	LD50 , rat, 2,050 mg/kg , No more than slightly toxic
Dermal:	LD50 , rabbit, > 5,010 mg/kg , Practically nontoxic after skin application in animal studies.
Inhalation:	LC50 , rat, 2.66 mg/l , 4 h, Toxic based on animal inhalation exposure studies.
Skin irritation:	rabbit , Slightly irritating to skin., 24 h
Repeat dose toxicity:	rat, , inhalation, 13 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies.
Repeat dose toxicity:	rat, , gavage, 26 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Effects only observed at very high dose levels.
Target organs affected	kidneys, liver, spleen
Repeat dose toxicity:	rat, , diet, subchronic, , Repeated oral exposure produced liver and kidney changes in animal models.
Target organs affected	liver, kidneys
Developmental toxicity:	rat, gavage, , No effects on offspring observed in laboratory animals in the presence of maternal toxicity.

Mutagenicity: No genetic effects were observed in standard tests using bacterial and animal cells.

Components

Data from Solutia studies and/or the available scientific literature on the components of this material which have been identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200) or the Canadian Hazardous Products Act are discussed below.

biphenyl	Chronic exposure has been reported to cause headache, fatigue, nausea, indigestion, abdominal pain, tremor, central and peripheral nerve damage and liver injury. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Practically non irritating to skin (rabbit). Slightly irritating to eyes (rabbit). No mortality or signs of toxicity at the highest level achievable. Irritating to respiratory system in animal models. Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Produced no dermal sensitization (guinea pigs). No effects on offspring observed in laboratory animals in the presence of maternal toxicity. No genetic effects were observed in standard tests using bacterial and animal cells.
diphenyl ether	Predictive patch testing on human volunteers did not produce irritation or sensitization. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Slightly irritating to eyes (rabbit). Slightly irritating to skin (rabbit). Repeated exposure produced respiratory tract irritation in animal models. Repeated exposure produced eye irritation in animal models. No genetic effects were observed in standard tests using bacterial and animal cells.

12. ECOLOGICAL INFORMATION

Environmental Toxicity

Invertebrates	48 h, EC50	Water flea (Daphnia magna)	2.4 mg/l
Fish:	96 h, LC50	Rainbow trout (Oncorhynchus mykiss)	7.6 mg/l
	96 h, LC50	Fathead minnow (Pimephales promelas)	24 mg/l
Algae:	96 h, EC50	Algae (Selenastrum capricornutum)	1.3 mg/l

Biodegradation Modified SCAS (OECD 302A) Primary degradation 99 %

13. DISPOSAL CONSIDERATIONS

US EPA RCRA Status: This material when discarded may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. This material should be analyzed in accordance with Method 1311 for the compound(s) below.

US EPA RCRA D018 Compound/Characteristic: BENZENE

hazardous waste number:

Disposal considerations: Incineration

Miscellaneous advice: This product meets the criteria for a synthetic used oil under the U.S. EPA Standards for the Management of Used Oil (40 CFR 279). Those standards govern recycling and disposal in lieu of 40 CFR 260 -272 of the Federal hazardous waste program in states that have adopted these used oil regulations. Consult your attorney or appropriate regulatory official to be sure these standards have been adopted in your state. Recycle or burn in accordance with the applicable standards.
Solutia operates a used fluid return program for certain fluids under these used oil standards. Contact your Sales Representative for details.
This product should not be dumped, spilled, rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *biphenyl*
Hazard Class:	9
Hazard Identification number:	UN3082
Packing Group:	Packing Group III
Transport label:	Class 9
Special provisions:	This material meets the definition of a marine pollutant.
Other:	Applies ONLY to containers with an RQ or for shipments in bulk via water transportation.

Canadian TDG

Other:	Not regulated for transport.

Reportable Quantity/Limit

US DOT RQ 100 lb *biphenyl*
Package size containing reportable amount: 377 lb

ICAO/IATA Class

Other:	See DOT Information

15. REGULATORY INFORMATION

All components are in compliance with the following inventories:	U.S. TSCA, EU EINECS, Canadian DSL, Australian AICS, Korean, Japanese ENCS, Phillipine PICCS, Chinese
Canadian WHMIS classification:	D2(A) - Materials Causing Other Toxic Effects D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification:

Hazard Categories Under Title III Rules (40 CFR 370):	Immediate Delayed

Section 302 Extremely Hazardous Substances:	Not applicable
Section 313 Toxic Chemical(s):	biphenyl

CERCLA Reportable Quantity:

100 lbs biphenyl
For this/these chemicals, release of more than the Reportable Quantity to the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

Safety data sheet also created in accordance with Brazilian law NBR 14725

16. OTHER INFORMATION

Product use: Heat transferring agents

Reason for revision: Significant changes to the following section(s):, Section 1

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	2	1	0	
Suggested HMIS Rating:	2	1	0	G

Prepared by the Solutia Hazard Communication Group. Please consult Solutia @ 314-674-6661 if further information is needed.

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Appendix C

DTSC Classification of HTF-Contaminated Soil

STATE OF CALIFORNIA - ENVIRONMENTAL PROTECTION AGENCY

PETE WILSON, Governor

PARTMENT OF TOXIC SUBSTANCES CONTROL
400 P Street, 4th Floor
P O Box 806
Sacramento, CA 95812-0806
(916) 327-2500

April 4, 1995

Mr. David M. Rib, Manager of Regulatory Affairs
KJC Operating Company
41100 Highway 395
Boron, CA 93516

Re: REQUEST FOR RECLASSIFICATION OF THERMINOL CONTAMINATED SOIL AS NONHAZARDOUS PURSUANT TO SECTION 66260.200(f), TITLE 22, CALIFORNIA CODE OF REGULATIONS (22 CCR) - WASTE EVALUATION UNIT FILE #F143 (WEU FILE #F143)

Dear Mr. Rib:

The Office of Scientific Affairs, Department of Toxic Substances Control (Department) has completed its review of the information submitted to the Department by you on behalf of the KJC Operating Company. The information was submitted in support of a petition to reclassify soil contaminated with a heat transfer fluid (HTF) known as Therminol as nonhazardous pursuant to 22 CCR section 66260.200(f). Based on our review of all the analytical data and information submitted, the Department finds that the Therminol-contaminated soil possesses mitigating physical and chemical characteristics which render it insignificant as a hazard to human health and safety, livestock, and wildlife. The Department, therefore, classifies the Therminol-contaminated soil as nonhazardous.

Background

The KJC Operating Company (KJC) facility, located in Boron, California, encompasses approximately 160 acres where a series of parabolic mirror troughs called Solar Collecting Assemblies (SCAs) are configured into multiple rows to form a solar field. The HTF, a synthetic material whose composition is a mixture of 26.5% biphenyl and 73.5% diphenyl oxide, is circulated through heat collection elements positioned at the focal point of each of the SCAs. The HTF is heated to between 650 and 735 degrees fahrenheit and, through a series of heat exchangers, generates steam for power production.

Occasional accidental or incidental spills or leaks of HTF result in contamination of the soils beneath the point of leakage. When these occur, the HTF-contaminated soils are excavated and transported to a central storage area. Historically, these HTF-contaminated soils were typically disposed of off-site into a Class I waste landfill. However, alternative treatment technologies have been explored for the management of this waste, the most recent being an on-site bioremediation facility. An estimated 500 cubic yards of HTF-contaminated sandy soil is generated per year. The average concentration of HTF in these contaminated soils ranges between 3,000 and 10,000 ppm.

Department's position that the test results demonstrate that the mitigating property is the much lower vapor pressure at the maximum ambient temperature, which will result in greatly reduced inhalation exposure than the theoretical value. Therefore, the Department grants your request for reclassification of the spilled Therminol as nonhazardous based on the information you previously submitted.

Conclusion

Based on the review of the analytical data and information provided, the Department finds that the HTF contaminated soils poses an insignificant hazard and classifies the waste as nonhazardous pursuant to 22 CCR section 66260.200(f). The Department's formal decision as outlined in this letter is contingent on the accuracy and representativeness of the analytical data and information provided to the Department for review. Furthermore, the nonhazardous classification granted in this letter is not to be construed as an approval by the Department to leave the HTF-contaminated soil on the site or for any other uses. Waste classification determines whether a waste must be managed and disposed of as a hazardous waste in accordance with Chapter 6.5, Division 20, of the California Health and Safety Code.

Irrespective of the Department's classification decision outlined in this letter, the management and disposal of the HTF-contaminated soils are subject to the requirements of the respective Regional Water Quality Control Board and other state, federal, or local agencies who have regulatory jurisdiction in this matter. It is the Department's understanding that the California Energy Commission, Energy Facilities Siting and Environmental Protection Division will also be providing direct oversight to insure that the HTF-contaminated soils will be managed and disposed of properly.

Should you have any questions regarding this classification letter, you may contact me at the letterhead address and telephone number. Classification of heat transfer fluid, ref: your letter of February 14, 1995.

Sincerely,

James C. Carlisle

James C. Carlisle, DVM, MSc
Waste Evaluation Unit
Office of Scientific Affairs

cc: Jeffrey J. Wong, PhD
Science Advisor to the Director

Sharon Fair
Surveillance and Enforcement, Region 4

Ronald Pilorin
Waste Evaluation Unit
Office of Scientific Affairs

Appendix D

Corrective Action Plan

AECOM
Environment

Prepared for:
Ridgecrest Solar 1, LLC

Corrective Action Plan
Ridgecrest Solar Power Project
Kern County, California
Appendix D of the Application/Report of Waste Discharge

January 2010

60139696-5450 - CAP

AECOM
Environment

Prepared for:
Ridgecrest Solar 1, LLC

Corrective Action Plan
Ridgecrest Solar Power Project
Kern County, California
Appendix D of the Application/Report of Waste Discharge

Prepared By Carmen Caceres-Schnell, PG

Reviewed By Roy Hauger, PE

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List of Acronyms

BLM	Bureau of Land Management
CAP	Corrective Action Plan
CCR	California Code of Regulations
CMP	Corrective Measures Program
COC	constituents of concern
DMP	Detection Monitoring Program
DTSC	Department of Toxic Substances Control
EMP	Evaluation Monitoring Program
°F	degrees Fahrenheit
HTF	heat transfer fluid
LTU	land treatment unit
mg/kg	milligrams per kilograms
Project	Ridgecrest Solar Power Project
ROW	Right-of-Way
ROWD	Report of Waste Discharge
RWQCB	Regional Water Quality Control Board
SSG	solar steam generator
STG	steam turbine generator

1.0 Introduction

Ridgecrest Solar 1 LLC (formerly Solar Millennium LLC) is proposing to construct, own, and operate the Ridgecrest Solar Power Project (herein "Project"). The Project is a concentrated solar thermal electric generating facility located in the high northern Mojave Desert in northeastern Kern County, California, about five miles southwest of the City of Ridgecrest, California. The Project right-of-way (ROW), for which a ROW grant sought by Solar Millennium from the Bureau of Land Management (BLM), will extend across approximately 3,995 acres of public lands owned by the Federal government. The Project facilities will occupy 1,440 acres of the 3,995-acre site, and there will be a total disturbance area (including areas outside the facility fence line), of approximately 1,944 acres. The Project will use well-established parabolic trough solar thermal technology to produce electrical power using a steam turbine generator (STG) fed from a solar steam generator (SSG). The SSG receives heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

Ridgecrest Solar 1 proposes to use a land treatment unit (LTU) as part of the Project. The LTU is the facility that receives and temporarily stores soil contaminated with HTF released from the process to the environment. This Corrective Action Plan (CAP) was developed as part of the Report of Waste Discharge (ROWD) application for the proposed Project.

1.1 Purpose

The monitoring requirements for the Project's waste facilities are specified under California Code of Regulations (CCR) Title 27 Chapter 3, Subchapter 3, Article 1, Sections 20380 through 20435 (CCR Title 27, Sections 20380 through 20435). Article 1 includes provisions for a Corrective Measures Plan (CMP) (CCR Title 27, Section 20385). The objective of the CMP is to ensure the constituents of concern (COCs) achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release, including any portions thereof that extend beyond the facility boundary, by removing the waste constituents or treating them in place.

This document describes the elements of the CAP and is considered to be a stand-alone document that supplements other elements of the ROWD application including the LTU Construction Engineering Design Package, the Construction Quality Assurance Plan, the Detection Monitoring Program (DMP), and the Closure Plan for the LTU.

1.2 Site Background

The Project is a concentrating solar electric generating facility proposed on an approximately 3,995-acre site in Kern County, California (see **Figure 1**). The Project will have a nominal electrical output of 250 megawatts (MW) and commercial operation is planned to commence by the third quarter of 2013, subject to timing of regulatory approvals and Applicant achievement of project equipment procurement and construction milestones. The solar thermal technology will provide 100 percent of the power generated by the Project; no supplementary energy source (e.g., natural gas to generate electricity at night) is proposed to be used for electric energy production. The Project will utilize two auxiliary boilers fueled by propane gas to reduce startup time and for HTF freeze protection. The auxiliary boilers will supply steam to the HTF freeze protection heat exchangers during nighttime hours to keep the HTF in a liquid state when ambient temperatures are not sufficient to keep the temperature of the HTF above its relatively high freezing point (54 degrees Fahrenheit [°F]). The propane gas will be delivered to the site via delivery truck. The Project will also have a diesel-fueled fire water pump for fire protection.

The Project proposes to use dry cooling for power plant cooling. Water for process water makeup and other industrial uses such as mirror washing will be supplied by the local municipal water district via a new

pipeline. This source will also be used to supply water for employee use (e.g., drinking, showers, sinks, and toilets). Water received from the Indian Wells Valley Water District (IWVWD) will meet the requirements of the California Department of Health Services for potable water supplies and will not require further treatment for this purpose. Power cycle makeup, mirror washing water, and cooling of ancillary equipment will require onsite treatment for reduction of dissolved solids, and this treatment varies according to the quality required for each of these uses. A sanitary septic system and on-site leach field will be used to dispose of sanitary wastewater.

The power generation cycle will not produce cooling tower blowdown because the plant will be dry cooled. The power plant unit includes two cooling systems: 1) an air-cooled steam cycle heat rejection system and, 2) the closed cooling water system for ancillary equipment cooling. A small auxiliary cooling tower will generate a small amount of blowdown which will be reused on site. No off-site backup cooling water supply is planned at this time.

The Project will include a LTU to treat soil contaminated with HTF. The unit will be designed in accordance with Lahontan Regional Water Quality Control Board (RWQCB) requirements. The LTU will cover an area of approximately 500 feet by 350 feet (4 acres).

The estimated project life for the Project is 30 years. Personnel will staff the Facility 24 hours per day/seven days per week. Even when the solar power plant is not operating, personnel will be present as necessary for maintenance, to prepare the Project for startup, and/or for site security. The layout of the proposed facility is shown in **Figure 2**.

1.3 Waste Handling Facilities

The waste storage and treatment unit includes a single LTU for HTF-contaminated soils as described below. The configuration of the planned LTU is shown in **Figure 3**.

1.3.1 On-site Land Treatment Unit

The LTU will be designed in accordance with Lahontan RWQCB requirements and is expected to comprise an area of about 4 acres. The bioremediation facility will utilize indigenous bacteria to metabolize hydrocarbons contained in non-hazardous HTF-contaminated soil. A combination of nutrients, water, and aeration facilitates the bacterial activity where microbes restore contaminated soil within two to four months. The California Department of Toxic Substances Control (DTSC) has determined for a similar thermal solar power plant that soil contaminated with up to 10,000 milligrams per kilogram (mg/kg) of HTF is classified as a non-hazardous waste[1]. However, the DTSC has further indicated that site-specific data will be required to provide a classification of the waste. Initially, in addition to sampling for HTF, samples will be analyzed for ignitability and toxicity using appropriate State and Federal methods to verify generator knowledge and characterize the waste as hazardous or non-hazardous. These data will be obtained to provide site-specific information and verify this classification.

The LTUs will be constructed with a 2 foot compacted, lime treated, clay/silt layer underlain by 3 foot of compacted native material in accordance with Title 27 requirements. Vadose zone leak detection at the LTU consists of the collection of soil samples from 1 foot below the compacted native material base at the LTU. Groundwater beneath the site is over 400 feet below ground surface. HTF is an oil that is solid at temperatures below 54°F, has relatively low solubility and a high sorption potential. The components of HTF have been demonstrated at Kramer Junction to biodegrade relatively rapidly within a four month period.

---

[1] DTSC 1995. Letter to Mr. David Rib, KJC Operating Company, re: Request for Reclassification of Therminol Contaminated Soil as Nonhazardous Pursuant to Section 66260.200(f), Title 22, California Code of Regulations – Waste Evaluation Unit (WEU) File # F143, April 4.

Environment

Given the great distance to groundwater, the physicochemical properties of HTF showing a limited potential to migrate within the environment and the propensity to biodegrade, the proposed detection monitoring is sufficient to protect ground water resources beneath the site. Additional detection monitoring beyond these efforts does not appear to be warranted.

Nutrients including nitrogen and phosphorus will be added to the contaminated soil to encourage consumption of the HTF by the indigenous bacteria. The soil will remain in the remediation unit until concentrations are reduced to an average concentration of less than 100 mg/kg HTF. Soil contaminated with HTF levels of between 100 and 1,000 mg/kg will be land farmed at the LTU, meaning that the soil will be aerated but no nutrients will be added. The remediated soil is expected to be used as fill material on the site. Soils with initial HTF concentrations less than 100 mg/kg will be used as fill material on the site.

The LTU will be surrounded on all sides by a minimum 2-foot high compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run on) of surface stormwater into the LTU or runoff of stormwater from the unit. The design details of the LTU are shown in **Figure 4**.

2.0 Corrective Action Plan Standards

Standards for a CAP include requirements that a corrective action achieves the following goals: to remediate release from the Unit and to ensure compliance with the Water Standard adopted under section 20390 for the Unit. If evidence of a release has occurred, this standard specifies notification requirements to the RWQCB as well as specifies sampling and analytical protocols to further evaluate releases from the waste storage unit including reporting schedules and deadlines.

The monitoring requirements for the Project's waste facilities are specified under CCR Title 27 Chapter 3, Subchapter 3, Article 1, Sections 20380 through 20435 (CCR Title 27, Sections 20380 through 20435). These standards include provisions that include requirements for a DMP to: establish background values for monitoring parameters, conduct sampling and analyses for monitoring parameters, set forth monitoring schedules, and perform statistical analysis of data to determine if evidence of a significant release has occurred. If evidence of a release has occurred, these standards specify notification requirements to the RWQCB as well as specify sampling and analytical protocols to further evaluate releases from the waste storage unit including reporting schedules and deadlines.

Standards for a DMP are specified in CCR Title 27, Chapter 3, Subchapter 3: Water Monitoring. Under Subchapter 3, Article 1, the general applicability for water quality monitoring and response programs for solid waste management units are addressed in section 20380 (CCR Title 27, Section 20380). Required monitoring programs such as a DMP, Evaluation Monitoring, and CAP are defined in CCR Title 27, Section 20385.

Establishment of Water Quality Protection Standard (Water Standard) for each waste unit is required under CCR Title 27, Section 20390. CCR Title 27, Section 2395 addresses COC to which the Water Standard applies. The COC list includes all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the LTU.

CCR Title 27, Section 20400 requires the establishment of concentration limits for each COC including the determination of background values. Monitoring Points and Point of Compliance (CCR Title 27, Section 20405) specifies the downgradient (horizontal) extent to which groundwater will be monitored. The compliance period is defined in CCR Title 27, Section 20410, which is typically the number of years equal to the active life of the waste unit plus the closure period. The compliance period is the minimum time period during which Ridgecrest Solar 1 will conduct a groundwater quality monitoring program subsequent to a release from a waste unit.

Requirements in a DMP are specifically addressed in CCR Title 27, Section 20420. This includes requirements to establish the following: background values, monitoring parameters, routine monitoring, monitoring schedules, data recording format, and data analysis. This standard also provides provisions in the event that a release is indicated.

If evidence of a significant release from the LTU is determined, then an Evaluation Monitoring Program (EMP) pursuant to CCR Title 27, Section 20425 will be implemented to assess if groundwater has been impacted. If groundwater has been impacted above the RWQCB thresholds, then the measures described in the CAP (pursuant to CCR Title 27, Section 20430) will be implemented.

Finally, Unsaturated Zone Monitoring and Response Provisions for LTUs are addressed in CCR Title 27, Section 20435.

3.0 Corrective Action Plan

This CAP has been designed to address releases from the LTU that have been confirmed by either physical evidence of a release or a “measurably significant” evidence of a release from the LTU during a DMP. Estimated costs to perform the vadose zone corrective actions are presented in **Appendix A**.

3.1 Vadose Zone Corrective Actions

3.1.1 Land Treatment Unit

As described in Section 1.3.1, the LTU does not have a dedicated vadose zone leak detection system. The nature of the HTF is such that it will be in a solid form at temperatures below 53.6 °F, is relatively insoluble in water (solubility approximately 25 milligrams per liter), combustible and has relatively low volatility (Solutia, 2006). Therefore, the potential for HTF to migrate through the base of the LTU is considered very small. The annual sampling and analysis of the soil beneath the base of the LTU, for COCs associated with the LTU has been judged to be sufficient at similar sites.

Should HTF be detected in the soil beneath the LTU, the following steps will be implemented:

- Soil will be removed from the vicinity of the sample location where the HTF was detected;
- The compacted base layer will be excavated;
- Native material will be excavated to the depth of the soil sample. Additional soil excavation, not to exceed a depth of 5 feet beneath the compacted base, will be performed if excessive moisture is encountered;
- The excavation will be backfilled and compacted with native material;
- The compacted base layer will be reinstalled; and
- Within 24 hours of the release being detected, the RWQCB will be verbally notified of the release and a written notification via certified mail will be sent within seven days of determining there was a release.

Should a severe storm event occur that fills up the LTU and allows water to overtop the berm, the following steps will be implemented:

- Standing water in the LTU will be sampled and analyzed for Table 1 constituents. If the analytical results indicate the liquid is a hazardous waste, the water will be pumped to a temporary holding tank and transported to a properly permitted disposal facility; if the analytical results indicate the liquid is non-hazardous, then the liquid will be transferred into the onsite water treatment system and recycled.
- The area outside the berm will be assessed using visual means and soil samples will be collected and analyzed for COCs listed in Table 1, if the visual impacts are not readily evident;
- The impacted soil will be excavated and placed in the LTU;
- If the confirmation soil samples are non-detect for Table 1 COCs, the excavation will be backfilled with native material; and
- Within 24 hours of the release being detected, the RWQCB will be verbally notified of the release and a written notification via certified mail will be sent within seven days of determining there was a release.

4.0 Reporting

Once the CMP has been initiated, progress reports will be submitted, in writing, to the RWQCB on the effectiveness of the corrective action program. The reports will be submitted at a minimum of semi-annually. The RWQCB may determine more frequent reporting is required, to ensure the protection of human health or the environment.

In accordance with CCR Title 27, Section 20385, once a CAP has been instituted and RWQCB determines (pursuant to section 20425) that the assessment of the nature and extent of the release and the design of the CAP have been satisfactorily completed, the RWQCB will approve the application for an amended report of waste discharge for corrective action.

5.0 References

Solutia, 2006. Material Safety Data Sheet (MSDS).

Tables

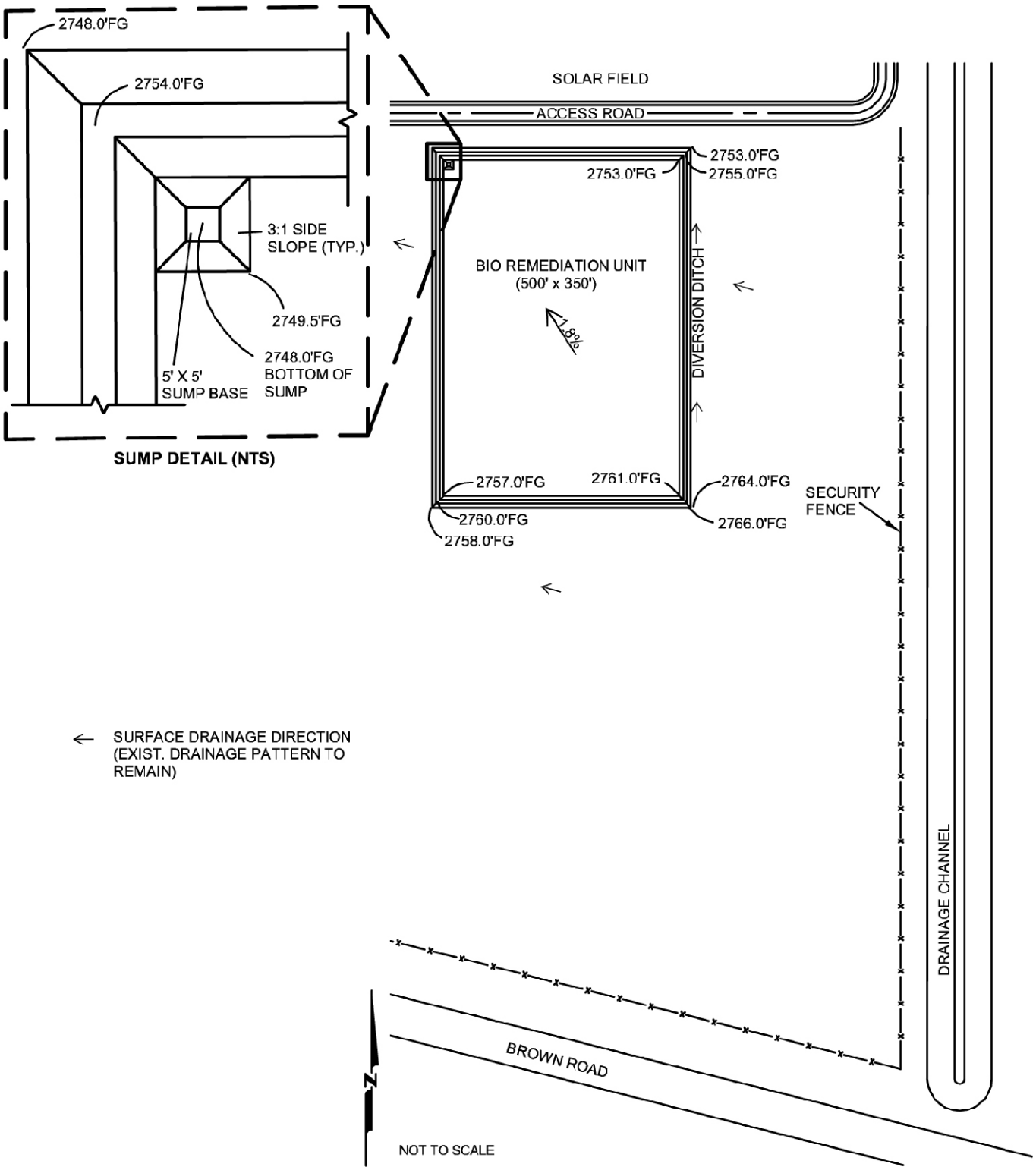
Table 1 Land Treatment Unit Wastewater Sampling Parameters

Parameter	U.S. EPA or Standard Method	RL Goal	Units
Biphenyl Oxide	8015M	500	ug/L
Diphenyl Oxide	8015M	500	ug/L
Key: mg/L – milligrams per liter RL – reporting limit			

Table 2 Land Treatment Unit Soil Sample Analytical Parameters

Parameter	U.S. EPA or Standard Method	RL Goal	Units
Biphenyl Oxide	8015M	1.0	mg/kg
Diphenyl Oxide	8015M	1.0	mg/kg
Key: mg/kg – milligrams per kilogram RL – reporting limit			

Figures



Map Location

Ridgecrest Solar Power Plant

Figure 3
Land Treatment Unit Details

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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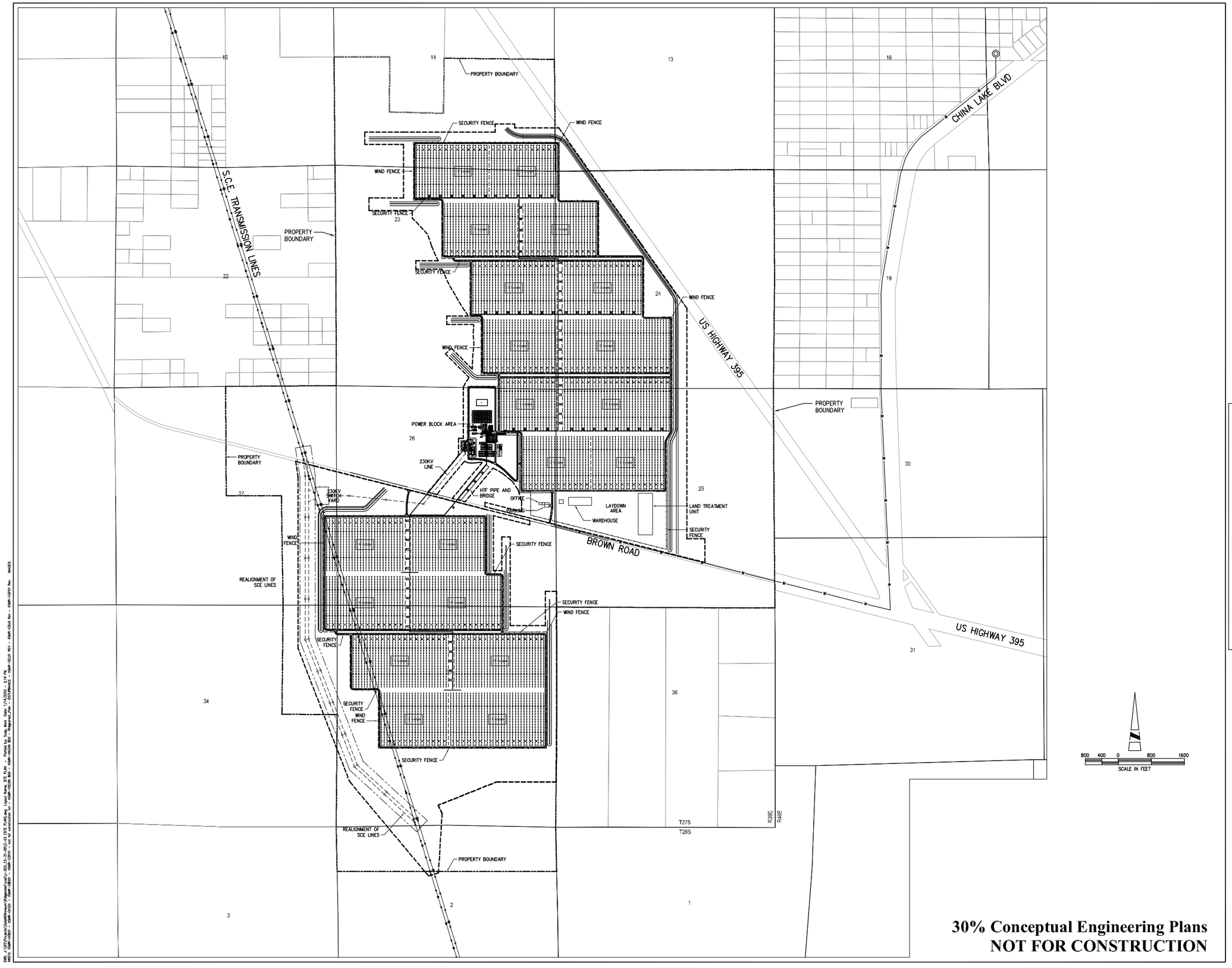

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CIVIL
STATE OF CALIFORNIA

Designed:	W. BLACK
Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- SOLAR FIELD PARABOLIC TROUGH
- BALANCE OF PLANT FACILITIES
- PROPOSED ACCESS ROAD (PAVED)
- PROPOSED ACCESS ROAD (GRAVEL)
- RAILROAD
- PROPOSED GAS
- PROPOSED WATER
- PROPOSED TELEPHONE
- PROPOSED ELECTRIC
- EXISTING ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED WIND FENCE
- EXISTING CONTOURS (10 FOOT INTERVALS)
- PROPOSED DRAINAGE CHANNEL/FLOW DIRECTION
- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- HEADER PIPING
- ACCELERATION LANE

Ridgecrest Solar Power Project

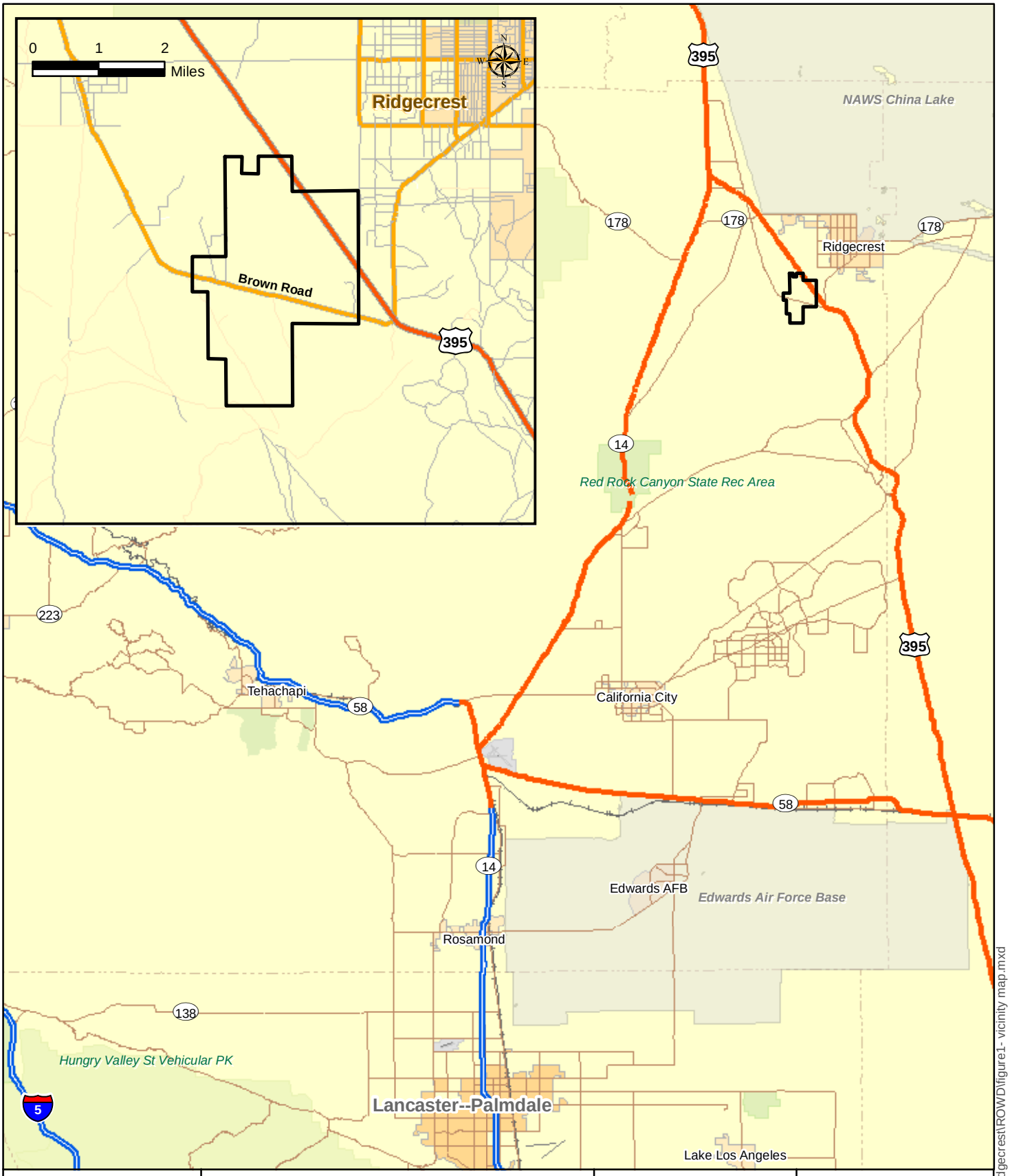
Kern County, California

Preliminary Site Plan

Figure 2

Date: 12/18/09

Sheet: .



Map Location

0 5 10
Miles

Ridgecrest Solar Power Plant

Figure 1
Regional Location and Vicinity Map

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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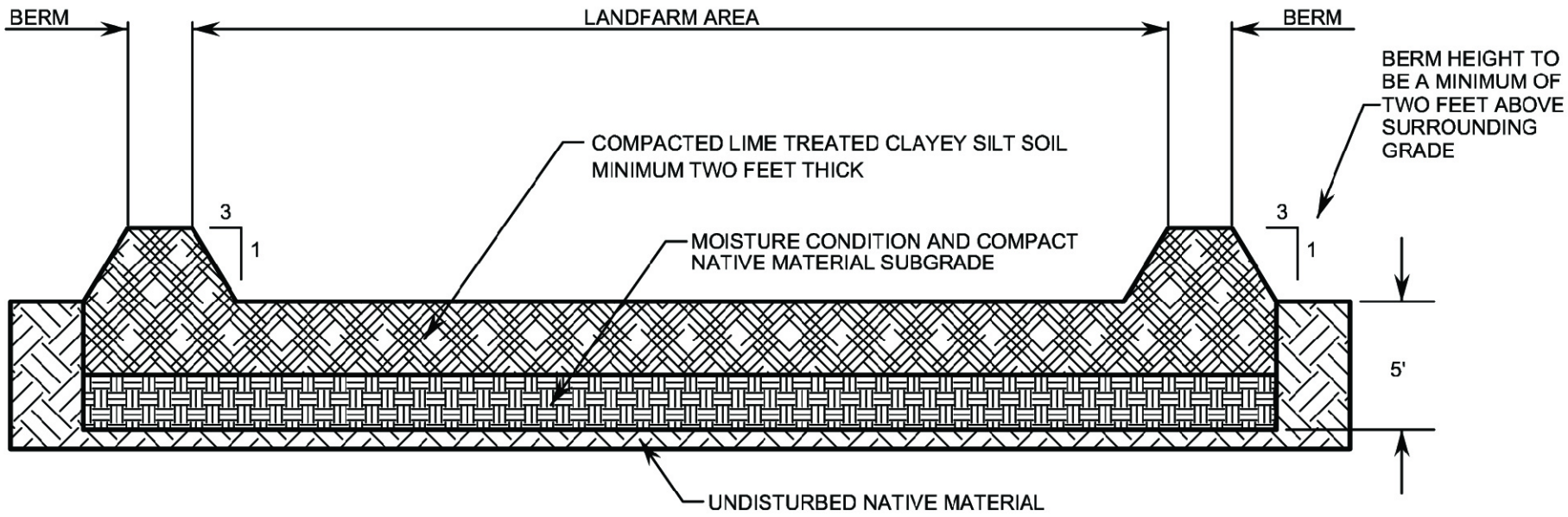

1 / - - LANDFARM UNIT-SECTION
N.T.S.

NOTES:

1. THE COMPACTED AND NATIVE SOIL BENEATH THE LAND FARM UNIT IS DESIGNATED AS A "TREATMENT ZONE" TO A DEPTH OF 5 FEET.
2. THE LIME TREATED LAYER IS TO BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 AND HAVE A LOW PERMEABILITY (CLAYEY SILT) MATERIAL.
3. THE CROSS SECTION IS A TYPICAL SECTION.
4. SEE TEXT FOR FURTHER DETAILS.

Map Location

Rdgecrest Solar Power Project

Figure 4
Cross-Section Details of Land Treatment Unit

Solar Millennium

AECOM

Project: 60139696
Date: Januaryr 2010

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Appendix A

Corrective Action Cost Estimates

Ridgecrest Solar Power Project
Bioremediation Land Treatment Units

	Item	Contingency Cost Estimate (each)	Quantity	Subtotal Closure Cost Estimate
1	HTF detected below the floor of the LTU in native soil	$192,000	1	$192,000
2	Stormwater overtops LTU	$47,000	1	$47,000
		Total Contingency Cost Estimate		**$239,000**

Order-of-Magnitude Cost Estimate-Closure of Scenario 1

Activities sequence to excavate HTF impacted soil

1. Relocate soil undergoing treatment in area of failure to another part of the LTU
2. Remove in area of failure the compacted clay and relocate to another part of the LTU
3. Remove impacted soil in area of failure, and relocate to another part of the LTU
4. Test bottom of impacted area to confirm clean up
5 Replace compacted native material and clay layer

		Unit Cost	Unit Quantity	Unit	Number	Cost Reference
Costs						
1. Relocate Soil						
Mobilization/Demobilization	LS	$15,000	1	1	$15,000	ROM Estimate
Excavate (dozer, 300' haul, clay)	CYD	$15	833	1	$12,328	Means 02315-400-1500&-4100-3340
				Total	**$27,328**	
2. Remove and Relocate compacted clay layer						
Mobilization	LS	$5,000	1	1	$5,000	ROM Estimate
Excavate (dozer, 300' haul, clay)	CYD	$15	1,252	1	$18,520	Means 02315-400-1500&-4100-3340
				Total	**$23,520**	
3. Remove impacted soil and Relocate to another part of the LTU						
Mobilization	LS		1	1	$0	covered in Relocate Soil
Excavate (dozer, 300' haul, clay)	CYD	$15	1,481	1	$21,917	Means 02315-400-1500&-4100-3340
				Total	**$21,917**	
4. Sample area of impact to demonstrate that it is acceptable/clean						
Sample Collection	Day	$1,800	2	1	$3,600	ROM Estimate (20 ft grid)
Sample Analysis	Each	$250	25	1	$6,250	TPH by 8015 & CAM 17
Report of Analytical & Project Coordination	Each	$10,000	1	1	$10,000	ROM Estimate
				Total	**$19,850**	
5. Replace Soil and Clay Layer						
Mobilization	LS	$10,000	1	1	$10,000	ROM Estimate, added equipment
Excavate Soil use onsite source (0.75 cyd Loader)	CYD	$5	1,481	1	$7,340	Means 02315-400-1500 + confined are
Truck Haul from on site source and dump	CYD	$6.31	1,481	1	$9,346	Means 02320-200-0330
Place soil, moisture condition and compact	CYD	$5.64	1,481	1	$8,349	Means 02315-100-1900 + 2200
Purchase Clay and transport to site	CYD	$20	1,252	1	$25,037	ROM Estimate
Place Clay, moisture condition and compact	CYD	$8.45	1,252	1	$10,583	Means 03310-220-0020
				Total	**$70,656**	
Subtotal Field Activities Costs					**$163,270**	
Contingency	(0% of All of the Above Costs)				$0	
				Total	**$163,270**	
Total Field Activities Costs					**$164,000**	
Engineering and Oversite						
Engineering	(2% of Total Construction Cost)				$4,000	Means 01107-300-1200 (min.)
Permitting	(0.5% of Total Construction Cost)				$1,000	Means 01310-150-0010 (min.)
Construction Management	(5% of Total Construction Cost)				$9,000	Means 01107-200-0010 (min.)
Closure Report	(8% of Total Construction Cost)				$14,000	Means 01310-150-0010
Total Engineering and Oversite Cost					**$28,000**	
T O T A L C O S T					**$192,000**	

Order-of-Magnitude Cost Estimate-Closure of Scenario 1

Activities sequence to excavate HTF impacted soil

1. Relocate soil undergoing treatment in area of failure to another part of the LTU
2. Remove in area of failure the compacted clay and relocate to another part of the LTU
3. Remove impacted soil in area of failure, and relocate to another part of the LTU
4. Test bottom of impacted area to confirm clean up
5 Replace compacted native material and clay layer

	Unit Cost	Unit Quantity	Unit	Number	Cost Reference

Assumptions

No need for construction support facilities since site has infrastructure

Annual sampling for integrity is on 100 ft grids, if one sample indicates a leak, excavate ½ way toward each of the adjoining sampling points

Assume that failure is limited to a 100 ft by 100 ft area of the LTU 100 ft wide 100 ft long

and that the failure reaches 1 foot below treatment zone

Remove soil undergoing treatment in LTU from 25 ft each side of impacted area

Volume of soil is 1 ft thick 150 ft wide 150 ft long

Dry Weigh 1250 tons or 833 Cubic Yards

Soil is transferred to unaffected portion of the LTU

Remove compacted clay from 15 ft each side of impacted area of LTU and relocate in LTU for treatment

Clay Thickness 2 feet Vol 1252 Cubic Yards

Density 120 lbs/cft Wt. 2028 Tons

Remove impacted soil from impacted area and relocate in LTU for treatment

Impacted soil Thickness 4 feet Vol 1481 Cubic Yards

Notes

Unit Costs are from RS Means Building Construction Cost Data 2001 Western Version

Unit Costs are adjusted by the City Cost Index; 1.13 Means page 612 for Installation index for Riverside, CA

Unit Costs are adjusted by the ENR Historical Cost Index to estimate 2009 costs

Compare Construction Cost Index since closure is mostly labor and not materials purchase

ENR Construction Cost Index for Los Angeles in December 1997		6664
ENR Construction Cost Index for Los Angeles in December 2000		7068
ENR Construction Cost Index for Los Angeles in August 2009		9766
Historical Cost adjustment is 2009 #/ 1997 #	1.47	
Historical Cost adjustment is 2009 #/ 2000 #	1.38	
Combine historical (2009 to 2000) & City cost adjustment	1.57	

Order-of-Magnitude Cost Estimate-Closure of Scenario 2

Activities sequence to correct if stormwater overtopps LTU berm
1. Repair berm breach
2. Soil Sample to determine extent of impact
3.Remove and Dispose sediments downstream of failure
4 Soil Sample to confirm clean up

		Unit Cost	Unit Quantity	Unit	Number	Cost Reference
Costs						
1. Repair berms						
Mobilization/Demobilization	LS	$15,000	1	1	$15,000	ROM Estimate (rush)
Excavate (0.75 cyd Front End Loader)	CYD	$3	67	1	$220	Means 02315-40-1500
Loading to trucks	CYD	$0.50	67	1	$33	Means 02315-400-0020
Truck Haul to on site stockpile and dump	CYD	$4.59	67	1	$306	Means 02320-200-0400
Spread dumped fill, compaction	CYD	$3.63	67	1	$242	Means 02320-200-0600
				Total	**$15,801**	
2. Sample area to determine extent of impact to surrounding soils						
Sample Collection	Day	$1,800	1	1	$1,800	Estimate (50x50' grid)
Sample Analysis (1 ft)	Each	$250	8	1	$2,000	TPH by 8015 & CAM 17
Report of Sampling and Coordination	Each	$10,000	1	1	$10,000	ROM Estimate
				Total	**$13,800**	
3. Excavate impacted soil and dispose						
Mobilization	LS	$10,000	0	1	$0	covered in Repair Berms
Excavate (0.75 cyd Front End Loader)	day	$1,500	1	1	$1,500	Means 02315-40-1500&-4100
Hauling to LTU					$0	Include in Front End loader
				Total	**$1,500**	
4. Sample area of impact to demonstrate that it is clean						
Sample Collection	Day	$1,800	1	1	$1,800	ROM Estimate
Sample Analysis	Each	$250	8	1	$2,000	TPH by 8015 & CAM 17
Report of Analytical & Coordination	Each	$8,000	0	1	$0	Covered in Task 2
				Total	**$3,800**	
Subtotal Field Activities Costs					**$34,901**	
Contingency	(0% of All of the Above Costs)				$0	
				Total	**$34,901**	
Total Field Activities Costs					**$40,000**	
Engineering and Oversite						
Engineering	(4% of Total Construction Cost)				$2,000	Means 01107-300-1200 (max.)
Permitting	(2% of Total Construction Cost)				$1,000	Means 01310-150-0010
Construction Management	(10% of Total Construction Cost)				$4,000	Means 01107-200-0010 (rush.)
Total Engineering and Oversite Cost					**$7,000**	
T O T A L C O S T					**$47,000**	

Assumptions
No need for construction support facilities since site has infrastructure
Berms are constructed by removal of native material from on site source

Height (ft)	Top of Bern	Bottom of	Cross s Length	Volume (CYD)

Order-of-Magnitude Cost Estimate-Closure of Scenario 2

Activities sequence to correct if stormwater overtopps LTU berm

1. Repair berm breach
2. Soil Sample to determine extent of impact
3.Remove and Dispose sediments downstream of failure
4 Soil Sample to confirm clean up

	Unit Cost	Unit Quantity	Unit	Number	Cost	Reference
Volume of lost berm material is ~	4	18	54	144	25	67
Assume that impacted soil extents out over an area of 25 by 100 and is impacted to a depth of 6 inches						
Volume of impacted material is ~	0.5	25			100	46
Weight of impacted material is ~	60	tons				

Notes

Unit Costs are from RS Means Building Construction Cost Data 2001 Western Version

Unit Costs are adjusted by the City Cost Index; 1.13 Means page 612 for Installation index for Riverside, CA

Unit Costs are adjusted by the ENR Historical Cost Index to become 2009 costs

Compare Construction Cost Index since closure is mostly labor and not materials purchase

ENR Construction Cost Index for Los Angeles in December 2000		7068
ENR Construction Cost Index for Los Angeles in August 2009		9766
Historical Cost adjustment is 2009 #/ 2000 #	1.38	
Combined adjustment is	1.57	

Appendix E

Detection Monitoring Plan

AECOM
Environment

Prepared for:
Ridgecrest Solar 1, LLC

Detection Monitoring Program Ridgecrest Solar Power Project Kern County, California

Appendix E of the Application/Report of Waste Discharge

January 2010

60139696-DMP

AECOM
Environment

Prepared for:
Ridgecrest Solar 1, LLC

Detection Monitoring Program
Ridgecrest Solar Power Project
Kern County, California

Prepared By Brian Ho

Reviewed By Roy Hauger, PE

January 2010

60139696-DMP

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List of Acronyms

CAP	Corrective Action Plan
CCR	California Code of Regulations
DMP	Detection Monitoring Program
DTSC	Department of Toxic Substances
HTF	heat transfer fluid
IWVWD	Indian Wells Valley Water District
LTU	land treatment unit
msl	mean sea level
Project	Ridgecrest Solar Power Project
ROWD	Report of Waste Discharge
RWQCB	Regional Water Quality Control Board
SSG	solar steam generator
STG	steam turbine generator

1.0 Introduction

Ridgecrest Solar 1, LLC, a California limited liability company, is proposing to construct, own and operate the Ridgecrest Solar Power Project (herein or "Project"). The Project is a concentrating solar electric generating facility proposed on an approximately 3,995-acre site in Kern County, California. Ridgecrest Solar 1 proposes to use land treatment units (LTUs) as part of the Project. The LTUs will be used to receive, temporarily store, and treat soil contaminated with heat transfer fluid (HTF) released from the process to the environment.

This Detection Monitoring Program (DMP) was developed as part of the Report of Waste Discharge (ROWD) application for the proposed Project. The Draft ROWD will be submitted to the Regional Water Quality Control Board – Lahontan Region (RWQCB).

The monitoring requirements for the Project's waste facilities are specified under California Code of Regulations (CCR) Title 27 Chapter 3, Subchapter 3, Article 1, Sections 20380 through 20435 (CCR 27 20380 through 20435). Article 1 includes provisions for a Detection Monitoring Program (CCR 27 20385). The objective of the DMP is to determine if a release has occurred from the land treatment units, and if groundwater quality is being degraded.

This document describes the elements of the DMP and is considered to be a stand-alone document that supplements other elements of the ROWD application including the LTU Construction Engineering Design Package, the Construction Quality Assurance Plan, and the Closure- and Post-Closure Maintenance and Corrective Action Plans.

1.1 Site Background

The Project is a concentrating solar electric generating facility proposed on an approximately 3,995-acre site in Kern County, California (see **Figure 1**). The Project will use well-established parabolic trough solar thermal technology to produce electrical power using a steam turbine generator (STG) fed from a solar steam generator (SSG). The SSG receives heated HTF from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

The Project proposes to use dry cooling for power plant cooling. Water for process water makeup, and other industrial uses such as mirror washing will be supplied by the local municipal water district via a new pipeline. This source will also be used to supply water for employee use (e.g., drinking, showers, sinks, and toilets). Water received from the Indian Wells Valley Water District (IWVWD) will meet the requirements of the California Department of Health Services for potable water supplies and will not require further treatment for this purpose. Power cycle makeup, mirror washing water, and cooling of ancillary equipment will require onsite treatment for reduction of dissolved solids, and this treatment varies according to the quality required for each of these uses. A sanitary septic system and on-site leach field will be used to dispose of sanitary wastewater. Water from the IWVWD will not be used for power plant cooling water.

The Project will include a LTU to treat soil contaminated with HTF. Based on the release history from the NextEra LLC Kramer Junction Facility, which is parabolic trough solar power plant that employs HTF in the same fashion as proposed for the RSPP, the LTU has been designed in accordance with CCR Title 27 requirements and designed to receive about 833 cubic yards of impacted soil on an annual basis. There is one LTU proposed for the Project. It will cover an area of approximately 500 feet by 350 feet (4 acres) in the eastern portion of the Project **(Figure 2)**. The LTU will use indigenous bacteria and amendments to the soil to bioremediate HTF-affected soils to levels acceptable for reuse on site. Characterization of the hazardous characteristics of HTF-affected soil will be established by the Department of Toxic Substances Control (DTSC) prior to operation and remediation. Soils in excess of the criterion established by the DTSC

will be removed from the site and transported to an appropriate treatment storage and disposal facility. Soil with HTF at concentrations below this criteria will be managed in the LTU and remediated to acceptable levels for reuse as fill on site.

1.2 Geologic and Hydrogeologic Setting

The Project site is located within Indian Wells Valley, which is in the southern end of the Basin and Range Province east of the Sierra Nevada, south of the Coso range, north of the El Paso Mountains, and west of the Argus Range. Indian Wells Valley is also situated between the Sierra Nevada Fault Zone to the west and the El Paso and Garlock faults to the south. The Valley is characterized by a broad alluvial basin of Cenozoic-age sedimentary and volcanic material overlying older plutonic and metamorphic rocks. Quaternary lacustrine deposits are also found in the region as a result of playas in the northeastern portion of the valley. Indian Wells Valley is underlain with alluvial deposits up to 2,000 feet thick. The geology of this area is shown on **Figure 3A and 3B**.

The Project site is underlain by three stratigraphic units: Jurassic age basement complex, Quaternary and Tertiary age Black Mountain Basalt and Quaternary alluvium of Holocene age. A basement complex of Jurassic, undifferentiated plutonic, hypabyssal, and metamorphic rocks outcrop in the eastern portion of the site. The basement complex forms a basin in which the Tertiary and Quaternary age deposits are found. The Black Mountain Basalt is thought to be of late Pliocene and Pleistocene age and consists of olivine basalt flows that are more than 100 feet thick in some places. An unconformity is formed at the boundary of the Black Mountain Basalt and the overhead Tertiary age continental deposits that comprise the Goler and Ricardo Formations. Surficial Quaternary alluvium sits atop the Tertiary continental deposits.

The Project site is located in the southeast portion of Indian Wells Valley. Topography at the site is relatively flat and slopes gently downward in a northwest direction at a gradient of approximately 2 percent. Ground surface elevations range from approximately 2,890 feet above mean sea level (msl) in the southeast to 2,580 feet above msl in the northwest. The Project site is bisected by a concealed, inactive fault. The fault shows evidence of displacement during the late Quaternary time, most likely during the Pleistocene. The inactive fault trends northwest and is located in the southern half of the site.

The majority of the Project site is underlain by Quaternary alluvium and alluvial fan deposits of Holocene age. These deposits consist of unconsolidated moderately to well-sorted gravel, sand silt, and clay. These deposits are derived as alluvial fans from the surrounding mountainous regions and may include fluvial deposits.

There are no perennial surface water bodies in Indian Wells Valley. During wet years, some surface flow enters the Valley through the Little Lake Gap. The water budget inflows for the Valley consist of mountain front recharge, subflow from the Rose Valley Basin and Coso Valley Basin, and infiltration of surface flows through Little Lake Gap. The only outflows are through groundwater pumping and evapotranspiration from the playa areas. Generally, groundwater flow directions throughout Indian Wells Valley are directed towards the playa just north of Ridgecrest. Groundwater flow direction on the Project site trends northeast towards the playa. In the region, groundwater elevations range from approximately 2,150 feet above msl to 2,350 feet above msl. Beneath the Project plant site groundwater flows to the northeast towards Ridgecrest and ranges from approximately 2,250 feet and 2,350 feet above msl.

1.3 Waste Handling Facilities

The LTU will be used to treat HTF-affected soil at various concentrations. A process flow diagram showing the management and treatment of the HTF-affected soil is presented in **Figure 4**. Spills of HTF will be cleaned up within 48 hours and affected soil will be moved to a temporary staging area in the LTU where it will be placed on and covered with plastic sheeting pending receipt of analytical results and characterization of the waste material. As possible, free liquids will be removed using a vacuum truck. The liquids will be filtered and reused to the extent possible and reintroduced into the process. Filtrate will be characterized

though will likely be managed as hazardous waste, as the concentration in the filtrate will likely be more than 10,000 mg/kg HTF.

No HTF-affected soils characterized as hazardous waste will be disposed or treated on site. Based on past experience, it is anticipated that soil containing 10,000 mg/kg HTF or more will be managed as hazardous waste, and that soil containing less than 10,000 mg/kg HTF will be non-hazardous waste and can be managed at the site. If the soil is characterized as a non-hazardous waste, it will be spread in the LTU for bioremediation treatment. In general, within the LTU, more highly contaminated soil will be covered with plastic sheeting to prevent contact with storm water and to control potential odors and emissions, as well as for moisture and temperature retention. Once the soil has been treated to a concentration of less than 100 mg/kg HTF, it will be moved from the LTU to another portion of the site until it is reused at the facility as fill material.

Based on available operation data from other sites, it is anticipated that approximately 833 cubic yards (on average) of HTF-affected soil may be treated per year. Larger or smaller quantities could be generated during some years, depending on the frequency and size of leaks and spills.

A Spill Prevention, Control, and Countermeasure (SPCC) plan will be undertaken for the Project. Periodically, equipment failures in and around mirror fields are expected at the Project resulting in spills of HTF onto soil.

Excess wastewater or storm water may occasionally accumulate in the LTU. The LTU has been constructed with 2-foot high (minimum) berms such that storm water will not drain into or from the LTU. Based on the frequency of storms in the area, it is anticipated accumulation of rainwater within the containment could occur on a yearly basis.

1.4 LTU Design

In compliance with Table 2.1 in CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20210, solid designated wastes will be managed in full containment in a Class II LTU with a single liner system. The LTU will be constructed to be above the level of a 100-year storm event and designed to meet seismic hazard criteria. In addition, the base of the LTU will have a greater than 5-foot separation to the underlying groundwater.

The LTU will incorporate a 2-foot thick lime-treated clay/silt layer, underlain by 3 feet of compacted native, material. This 5-foot barrier will serve as a competent platform for land treatment activities, and will serve to slow the rate of surface water infiltration in the treatment area. A staging area is allocated in the LTU for storage of HTF-impacted soils while they are being characterized. Although the LTU will be taking vehicle traffic, no hard surface will be required, as there is no sensitive liner system to protect.

The LTU will be surrounded on all sides by a 2-foot high (minimum) compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run-on) of surface storm water into the LTU or runoff of stormwater from the unit. A cross-section showing the design and details of the LTU are shown in **Figures 5 and 6.**

2.0 Detection Monitoring Program Standards

The monitoring requirements for the Project's waste facilities are specified under CCR Title 27 Chapter 3, Subchapter 3, Article 1, Sections 20380 through 20435 (CCR 27 20380 through 20435). These standards include provisions that include requirements to: establish background values for monitoring parameters, conduct sampling and analyses for monitoring parameters, set forth monitoring schedules, and perform statistical analysis of data to determine if evidence of a significant release has occurred. If evidence of a release has occurred, these standards specify notification requirements to the RWQCB as well as specify sampling and analytical protocols to further evaluate releases from the waste storage unit including reporting schedules and deadlines.

Standards for a DMP are specified in CCR 27, Chapter 3, Subchapter 3: Water Monitoring. Under Subchapter 3, Article 1, the general applicability for water quality monitoring and response programs for solid waste management units are addressed in section 20380 (CCR 27, 20380). Required monitoring programs such as a DMP, Evaluation Monitoring, and Corrective Action programs are defined in CCR 27, 20385.

Establishment of Water Quality Protection Standard (Water Standard) for each waste unit are required under CCR 27 20390. CCR 27 2395 addresses Constituents of Concern (COC) to which the Water Standard applies. The COC list includes all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the LTU.

CCR 27 20400 requires the establishment of concentration limits for each COC including the determination of background values. Monitoring Points and Point of Compliance (CCR 27, 20405) specifies the downgradient (horizontal) extent to which groundwater will be monitored. The compliance period is defined in CCR 27 20410, which is typically the number of years equal to the active life of the waste unit plus the closure period. The compliance period is the minimum time period during which the Project will conduct a groundwater quality monitoring program subsequent to a release from a waste unit.

General Water Quality Monitoring and System Requirements at addressed in CCR 27 20415 which define the elements of a groundwater monitoring system for a DMP, Evaluation Program, or a corrective action plan. Provisions for monitoring well standards, surface water monitoring systems, and unsaturated zone monitoring systems as well as descriptions of statistical data analysis methods are addressed in CCR 27 20415.

Requirements in a DMP are specifically addressed in CCR 27 20420. This includes requirements to establish the following: background values, monitoring parameters, routine monitoring, monitoring schedules, data recording format, and data analysis. This standard also provides provisions in the event that a release is indicated.

If evidence of a significant release from an LTU is determined, then an Evaluation Monitoring Program pursuant to CCR 27 20425 will be implemented to assess if groundwater has been impacted. If groundwater has been impacted above the RWQCB thresholds, then the measures described in the Corrective Action Plan (CAP) pursuant to CCR 27 20430) will be implemented.

Unsaturated Zone Monitoring and Response Provisions for Land Treatment Units are addressed in CCR 27 20435.

3.0 Waste Unit Inspection, Sampling, and Maintenance Programs

The DMP encompasses inspection of the LTUs as well as periodic sampling of waste unit contents and a maintenance program to ensure that the waste units operate as designed. The following section outlines the inspection and maintenance requirements for the LTUs.

3.1 Waste Unit Inspection Program

3.1.1 Land Treatment Units

Inspection of the LTU will be conducted monthly. The inspection will involve visual observation to identify the potential presence of cracks or subsidence in the base soil layer that would allow penetration of contaminants. The perimeter earthen berms will be inspected to ensure they in good repair and that these areas are free of debris and accumulated sediment. Inspection of the effectiveness of general housekeeping, run-on controls, and the soil piles for odors and fugitive dust may be required for regular maintenance.

3.2 Sampling Program

All samples collected for the DMP will be properly documented and a written record of the chain-of-custody recorded. The chain-of-custody record will track the samples from the field to the laboratory. This form documents the time, date, sample location, person collecting the sample, and names and signatures of all persons who are maintaining custody of the samples from the time the samples are collected in the field to their arrival at the laboratory.

3.2.1 Land Treatment Unit – Wastewater

Water that accumulates in the LTU that needs to be removed to maintain the operation of the LTU will be inspected and if needed, sampled to assess the HTF and amendment content. Samples will be analyzed by a state-certified laboratory to determine the concentration of the parameters in **Table 1** to determine an appropriate off-site disposal facility. If HTF is not detected above the practical quantitation limit and amendment concentrations (i.e., nitrate, phosphate, TDS) are at or near background groundwater concentrations and below State of California primary or secondary maximum contaminant levels, the water may be reused in the plant process. If HTF is detected and amendment concentrations exceed background or drinking water standards, the waste will be properly disposed of at a licensed TSDF.

3.2.2 Land Treatment Unit – Soil

Representative soil samples will be collected for every batch of HTF contaminated soil undergoing treatment in the LTU and composited according to methods specified in EPA SW-846. The samples will be analyzed for HTF constituents and to the associated reporting limits as listed in **Table 2** using EPA Method 8015 .

Soil sampling to confirm the integrity of the LTU will be performed on an annual basis. Within each LTU, samples will be collected at a depth of 1 foot below the compacted soil base (approximately 6 feet below ground level) and analyzed for HTF using modified EPA Method 8015 to verify that HTF is not migrating below the 5-foot treatment zone underlying the unit.

If the laboratory results indicate that the HTF concentrations are greater than the laboratory detection limit, additional soil samples will be collected at successively deeper depths (using 1-foot intervals) until

laboratory analytical results show that concentrations are less than the laboratory detection limit. If HTF concentrations above the laboratory detection limit are found below the 5-foot treatment zone, the Facility will implement the CAP and submit a letter to the RWQCB highlighting the "evidence of a release." Results of sample analysis will be reported annually.

3.3 Maintenance Program

3.3.1 Land Treatment Units

Maintenance involved with the LTUs will include general housekeeping and drainage system maintenance. General housekeeping within the LTU includes the following measures:

- Keeping soil piles tidy and contained;
- Clearing the unit of debris that may have been accumulated during operation;
- Re-applying plastic sheeting on soil piles as needed; and
- Moisture conditioning and fertilizing the soil piles as needed.

Drainage system maintenance will include the following measures:

- Re-grading of the base of the LTU as needed; and
- Repair/replacement of earth berms as needed.

4.0 Detection Monitoring

HTF (Therminol VP-1 or equivalent) is an oil that consists of a mixture of biphenyl and diphenyl oxide that is solid at temperatures below 54 degrees Fahrenheit, is relatively insoluble in water (solubility of approximately 25 mg/L), combustible, and has relatively low volatility (Solutia 2006). The components of HTF are reported to biodegrade relatively rapidly in the environment, have slight toxicity to tested terrestrial species, higher toxicity to tested aquatic species, and a potential to bio-accumulate (IPCS 1999; JECFA 2003; SOCMA Biphenyl Working Group 2003). Material Safety Data Sheets for HTF are provided in **Appendix A**. Standard Operating Procedures for the detection monitoring program are provided in **Appendix B**.

Installation of groundwater monitoring wells around the perimeter of the LTUs and initiation of a groundwater monitoring program was considered for this DMP but was rejected due to the immobility of HTF at ambient temperatures, the insolubility of HTF in water, and the water table is approximately 480 feet below the ground surface.

Similarly, unsaturated zone monitoring beneath the LTUs through the use of suction lysimeters, for example would not be a reliable method to evaluate for leaks from an LTU due to the high viscosity of the HTF at ambient temperatures.

As a result, groundwater monitoring and unsaturated monitoring are not planned as a routine monitoring component for the LTUs. If HTF is “released” from the LTU, it will be noticeable in the soil underlying the LTU during the annual soil sampling measures described above, at which time the CAP will be implemented.

Detection monitoring will consist of collecting soil samples annually at a depth of 1 foot below the compacted soil base at the LTU (approximately 6 feet below ground level) and analyzing the soil samples for the parameters listed in **Table 2** using EPA Method 8015M to verify that HTF is not migrating below the 5-foot treatment zone underlying the unit. Soil samples will be collected at a minimum frequency of one sample for each acre. If results of sample analysis indicate HTF concentrations greater than the laboratory detection limit, additional soil samples will be collected at successively deeper depths (at 1-foot intervals) until laboratory analytical results show that concentrations are less than the laboratory detection limit. If HTF concentrations above the laboratory detection limit are found below the 5-foot treatment zone, the Facility will implement the CAP and submit a letter to the RWQCB highlighting the “evidence of a release.” Results of sample analysis will be reported annually.

5.0 Reporting

5.1 Record Keeping and Reporting Requirements

5.1.1 Scheduled Reports Filed with the RWQCB

A detection monitoring report will be submitted on a annual basis to the RWQCB with reports submitted on January 31st of each year. Each report will include the following information:

- Total volume of contaminated soil resulting from spills regardless of the volume of HTF spilled,
- Analytical results of the HTF contaminated soil,
- Disposition of the contaminated soil,
- Total volume of contaminated soil, and
- Breakdown of the total volume by disposition location (e.g., hauled off site as hazardous waste, discharged to the LTU, or re-used on site).

- Evidence that adequate financial assurance for closure, post-closure, and reasonably foreseeable releases is still in effect and may be verified by including a copy of the renewed financial instrument or a copy of the receipt for payment of the financial instrument;
- Evidence that the amount is still adequate or if not, that the amount of financial assurance has been increased by the appropriate amount, due to inflation, a change in the approved closure plan, or other unforeseen events;
- A review of the closure plan and a statement that the closure activities described are still accurate or an updated closure plan; and

- A summary of the results of the annual soil sampling program to detect if a release had occurred and evaluate the integrity of the LTU.

The "General Provisions for Monitoring and Reporting," dated September 1, 1994, will be followed for all submittals to the RWQCB.

5.1.2 Unscheduled Reports Filed with the Regional Board

Incidents that result in implementation of the CAP or SPCC will be reported to the appropriate agencies. If such incidents threaten to result in an off-site discharge or may present a potential threat to human health or the environment, immediate verbal notification shall be made as specified in the CAP or SPCC. A record of such verbal communications will be maintained in the operating record. The potential discharge situations are outlined in the following sections.

5.1.2.1 Release from the LTU Reporting

The RWQCB will be immediately notified (verbally) whenever a determination is made that there is physical evidence of a release from the LTU. This verbal notification will be followed by written notification via certified mail within seven days of such determination. Upon such notification, verification procedures may be initiated or the Project may demonstrate that another source caused evidence of a release (see below). The notification will include the following information:

- LTU that may have released or may be releasing;
- General information including the date, time, location, and cause of the release;

- An estimate of the flow rate and volume of waste involved;
- A procedure for collecting samples and description of laboratory tests to be conducted;
- Identification of any water-bearing media affected or threatened;
- A summary of proposed corrective actions; and
- For physical evidence of a release – Physical factors that indicate physical evidence of a release.

5.1.2.2 Additional reporting

Additional reporting may be required under the Waste Discharge Requirements and Monitoring and Reporting Program established by the RWQCB.HTF Spill or Leak Reporting

HTF spill or leak reporting requirements will be incorporated into the SPCC plan for the Project as follows:

- Facility personnel will be required to submit an internal report detailing a HTF spill, regardless of size.
- A release of 20 gallons is reportable to the California Energy Commission.
- A release of 25 gallons is reportable to the RWQCB.
- Project personnel will be required to verbally report a spill greater than reportable quantities (42 gallons) and is outside of a containment to the State of California, Office of Emergency Services and to the National Response Center.
- Project personnel will be required to submit a written report (Form 304) detailing a spill of 42 gallons or more to the State of California, Office of Emergency Services within 30 days

6.0 References

International Programme on Chemical Safety (IPCS), 1999. International Chemical Safety Card 0791 - Diphenyl Ether.

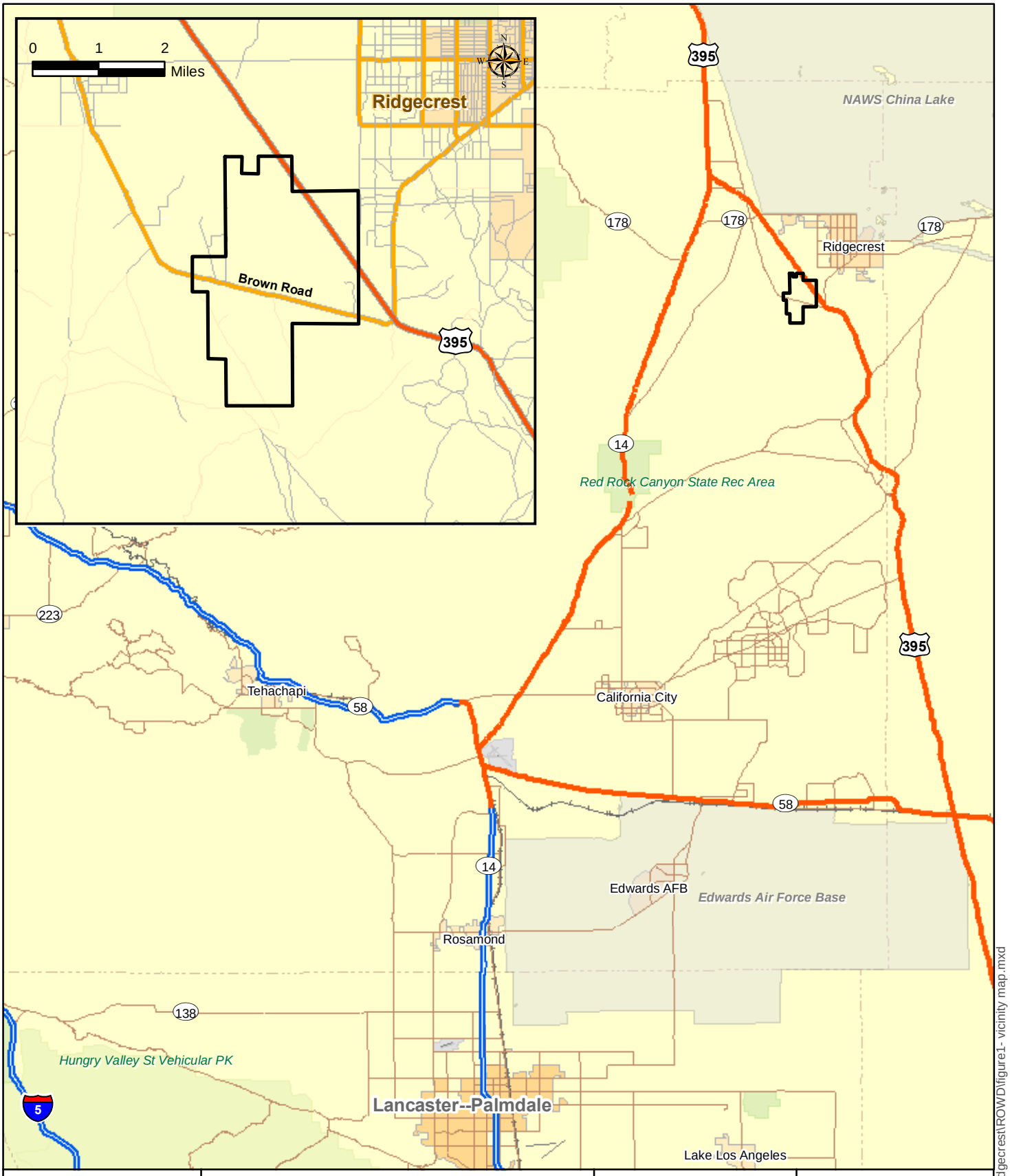
Joint FAO/WHO Expert Committee on Food Additives (JECFA), 2003. Toxicological Monograph FAS 52-JECFA 61/335 - Diphenyl Ether.

SOCMA Biphenyl Working Group, 2003. U.S. EPA High Production Volume (HPV) Challenge Program Submission - Biphenyl: CAS Number 92-52-4.

Solutia, 2006. Material Safety Data Sheet (MSDS).

Southern California Earthquake Center (SCEC), 2007. Faults of Southern California Map.

Figures



Map Location

0 5 10 Miles

Ridgecrest Solar Power Plant

Figure 1
Regional Location and Vicinity Map

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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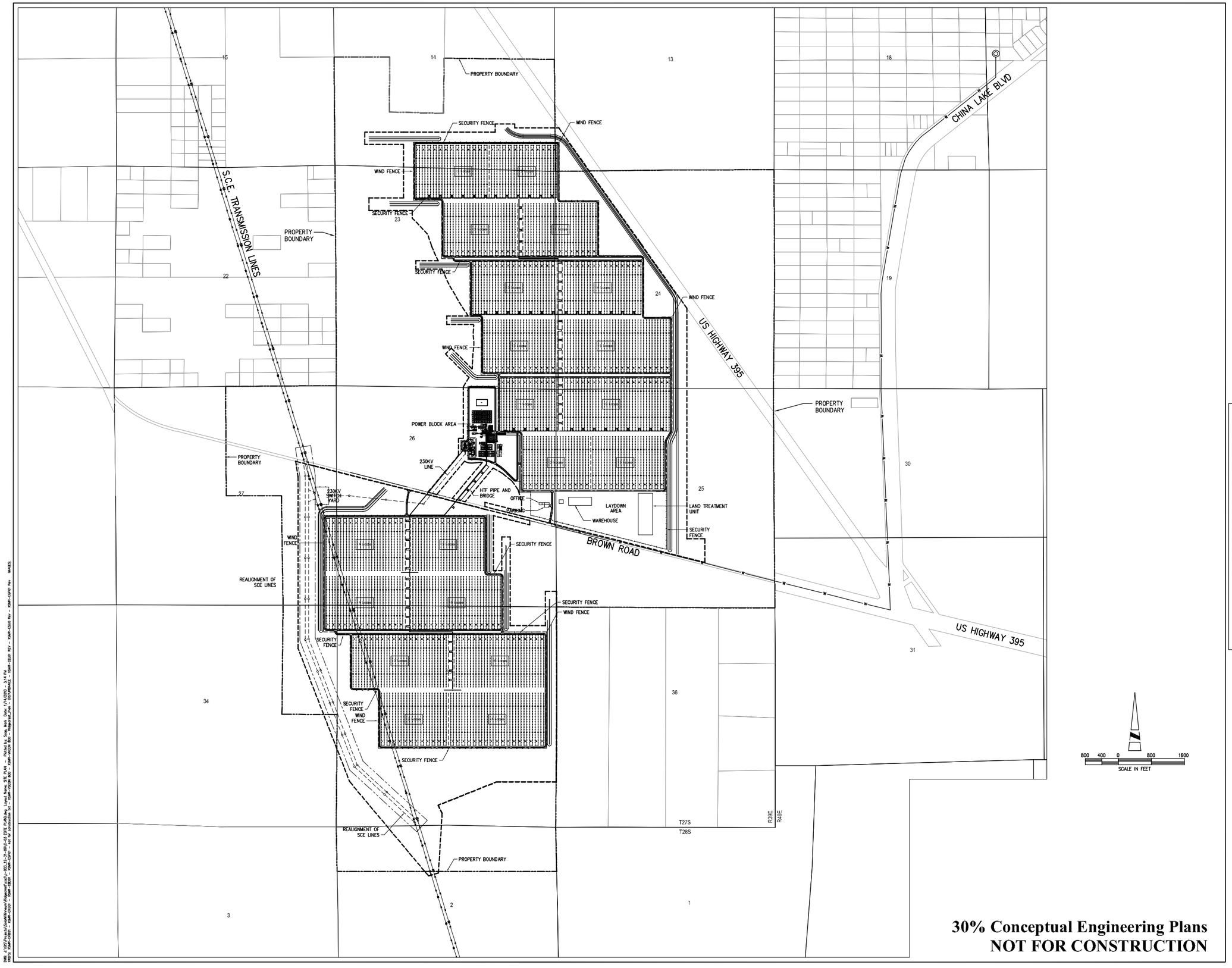

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM CHARLES BLACK
No. C31465
EXP. 12-31-10
CIVIL
STATE OF CALIFORNIA

Designed:	W. BLACK
Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- SOLAR FIELD PARABOLIC TROUGH
- BALANCE OF PLANT FACILITIES
- PROPOSED ACCESS ROAD (PAVED)
- PROPOSED ACCESS ROAD (GRAVEL)
- RAILROAD
- PROPOSED GAS
- PROPOSED WATER
- PROPOSED TELEPHONE
- PROPOSED ELECTRIC
- EXISTING ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED WIND FENCE
- EXISTING CONTOURS (10 FOOT INTERVALS)
- PROPOSED DRAINAGE CHANNEL/FLOW DIRECTION
- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- HEADER PIPING
- ACCELERATION LANE

Ridgecrest Solar Power Project

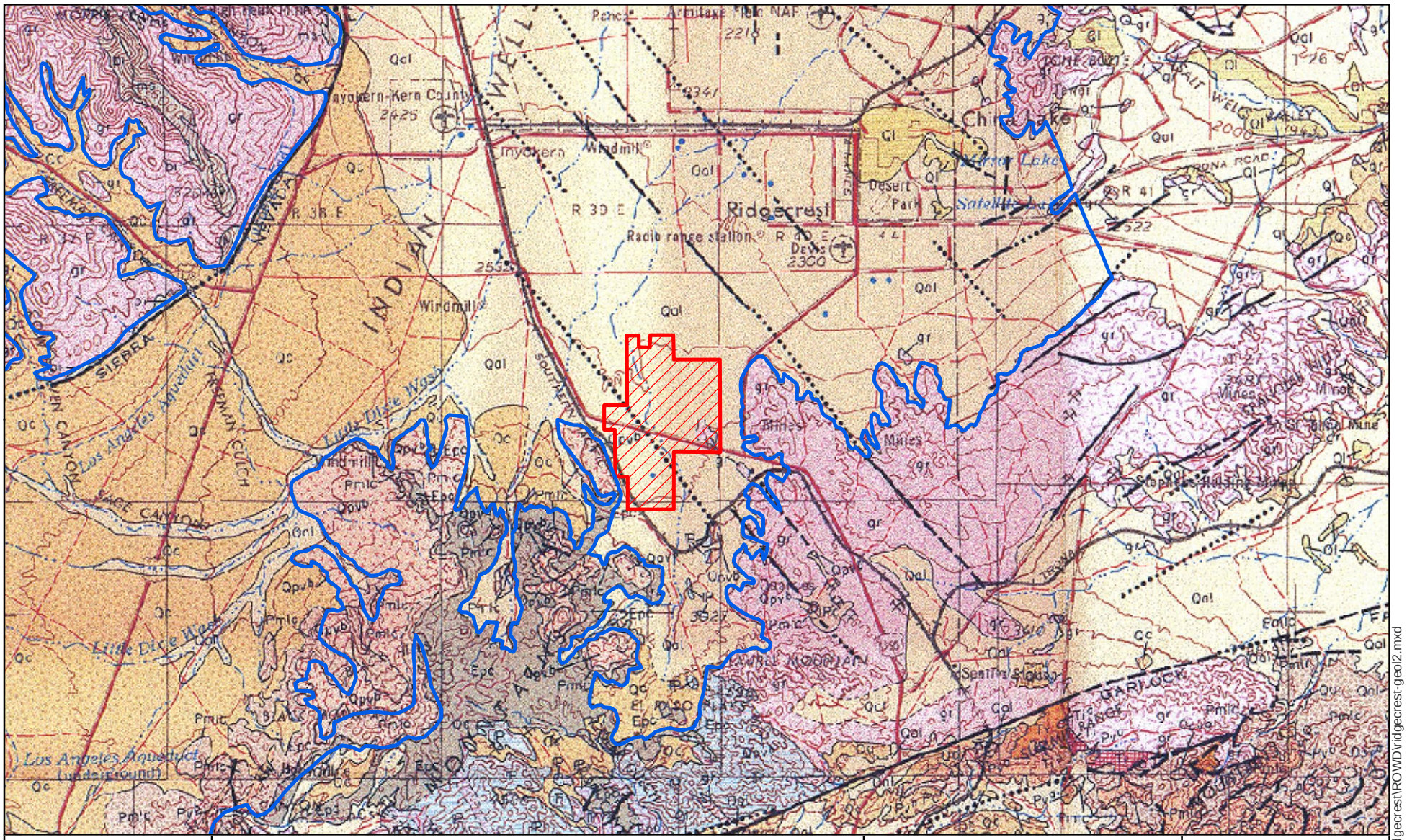
Kern County, California

Preliminary Site Plan

Figure 2

Date: 12/18/09

Sheet: .



Map Location

Legend

Project Right-of-Way

Indian Wells Valley Groundwater Basin

See Figure 3b for Geologic Legend

Sources:
Division of Mines and Geology, Geologic Map of California, Trona Sheet, Scale 1:250,000, 1963

1 in = 3 miles

0 3 6 Miles

N W E S

Ridgecrest Solar Power Plant

Figure 3a
Regional Geologic Map

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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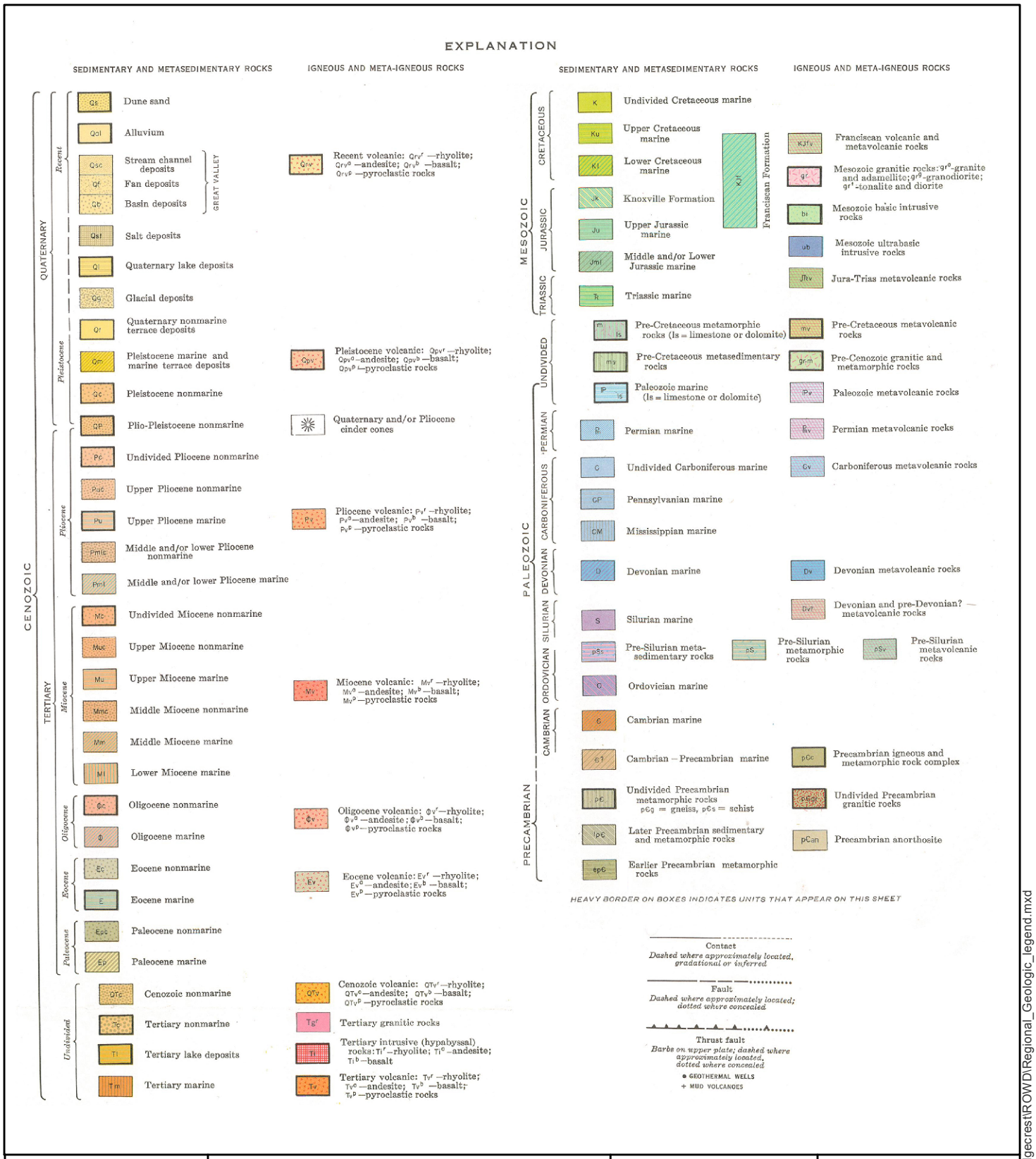

Map Location

Legend

Sources:
Division of Mines and Geology, Geologic Map of California, Trona, Scale 1:250,000, 1963

N
W
E
S

Ridgecrest Solar Power Project

Figure 3b
Regional Geologic Map Legend

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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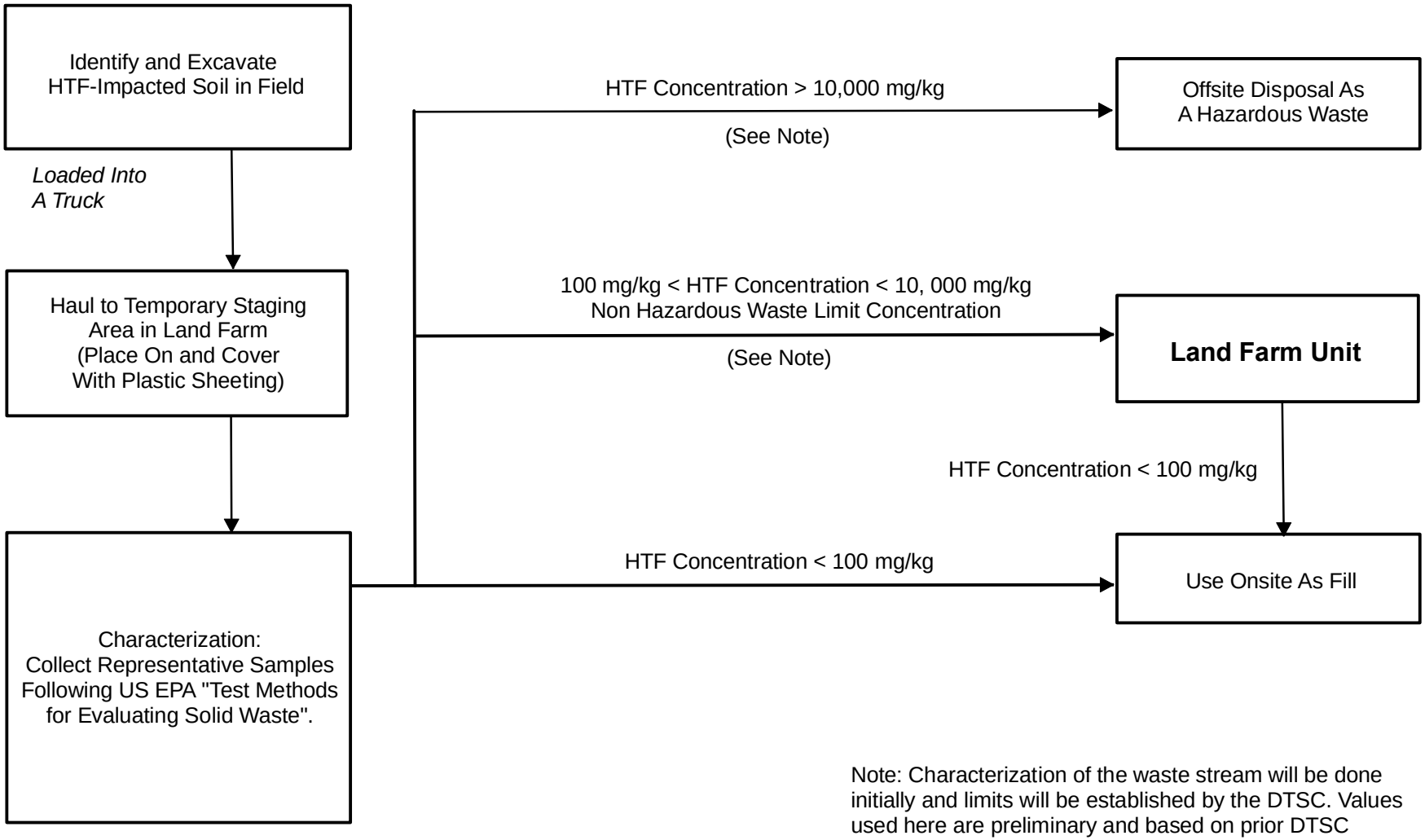

Note: Characterization of the waste stream will be done initially and limits will be established by the DTSC. Values used here are preliminary and based on prior DTSC determination.

Map Location

Ridgecrest Solar Power Project

Figure 4
Process Flow Diagram

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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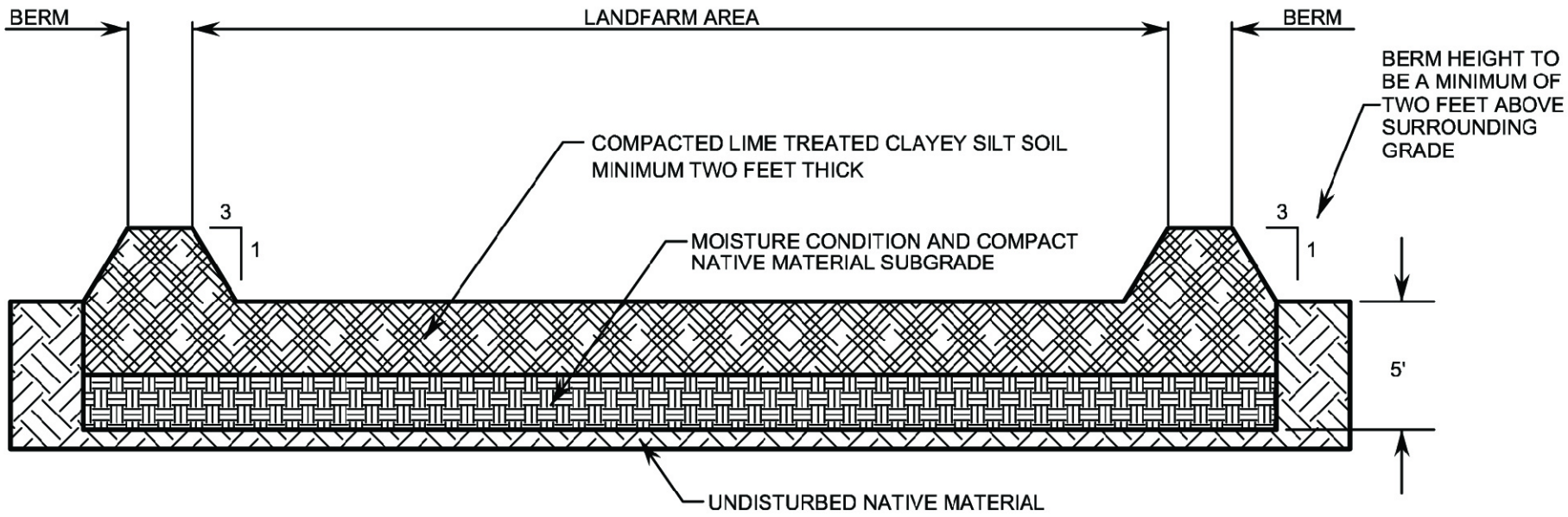

1 / - - LANDFARM UNIT-SECTION
N.T.S.

NOTES:

1. THE COMPACTED AND NATIVE SOIL BENEATH THE LAND FARM UNIT IS DESIGNATED AS A "TREATMENT ZONE" TO A DEPTH OF 5 FEET.
2. THE LIME TREATED LAYER IS TO BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 AND HAVE A LOW PERMEABILITY (CLAYEY SILT) MATERIAL.
3. THE CROSS SECTION IS A TYPICAL SECTION.
4. SEE TEXT FOR FURTHER DETAILS.

Map Location

Rdgecrest Solar Power Project

Figure 5
Cross-Section Details of Land Treatment Unit

Solar Millennium

AECOM

Project: 60139696
Date: Januaryr 2010

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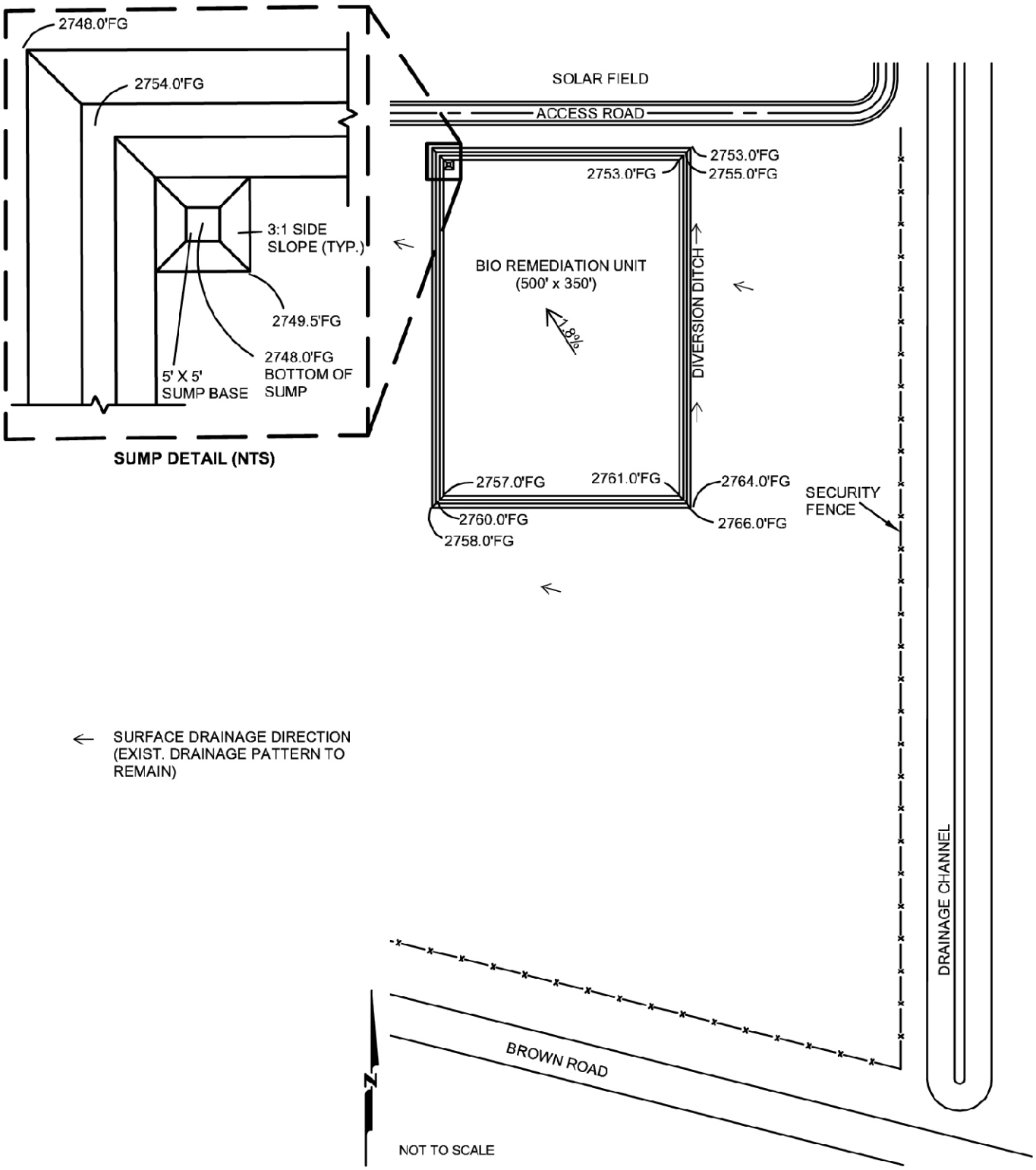

Map Location

Ridgecrest Solar Power Plant

Figure 6
Land Treatment Unit Details

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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Tables

Table 1 Land Treatment Unit Wastewater Sampling Parameters

Parameter	U.S. EPA or Standard Method	RL Goal	Units
Biphenyl Oxide	8015M	500	ug/L
Diphenyl Oxide	8015M	500	ug/L
Key: mg/L – milligrams per liter RL – reporting limit			

Table 2 Land Treatment Unit Soil Sample Analytical Parameters

Parameter	U.S. EPA or Standard Method	RL Goal	Units
Biphenyl Oxide	8015M	1.0	mg/kg
Diphenyl Oxide	8015M	1.0	mg/kg
Key: mg/kg – milligrams per kilogram RL – reporting limit			

Appendix A

Material Safety Data Sheets

Solutia Inc.

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: THERMINOL® VP1 Heat transfer fluid

Reference Number: 000000000211 Date: 05/16/2006

Company Information:

United States:
Solutia Inc.
575 Maryville Center Drive, P.O. Box 66760
St. Louis, MO 63166-6760
Emergency telephone: Chemtrec: 1-800-424-9300
International Emergency telephone: Chemtrec: 703-527-3887
Non-Emergency telephone: 1-314-674-6661

Canada:
Solutia Canada Inc.
6800 St. Patrick Street
LaSalle, PQ H8N 2H3
Emergency telephone: CANUTEC: 1-613-996-6666
Non-Emergency telephone: 1-314-674-6661

Mexico:
Solutia MEXICO, S. DE R.L. DE C.V.
Prol. Paseo de la Reforma 2654
Local 501, Piso-5
Col. Lomas Altas
11950 Mexico, D.F.
Emergency telephone: SETIQ: (in Mexico) 01-800-002-1400
Non-Emergency telephone: (in Mexico) 01-55-5259-6800

Brazil:
Solutia Brazil Ltd.
Avenue Carlos Marcondes, 1200
CEP: 12241-420-São José dos Campos/SP-Brazil
Emergency telephone: 55 12 3932 7100 (PABX)
Non-Emergency telephone: 55 11 3365 1800 (PABX)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Form:	liquid
Colour:	clear to colourless
Odour:	characteristic

WARNING STATEMENTS

WARNING!
Causes eye irritation
Causes skin irritation
Causes respiratory tract irritation
Contains material which can cause liver and nerve damage

POTENTIAL HEALTH EFFECTS

Likely routes of exposure:	eye and skin contact inhalation
Eye contact:	Highly irritating to eyes.
Skin contact:	Highly irritating to skin. Prolonged or repeated skin contact may result in irritant dermatitis.
Inhalation:	Severely irritating if inhaled. No more than slightly toxic if inhaled. Significant adverse health effects are not expected to develop under normal conditions of exposure.
Ingestion:	No more than slightly toxic if swallowed. Significant adverse health effects are not expected to develop if only small amounts (less than a mouthful) are swallowed.
Signs and symptoms of overexposure:	headache fatigue nausea/vomiting indigestion abdominal pain tremors
Target organs/systems:	May cause liver damage May cause nerve damage

Refer to Section 11 for toxicological information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS No.	Average concentration	Concentration range	Units
diphenyl ether	101-84-8	73.5		%
biphenyl	92-52-4	26.5		%

4. FIRST AID MEASURES

If in eyes:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.
If on skin:	Immediately flush the area with plenty of water. Remove contaminated clothing. Wash skin gently with soap as soon as it is available. Get medical attention. Wash clothing before reuse.
If inhaled:	Remove patient to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Remove material from eyes, skin and clothing.

If swallowed: Immediate first aid is not likely to be required.
A physician or Poison Control Center can be contacted for advice.
Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

Fire point: 127 C

Hazardous products of combustion: carbon monoxide (CO); carbon dioxide; hydrocarbons

Extinguishing media: Water spray, foam, dry chemical, or carbon dioxide

Unusual fire and explosion hazards: None known

Fire fighting equipment: Firefighters, and others exposed, wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

Miscellaneous advice: This product is not classified as a fire-resistant heat transfer fluid. Precautions to avoid sources of ignitions should be taken.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protection recommended in section 8.

Environmental precautions: Keep out of drains and water courses.

Methods for cleaning up: Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Flush spill area with water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling
Avoid contact with eyes, skin and clothing.
Avoid breathing vapour or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Precautions against ignitions and fire should be taken with this product.
Heat transfer fluids are intended for INDIRECT heating purposes ONLY.
This product has not been approved for food grade use.

Emptied containers retain vapour and product residue. Observe all recommended safety precautions until container is cleaned, reconditioned or destroyed. Do not cut, drill, grind or weld on or near this container. The reuse of this material's container for non industrial purposes is prohibited and any reuse must be in consideration of the data provided in this material safety data sheet.

Storage
General: Stable under normal conditions of handling and storage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits: (ml/m3 = ppm)

THERMINOL® VP1	No specific occupational exposure limit has been established.
biphenyl	ACGIH TLV: 0.2 ml/m3 ; mist ; 8-hr TWA OSHA PEL: 0.2 ml/m3 ; 1.0 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.2 ml/m3 ; 1.5 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.6 ml/m3 ; 4 mg/m3 ; ; 15-min STEL
diphenyl ether	ACGIH TLV: 1 ml/m3 ; ; 8-hr TWA ACGIH TLV: 2 ml/m3 ; ; 15-min STEL OSHA PEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 2 ml/m3 ; 14 mg/m3 ; ; 15-min STEL

Eye protection:	Wear safety goggles. Have eye flushing equipment available.
Hand protection:	Wear chemical resistant gloves. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. See Solutia Glove Facts for permeation data.
Body protection:	Wear suitable protective clothing. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. Wear full protective clothing if exposed to splashes. Wash contaminated skin promptly. Launder contaminated clothing and clean protective equipment before reuse. Wash thoroughly after handling. Have safety shower available at locations where skin contact can occur.
Respiratory protection:	Avoid breathing vapour or mist. Use approved respiratory protection equipment (full facepiece recommended) when airborne exposure limits are exceeded. If used, full facepiece replaces the need for face shield and/or chemical goggles. Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer.
Ventilation:	Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits. If practical, use local mechanical exhaust ventilation at sources of air contamination such as processing equipment.

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Flash point:	110 C	Pensky-Martens closed tester
	124 C	Cleveland Open Cup

Autoignition temperature:	612 C	ASTM D-2155
Density:	1.06 g/cm3 @ 25 C	
Boiling point :	257 C	
Crystallising point :	12 C	
Water solubility:	~25 mg/l	

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Conditions to avoid:	All sources of ignition.
Materials to avoid:	Contact with strong oxidizing agents.
Hazardous reactions:	Hazardous polymerization does not occur.
Hazardous decomposition products:	None known;

11. TOXICOLOGICAL INFORMATION

This product has been tested for toxicity. Results from Solutia sponsored studies or from the available public literature are described below.

Acute animal toxicity data

Oral:	LD50 , rat, 2,050 mg/kg , No more than slightly toxic
Dermal:	LD50 , rabbit, > 5,010 mg/kg , Practically nontoxic after skin application in animal studies.
Inhalation:	LC50 , rat, 2.66 mg/l , 4 h, Toxic based on animal inhalation exposure studies.
Skin irritation:	rabbit , Slightly irritating to skin., 24 h
Repeat dose toxicity:	rat, , inhalation, 13 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies.
Repeat dose toxicity:	rat, , gavage, 26 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Effects only observed at very high dose levels.
Target organs affected	kidneys, liver, spleen
Repeat dose toxicity:	rat, , diet, subchronic, , Repeated oral exposure produced liver and kidney changes in animal models.
Target organs affected	liver, kidneys
Developmental toxicity:	rat, gavage, , No effects on offspring observed in laboratory animals in the presence of maternal toxicity.

Mutagenicity: No genetic effects were observed in standard tests using bacterial and animal cells.

Components

Data from Solutia studies and/or the available scientific literature on the components of this material which have been identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200) or the Canadian Hazardous Products Act are discussed below.

biphenyl	Chronic exposure has been reported to cause headache, fatigue, nausea, indigestion, abdominal pain, tremor, central and peripheral nerve damage and liver injury. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Practically non irritating to skin (rabbit). Slightly irritating to eyes (rabbit). No mortality or signs of toxicity at the highest level achievable. Irritating to respiratory system in animal models. Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Produced no dermal sensitization (guinea pigs). No effects on offspring observed in laboratory animals in the presence of maternal toxicity. No genetic effects were observed in standard tests using bacterial and animal cells.
diphenyl ether	Predictive patch testing on human volunteers did not produce irritation or sensitization. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Slightly irritating to eyes (rabbit). Slightly irritating to skin (rabbit). Repeated exposure produced respiratory tract irritation in animal models. Repeated exposure produced eye irritation in animal models. No genetic effects were observed in standard tests using bacterial and animal cells.

12. ECOLOGICAL INFORMATION

Environmental Toxicity

Invertebrates	48 h, EC50	Water flea (Daphnia magna)	2.4 mg/l
Fish:	96 h, LC50	Rainbow trout (Oncorhynchus mykiss)	7.6 mg/l
	96 h, LC50	Fathead minnow (Pimephales promelas)	24 mg/l
Algae:	96 h, EC50	Algae (Selenastrum capricornutum)	1.3 mg/l

Biodegradation Modified SCAS (OECD 302A) Primary degradation 99 %

13. DISPOSAL CONSIDERATIONS

US EPA RCRA Status: This material when discarded may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. This material should be analyzed in accordance with Method 1311 for the compound(s) below.

US EPA RCRA	D018	Compound/Characteristic:	BENZENE

hazardous waste number:

Disposal considerations: Incineration

Miscellaneous advice: This product meets the criteria for a synthetic used oil under the U.S. EPA Standards for the Management of Used Oil (40 CFR 279). Those standards govern recycling and disposal in lieu of 40 CFR 260 -272 of the Federal hazardous waste program in states that have adopted these used oil regulations. Consult your attorney or appropriate regulatory official to be sure these standards have been adopted in your state. Recycle or burn in accordance with the applicable standards.
Solutia operates a used fluid return program for certain fluids under these used oil standards. Contact your Sales Representative for details.
This product should not be dumped, spilled, rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *biphenyl*
Hazard Class:	9
Hazard Identification number:	UN3082
Packing Group:	Packing Group III
Transport label:	Class 9
Special provisions:	This material meets the definition of a marine pollutant.
Other:	Applies ONLY to containers with an RQ or for shipments in bulk via water transportation.

Canadian TDG

Other:	Not regulated for transport.

Reportable Quantity/Limit

US DOT RQ 100 lb *biphenyl*
Package size containing reportable amount: 377 lb

ICAO/IATA Class

Other:	See DOT Information

15. REGULATORY INFORMATION

All components are in compliance with the following inventories:	U.S. TSCA, EU EINECS, Canadian DSL, Australian AICS, Korean, Japanese ENCS, Phillipine PICCS, Chinese
Canadian WHMIS classification:	D2(A) - Materials Causing Other Toxic Effects D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification:

Hazard Categories Under Title III Rules (40 CFR 370):	Immediate Delayed

Section 302 Extremely Hazardous Substances:	Not applicable
Section 313 Toxic Chemical(s):	biphenyl

CERCLA Reportable Quantity:

100 lbs biphenyl
For this/these chemicals, release of more than the Reportable Quantity to the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

Safety data sheet also created in accordance with Brazilian law NBR 14725

16. OTHER INFORMATION

Product use: Heat transferring agents

Reason for revision: Significant changes to the following section(s):, Section 1

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	2	1	0	
Suggested HMIS Rating:	2	1	0	G

Prepared by the Solutia Hazard Communication Group. Please consult Solutia @ 314-674-6661 if further information is needed.

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SOLUTIA is a trademark of Solutia Inc.
Responsible Care® is a registered trademark of the American Chemistry Council.

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Appendix B

Standard Operating Procedures

RIDGECREST SOLAR 1, LLC
STANDARD OPERATING PROCEDURES
KERN COUNTY, CALIFORNIA

SOP-01

DRILLING METHODS

STANDARD OPERATING PROCEDURES

SOP-1
DRILLING METHODS

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DISCLAIMER

THE FOLLOWING STANDARD OPERATING PROCEDURE PROVIDES GENERAL GUIDANCE FOR AECOM PERSONNEL FOR TECHNICAL ISSUES ADDRESSED DURING ENVIRONMENTAL SITE INVESTIGATION AND REMEDIATION ACTIVITIES. IT IS NOTED, HOWEVER, THAT EACH SITE IS UNIQUE AND THESE GUIDELINES ARE NOT A SUBSTITUTE FOR COMMON SENSE AND GOOD MANAGEMENT PRACTICES BASED ON PROFESSIONAL TRAINING AND EXPERIENCE. IN ADDITION, INDIVIDUAL CONTRACT TERMS MAY AFFECT THE IMPLEMENTATION OF THIS STANDARD OPERATING PROCEDURE. AECOM PERSONNEL RESERVE THE UNRESTRICTED RIGHT TO CHANGE, MODIFY OR NOT APPLY THESE GUIDELINES IN THEIR SOLE, COMPLETE, AND UNRESTRICTED DISCRETION TO MEET CERTAIN CIRCUMSTANCES, CONTRACTUAL REQUIREMENTS, SITE CONDITIONS, OR JOB REQUIREMENTS.

1.0 INTRODUCTION

Drilling is a common activity associated with many phases of environmental investigations. A variety of drilling methods can be used to collect site data during investigations and studies, and to install vapor extraction or water wells associated with remedial actions, treatability studies, or pilot studies.

Field investigations usually require invasive activities to gather information for site evaluation. The investigation may require a borehole to facilitate the collection and subsequent analysis of soil and/or groundwater samples. The borehole is often converted into a well for evaluating vapor or groundwater conditions over a longer period of time. In addition to the collection of samples for analyses, other data, such as sediment or rock classification; the presence of contamination; geophysical, geotechnical, or physical parameters of the sediment or rock; and the occurrence of groundwater, can be obtained from boreholes.

To determine the most appropriate drilling method for investigations or studies, primary consideration must be given to obtaining samples that are representative of existing conditions and are valid for chemical analysis. The samples must not be contaminated or adversely affected by the drilling method.

Drilling associated with remedial actions, pilot studies, or treatability studies may include the installation of vapor or water extraction and/or injection wells. In selecting the most appropriate drilling method for these projects, primary consideration must be given to completion of a well that will perform as designed.

This Standard Operating Procedure (SOP) describes the principles of operation and the applicability and implementability of standard drilling methods used during field investigations. The purpose of this document is to aid in the selection of appropriate drilling methods for site-specific conditions. This SOP is intended to be used by the Project Manager (PM), Project Engineer (PE), Field Team Leader (FTL), and site hydrogeologist or geologist (of which a minimum of one must be a qualified Nevada Certified Environmental Manager [C.E.M.]) to develop an understanding of each drilling method sufficient to plan, schedule, and perform the activities associated with drilling.

This SOP focuses on methods and equipment that are readily available and typically applied. It is not intended to provide a comprehensive discussion of drilling methods. Two general drilling methods are discussed: (1) methods that do not use circulating fluids; and (2) methods requiring the circulation of drilling fluids to transport cuttings to the surface. More specific drilling methods or techniques can be researched, as necessary, by contacting a drilling subcontractor and learning about the specific methodology that may be most beneficial to implement.

2.0 DEFINITIONS

Bailer	A cylindrical tool designed to remove material, both solid and liquid, from a well or borehole. A valve, which can be a ball or flap, at the bottom of the bailer retains the material in the bailer. There are four types of bailers: ball-valve, flat-valve, dart-valve, and the sand pump with rod plunger.
Cone Penetrometer	An instrument used to determine and evaluate subsurface conditions by measuring the ratio of cone tip resistance to sleeve friction, and then comparing that ratio to a standardized set of ratios. The cone penetrometer can be fitted with other instruments that are able to determine pore pressure (the presence of groundwater), to detect contamination and identify the contaminant, and to determine other physical parameters of the sediment. The cone penetrometer consists of a conical point attached to a drive rod of smaller diameter. Penetration of the cone into the formation forces the soil aside, creating a complex shear failure. The cone penetrometer is very sensitive to small differences in soil consistency.
Cuttings	As a borehole is drilled, the subsurface material displaced by drilling and brought to the surface.
Drilling Fluids or Muds	A water-based or air-based fluid used in the well drilling operation to remove cuttings from the borehole, to clean and cool the bit, to reduce friction between the drill string and the sides of the borehole, to stabilize borehole walls, and to seal the borehole.
Dual-Purpose Well	A well that can be used as both a monitoring and extraction or injection well.
Flight	An individual auger section, usually 5 feet in length.
Heaving Formation	Unconsolidated, saturated substrate encountered during drilling where the hydrostatic pressure of the formation is greater than the borehole pressure causing the sands to move up into the borehole, and frequently causing drilling or well installation complications. Clean water or drilling muds may need to be introduced into the borehole to minimize or eliminate the potential for heaving.
Kelly Bar	A hollow steel bar or pipe that is the main section of drill string to which the power is directly transmitted from the rotary table to rotate the drill pipe and bit. The cross section of the kelly is either square, hexagonal, or grooved. The kelly works up and down through drive bushings in the rotary table.
Pitch	The distance along the axis of an auger flight that it takes for the helix to make one complete 360-degree turn.
Rotary Table	A mechanical or hydraulic assembly that transmits rotational torque to the kelly, which is connected to the drill pipe and the bit. The rotary table has a hole in the center through which the kelly passes.
Split-Spoon Sampler	A thick-walled, typically 18-inch long steel tube split lengthwise and used to collect soil samples. The sampler is commonly lined with brass or

	stainless steel sample sleeves and is driven or pushed downhole by the drill rig to collect samples.
Thin-Walled Sampler	A sampling devise used to obtain undisturbed soil samples made from thin-wall tubing. The sampler is also known as a Shelby tube. The thin-wall sampler minimizes the most serious sources of disturbance: displacement and friction.

3.0 RESPONSIBILITIES

The **Project Manager** or **Task Leader** will select site-specific drilling methods, with input from the FTL and Site Hydrogeologist or Geologist, and will maintain close supervision of the activities and progress.

The **Site Hydrogeologist** (a California licensed Professional Geologist (P.G)) selects site-specific drilling options and assists in the preparation of technical provisions of drilling procedures and details.

The **Field Team Leader** implements the selected drilling program and assists in the selection of drilling methods.

4.0 DRILLING METHODS

Drilling methods can be separated into two general types: techniques that use circulating fluids and techniques that do not use circulating fluids. The following section discusses the drilling methods that fall into these two general categories.

4.1 Methods Without Circulating Fluids

There are two drilling methods that do not require circulating fluids: augering and percussion drilling. SOPs for each of these methods are described below.

4.1.1 Augering

Auger drilling is accomplished by rotating a pipe or rod that has a cutting bit. The common auger drilling methods discussed in this section are hand, continuous-flight, hollow-stem, and bucket.

4.1.1.1 Hand Auger

A hand auger typically cuts a hole 2 to 9 inches in diameter and, depending on the geologic materials, may be advanced to about 15 or 20 feet. Generally, the borehole cannot be advanced below the water table because the hole collapses. Soil samples for chemical or geotechnical analyses should not be collected directly from a hand auger because the samples are disturbed and cross contamination may

occur. Samples for chemical or geotechnical analyses should be taken with a sampling tool such as a drive sampler driven at the desired depth. Samples for lithologic logging purposes may be taken directly from the auger.

Applications	Limitations
• Shallow soil investigations	• Limited to shallow depths
• Requires minimal access	• Unable to penetrate dense or rocky soil
• Soil sample collection	• Borehole stability difficult to maintain
• Water-bearing zone identification	• Labor intensive

4.1.1.2 Continuous-Flight Auger

Continuous-flight augers consist of a plugged, tubular steel center shaft around which a continuous steel strip, in the form of a helix, is welded. An individual auger is known as a “flight” and is generally 5 feet long. Auger drill heads are generally designed to cut a hole 10 percent greater in diameter than the actual diameter of the auger they serve. In addition to diameter, augers are specified by the pitch of the auger and the shape and dimension of the connections.

Applications	Limitations
• Shallow soils investigations	• Soil sampling difficult and limited to areas of stable soils
• Soil sample collection	• Difficult to build monitoring wells in unstable soils
• Vadose zone monitoring wells	• Depth capability decreases as diameter of auger increases
• Groundwater monitoring wells in saturated, stable soils	• Monitoring well diameter limited by auger diameter
• Identification of depth to bedrock	
• Fast and mobile	

4.1.1.3 Hollow-Stem Auger

Hollow-stem augers are commonly used in unconsolidated materials to depths of approximately 150 feet. An advantage of this drilling method is that undisturbed soil samples can be collected and the augers act as a temporary outer casing when installing a monitoring well.

Hollow-stem augers are generally made of two pieces: an annular outer head attached to the bottom of the lead auger and an inner pilot or center bit mounted in a plug that is removable from the center of the auger to the surface. The removable inner plug is the primary advantage of this drilling method.

Withdrawing the plug while leaving the auger in place provides an open, cased hole into which samplers, down-hole drive hammers, instruments, casing, wire, pipe, or numerous other items can be inserted. Replacing the center bit and plug allows for continuation of the borehole.

Hollow-stem augers are specified by the inside diameter of the hollow stem, not by the hole size it drills. Hollow-stem augers are available with inside diameters of 2.5, 3.25, 3.375, 4.0, 4.25, 6.25, 6.625, 8.25, and 10.25 inches. The larger diameter augers, 8.25 and 10.25 inches, are not generally used for monitoring well installation, although they have been used for the installation of dual-purpose wells.

The rotation of the augers causes the cuttings to move upward and “smear” along the borehole walls. This smearing may effectively seal off the upper zones, thereby reducing the possibility of cross contamination of the upper zones to the deeper zones, but increases the possibility of deep to shallow contamination. However, this is not a method that is used for the purpose of sealing a borehole.

Drilling speed with hollow-stem augers is dependent upon the types of materials encountered. Heavy formations such as “fat” clays should be drilled at 30 to 50 revolutions per minute (rpm). Good clean sand that will stand open can be successfully augered at 75 rpm.

Applications

- Most frequently used method
- Most types of soil investigations
- Permits good soil sampling with split-spoon or thin-wall samplers
- Monitoring well installation in unconsolidated formations
- Can serve as temporary casing
- Can be used in stable formations to set surface casing

Limitations

- Difficulty in preserving sample integrity in heaving formations
- Formation invasion by water or drilling mud if used to control heaving
- Possible cross contamination of aquifers where annular space not positively controlled by water or drilling mud or surface casing
- Limited diameter of augers limits casing size
- Smearing of clays may seal off aquifer to be monitored

4.1.1.4 Bucket Auger

Bucket augers have a depth capacity of 30 to 75 feet and are used for large diameter holes (16 to 48 inches). Most bucket augers are “gravity fed” and are used for vertical holes. They are not normally used to drill monitoring wells or for soil sampling but may be used to drill production and recovery wells. Bucket augers may also be used to set conductor or surface casings for production wells.

Generally, the auger bucket advances into the formation by combination of dead weight and the tooth cutting angle. The auger cuts into the formation approximately 1 to 2 feet at a time, filling the auger bucket. The bucket is attached to the lower end of a kelly bar that passes through and is rotated by a

large ring gear that serves as a rotary table. The kelly is square in cross section and consists of two or more lengths of square tubing, one length telescoped inside the other. When the bucket is withdrawn from the hole by means of a wire-line hoist cable, it is swung to the side of the hole and the spoil is dumped out through the bottom by means of a hinge and latch device on the bucket bottom.

Applications	Limitations
• Drilling of large diameter boreholes to a maximum depth of 75 feet • Drilling in unconsolidated formations	• Difficult to advance the borehole below the water table • Consolidated formations and cobbles are difficult to drill • Loose sand formations may slough during drilling • Undisturbed soil sampling difficult to achieve

4.1.2 Percussion Drilling

The basic method of advance in percussion drilling is hammering, striking, or beating on the sediments or formation. Common percussion methods that do not use circulating fluids are cable-tool, driven boreholes, and sonic drilling.

4.1.2.1 Cable-Tool Drilling

Cable-tool operates by alternately raising and dropping a bit, hammer, or other heavy tool. In consolidated formations, the drill bit breaks or crushes the formation. In unconsolidated formations, the drill bit primarily loosens the formation when drilling. In both instances, the reciprocating action of the tools mixes the crushed or loosened particles with water to form a slurry or sludge at the bottom of the borehole. If little or no water exists in the penetrated formation, water is added to form the slurry. Slurry accumulation increases as drilling proceeds and eventually it reduces the impact of the tools. When the drop of the string of tools is hindered by the thickened slurry, the slurry is removed by a bailer. Water is then added, if needed, and drilling resumes.

Most boreholes drilled in unconsolidated formations are drilled “open hole;” that is, no casing is used during part or all of the drilling operation. Drilling in unconsolidated formations differs from hard-rock drilling as pipe or well casing must follow the drill bit closely as the well is deepened to prevent caving and to keep the borehole open.

Using the cable-tool drilling technique in monitoring work is limited because the method is slow. Drilling rates of 20 to 100 feet per day are typical with the average being approximately 50 feet per day. Holes much smaller than 6 inches are impractical because of the need for a relatively large, heavy bit. The

method does not use drilling muds but does allow sampling of groundwater with a drive and bail technique as the hole is advanced in high-yielding formations.

Applications

- Drilling in most types of geologic formations
- Almost any depth and diameter range
- Ease of monitoring well installation
- Ease and practicality of well development
- Excellent samples of geologic materials

Limitations

- Drilling relatively slow
- Heaving of unconsolidated materials must be controlled
- Equipment availability more common in central, north central and northeast sections of the United States

4.1.2.2 Driving

A borehole can be constructed by driving a solid probe or plugged pipe into the ground. The information obtained by this technique can be either minimal or extensive.

Driven wells, commonly referred to as wellpoints, are driven into the ground by hand or with heavy drive heads mounted on a tripod, drill rig derrick, or similar hoisting device. Wellpoints consist of a wellpoint (screen) that is attached to the bottom of a casing. Wellpoint and casing diameters generally range from 1.25 to 2 inches. Depths of 30 feet can be achieved by hand in sands or sands and gravels with thin clay seams. Depths of 50 feet or more can be achieved in loose soils with hammers weighing up to 1,000 pounds.

Driving through dense silts and clays and/or bouldery silts and clays is often extremely difficult or impossible. The well point may not be structurally strong enough and may be damaged or destroyed by driving through dense soils. Additionally, the screen may become plugged when driving through silts and clays and may be very difficult to reopen during development. Soil samples cannot be collected during this process; however, crude stratigraphic information may be obtained by recording the number of blows per foot of penetration. Driven wells or well points are usually installed for the collection of groundwater samples and the determination of static water levels to establish the regional groundwater gradient.

A large track-mounted backhoe (CAT 245) has been used to install extraction wells in a landfill to the 30-foot depth. The bucket of the backhoe is used to push a 6-inch diameter drive pipe with a plugged bottom. When the drive pipe reaches the final depth for the well, the plug at the bottom of the drive pipe is removed and the well screen and casing materials are placed inside the drive pipe. A large 50-ton crane then pulls the drive pipe, leaving the well materials in the borehole. This technique is highly dependent upon the geologic formation and required depth. The drive pipe pushes the formation aside. This can cause a compaction of the formation, which could impact the performance of the well.

Considerably more information can be obtained by driving a penetrometer or a Dutch Cone. Penetration of the soil with a cone forces the soil aside, creating a complex shear failure. The degree of resistance yields the geologic logs of the borehole. Penetrometers can also obtain groundwater samples and possibly soil samples. The borehole that the penetrometer makes is usually abandoned; however, occasionally a small-diameter piezometer can be constructed within the borehole. For more information on cone penetrometer testing, see the SOP on Cone Penetrometer Testing (SOP-11).

Applications	Limitations
• Drilling of a borehole when soil samples are not needed • Installation of a shallow well point when there are site access and work place limitations	• Geologic formations must be conducive for driven wells • Driven wells should be limited to shallow wells • Formation compaction usually occurs that can affect well production

4.1.2.3 Sonic Drilling

Sonic drilling, also known as resonance drilling, is a percussion drilling technique that uses a high-frequency drive hammer. The drilling rig uses a combination of mechanically generated vibrations and limited rotary power to penetrate the soil. The drill head, which is attached to the drill pipe, consists of two counter rotating, out-of-balance rollers that cause the drill pipe to vibrate. Resonance occurs when the frequency of the vibrations equals to the natural frequency of the drill pipe. The resonance and weight of the drill pipe along with the downward thrust of the drill head permit easier penetration of the formation, without adding drilling muds or lubricating fluids. The drive pipe is either closed bottom or fitted with a soil sampling tube. If the bottom of the drive pipe is closed, the borehole is made without the removal of any formation. Instead, the formation is literally pushed to the side and out of the way of the drive pipe, which acts as well casing as the boring proceeds.

A soil sampling device, such as a split-spoon sampler or a core barrel, can be placed inside the drive pipe in lieu of the end plug. The sampler is removed at 5- or 10-foot intervals and replaced with an empty sampler. This procedure yields a continuous soil sample and produces minimal waste as only the formation within the sampler is brought to the surface. A monitoring well can be installed in the borehole by removing the sampler and setting the well screen and casing inside the drive pipe. The drive pipe is then withdrawn. This drilling technique again pushes the formation aside to create the borehole. Certain formation compaction can occur which could impact the performance of a well. Sonic drilling can produce considerable heat at the bit on the drive pipe and within the sampler. The heat in the sampler may have a detrimental effect on soil samples such for chemical analysis that are impacted by heat, such as volatile organic compounds.

Applications

- Rapid drilling technique especially in difficult drilling formations
- Use when drilling in contaminated areas and disposal costs for wastes are high
- Can obtain continuous core

Limitations

- Very limited equipment availability
- Heat generated with drive pipe can compromise soil samples
- Formation compaction usually occurs that can affect well production

4.2 Methods With Circulating Fluids

Many drilling techniques use a circulating fluid, such as water or drilling mud, gas such as air, or a combination of air, water, and a surfactant to create foam. Circulation fluids flow from the surface either through the drill pipe, out through the bit, and up the annulus between the borehole wall and the drill pipe (direct rotary) or down the borehole annulus, into the bit, and up the drill pipe (reverse rotary). Generally the up-hole velocity needed to transport cuttings to the surface is between 100 to 150 feet per minute for plain water with no additives, 80 to 120 feet per minute for high-grade bentonite drill muds, 50 to 1,000 feet per minute for foam drilling, and up to 3,000 feet per minute for air with no additives. Additives decrease the required minimum velocity. Excessive velocities can cause erosion of the borehole wall.

The use of circulating fluids may involve the addition of chemicals to the borehole. Drilling mud utilizes bentonite clay and possibly polymers. Additives to air drilling may include surfactants (detergents) and water mist to generate foam. Compressed air may also contain various amounts of hydrocarbon lubricants. Therefore, attention should be given to the circulating fluids and any possible additives that are used when using drilling methods utilizing circulation fluids.

4.2.1 Rotary Drilling Methods

Rotary drilling methods require the rotation of the drill pipe and the drill bit to advance the borehole. The common drilling methods that use circulating fluids to remove the drill cuttings from the borehole are presented in the following sections.

4.2.1.1 Conventional Mud Rotary Drilling

In conventional mud rotary drilling, the circulating fluid is pumped from the surface through the rotating drill pipe and bit to flush cuttings to the surface. At the surface the fluid is directed into a circulation pit or tank where the cuttings settle out. The circulating fluid is then picked up with the mud pump and again directed downhole. Bentonite is usually added to water to make the drilling mud or fluid. The functions of the drilling fluid are to:

- Lift the cuttings from the bottom of the borehole and carry them to a settling pit
- Support and stabilize the borehole wall to prevent caving
- Seal the borehole wall to reduce fluid loss
- Cool and clean the drill bit
- Allow the cuttings to drop out in the settling pit
- Lubricate the bit, cone bearings, mud pump, and drill pipe

For effective rotary drilling, the down force on the bit should be great enough to cause continuous penetration of the boring. The pounds per inch of bit weight depends upon the configuration of the bit and the formation being penetrated. Rotary speeds are generally in the range of 60 to 200 rpm.

Applications

- Rapid drilling of clay, silt, and reasonably compacted sand
- Allows split-spoon and thin-walled samples in unconsolidated materials
- Allows core sampling in consolidated rock
- Drilling rigs widely available
- Abundant and flexible range of tool sizes and depth capabilities
- Very sophisticated drilling and mud programs available
- Geophysical borehole logs

Limitations

- Difficult to remove drilling mud and wall cake from borehole wall during development
- Bentonite and other drilling additives may influence quality of groundwater samples
- Circulated samples poor for monitoring well screen selection
- Split-spoon and thin-wall samplers are expensive and of questionable cost-effectiveness at depths greater than 150 feet
- Wireline coring techniques for sampling both unconsolidated and consolidated formations often not available locally
- Difficult to identify aquifers
- Drilling fluid invasion of permeable zones may compromise validity of subsequent monitoring well samples

4.2.1.2 Air Rotary Drilling

In air rotary drilling, the circulation fluid is compressed air or a mixture of compressed air, a surfactant, and water mist, which creates a foam. As in conventional mud rotary, the drilling fluid is forced through the rotating drill pipe and bit to flush cuttings to the surface. At the surface the fluid is directed into a pit or storage container. The up-hole velocity of the air and cuttings should be approximately 3,000 feet per minute. Air rotary drilling method is primarily used in consolidated formations due to the fact that the rapidly rising cuttings would cause considerable erosion of the borehole wall in unconsolidated formations. With the air rotary drilling method, the circulating fluid is not reused again. The following are functions of the drilling fluid:

- Lifting the cuttings from the bottom of the borehole and carrying them to the surface
- Cooling and cleaning the drill bit
- Lubricating the bit, cone bearings, mud pump, and drill pipe

Rotary speeds are generally in the range of 75 to 200 rpm. If the hardness of the formation increases to the point that roller-cone rock bits cannot successfully penetrate the formation, then a down-hole air hammer is used to penetrate the formation. The rotating speed using the down-hole air hammer is in the range of 15 to 30 rpm.

Applications

- Rapid drilling of semi-consolidated and consolidated rock
- Good quality/reliable formation samples
- Equipment generally available
- Allows easy and quick identification of lithologic changes
- Allows identification of most water bearing zones
- Allows estimation of yields in strong water-producing zones with short “down time”

Limitations

- Surface casing frequently required to protect top of hole
- Drilling restricted to semi-consolidated and consolidated formations
- Samples reliable but occur as small particles that are difficult to interpret
- Drying effect of air may mask lower yield water producing zones
- Air stream requires contaminant filtration
- Air may modify chemical or biological conditions. Recovery time uncertain

4.2.1.3 Air Rotary Casing Hammer (Drill and Drive)

Air rotary casing hammer method combines percussion and air rotary drilling methods to drill in unconsolidated formations. The borehole is drilled with the air rotary drilling method. Casing or drive pipe follows closely behind the rotary bit to prevent the erosion of the borehole wall. The casing is driven similar to a pile driver except for a hole through its axis through which a drill pipe is inserted and rotated. The drill bit is usually extended approximately 1-foot below the bottom of the drive pipe that acts as temporary casing.

Applications

- Rapid drilling of unconsolidated sands, silts, and clays
- Drilling in alluvial materials (including boulder formations)
- Casing supports borehole thereby maintaining borehole integrity and minimizing inter-aquifer cross contamination
- Eliminates circulation problems common with direct mud rotary method
- Good formation samples
- Minimal formation damage as casing pulled back

Limitations

- Thin, low pressure water bearing zones easily overlooked if drilling not stopped at appropriate places to observe whether or not water levels are recovering
- Samples pulverized as in rotary drilling
- Air may modify chemical or biological conditions
- Difficult to obtain soil samples for chemical analysis

4.2.1.4 Center Stem Recovery Rotary Drilling (Reverse Circulation)

In reverse circulation drilling, the circulating fluid (water) flows from the surface down the borehole annulus outside the drill pipe, into the drill bit, and up the inside of the drill pipe to ground surface. The fluid carries the cuttings to the surface and discharges them into a settling pit or tank. Reverse circulation is especially advantageous in very large boreholes and also in those cases where the erosive velocity of conventional rotary circulation would be detrimental to the borehole wall. Drilling is accomplished typically with water without additives. A large and dependable water supply is required to keep the borehole full of drilling fluid to maintain sufficient hydrostatic head on the borehole walls to prevent sloughing. Reverse circulation has few applications in monitoring work except when nested wells are desired. Production wells with 18- to 24-inch-diameter casing are typically drilled by the reverse circulation drilling method. Typical borehole diameters range from 15 to 36 inches; however, 60-inch-diameter boreholes are not uncommon.

Applications

- Large capacity production wells
- Nested wells
- Normally does not use drilling muds (little if any mud cake is formed on the wall of the borehole)
- Drills best in unconsolidated sands, silts, and clays

Limitations

- Requires large and dependable source of water during drilling and well installation
- Cobbles and bedrock are difficult to drill

4.2.1.5 Dual-Tube Rotary

Dual-tube rotary is an exploratory drilling technique utilizing two concentric drill pipes. Both drill pipes are rotated during drilling. The outside of the outer drill pipe is typically 4.5 inches in diameter. The diameter of the borehole is approximately 5 inches. Compressed air is forced between the two drill pipes and is

directed to the center pipe at the bit. The cuttings are carried to the surface by the returning air at a velocity of approximately 3,000 feet per minute. This is an excellent drilling method to identify lithology and the locations of aquifers in deep boreholes. It is very difficult to obtain undisturbed soil samples for chemical or geotechnical analyses; however, groundwater samples can be obtained as aquifers are encountered. Geophysical logs can be obtained if the borehole is filled with drilling mud as the drill pipe is removed. Monitoring wells are typically not installed in dual-tube rotary boreholes unless the borehole is reamed out by the mud rotary method. Depths of 1,000 feet are not uncommon for this drilling method and typically, the more consolidated the formation, the better the drilling, as unconsolidated formations cause more drag or friction on the outside of the rotating drill pipe.

Applications

- Used mostly for exploratory boreholes
- Rapid extraction of drill cuttings from the borehole
- Drill cuttings are representative of formation
- Very rapid penetration rate in most formations
- Can collect groundwater samples as aquifers are encountered

Limitations

- Equipment availability
- Cannot obtain undisturbed soil samples for chemical analysis
- Borehole size is limited (5 inches)

4.2.2 Dual-Tube Percussion Drilling

Dual-tube percussion drilling is very similar to dual-tube rotary drilling with the exception that the two drive pipes do not rotate during drilling. Two concentric drive pipes are driven into the ground with a hammer. The hammer is similar to units on pile drivers. The typical outside diameter of the outer drive pipe is 9 to 12 inches. The typical inside diameter of the inner pipe, where well materials would be inserted, is 6 to 8 inches. This drilling system is also a center stem recovery system. This drilling technique has been developed and is used primarily in hazardous waste investigations. This method is rapid and effective to depths of about 250 feet.

The outer pipe effectively seals off the formation while drilling, reducing the chance of cross contamination. Air is pumped between the annulus of the two pipes to the bit where it is deflected upward into the center pipe. Cuttings are transported to the surface through the center pipe.

In general, three systems are available: 7-inch outside diameter (OD)/4.25-inch inside diameter (ID), 9-inch OD/6-inch ID, and 12-inch OD/8-inch ID. A 2-inch-diameter monitoring well can be constructed in the 7-inch system, a 4-inch-diameter monitoring well can be constructed in the 9-inch system, and a 5- or 6-inch-diameter monitoring well can be constructed in the 12-inch system.

Applications **Limitations**

- Very rapid drilling through both unconsolidated and consolidated formations
- Allows continuous sampling for lithologic logging in most types of formations
- Very good representative samples can be obtained with minimal risk of contamination of sample and/or water bearing zone
- In stable formations, wells with diameters as large as 6 inches can be installed in open hole completions
- Soil samples can be easily obtained for chemical analysis

- Limited borehole size that limits diameter of monitoring wells
- In unstable formations wells are limited to approximately 4 inches
- Equipment availability more common in the southwest
- Air may modify chemical or biological conditions; recovery time is uncertain

4.2.3 Suction Drilling

Suction drilling has been used to drill into consolidated formations that yield little if any groundwater. This is an experimental drilling method that has been used by the U.S. Geological Survey (USGS) to drill in basalts in Idaho. The drilling technique is very similar to the reverse circulation drilling technique discussed in Section 4.2.1.4 with the exception that air is circulating, not water. To drill the borehole, a drill rig rotates a modified air rotary bit at the end of the drill pipe. The cuttings are removed by the suction from a high-pressure, high-volume air and steam ejector/eductor siphon system. The suction is directed to the interior of the drill pipe. The formation cuttings, including formation fluids, are brought to the surface via the interior of the drill pipe.

To drill a 10-inch-diameter borehole, two 600 cubic feet per minute (cfm)/250 pounds per square inch (psi) air compressors are connected parallel to the ejector/eductor siphon device. Suction from the siphon device is directed to the 2-3/8-inch-diameter drill pipe. A 1.5-horsepower blower fan is used to direct air down the borehole.

Applications

- Allows continuous sampling for lithologic logging
- Very good representative samples can be obtained
- Drilling is not impeded in fractured formations that typically cause lost circulation problems

Limitations

- Formations must be very consolidated to prevent the borehole wall from sloughing during drilling
- Cuttings are very abrasive to the drill pipe and discharge lines
- Difficult to maintain an adequate vacuum as air leaks form easily at threaded joints of the drill pipe
- Groundwater could prevent the advancement of the borehole

Drilling contractors have had numerous mechanical problems advancing boreholes beyond the 150-foot depth. Vacuum leaks have caused a loss in suction and the plugging of the drill pipe. The drill pipes have twisted off and the abrasive cuttings have worn holes in hoses and pipes. This drilling method has some unique advantages; however, until the mechanical problems are solved, this technique will not be available for use.

5.0 CONSIDERATIONS FOR SELECTION OF DRILLING METHODS

Each project or drilling site has its own considerations for the selection of a particular drilling method. Prior to selecting a drilling method, several factors must be considered. The major factors that this section will address include the objective of the drilling program, site conditions, wastes generated, and client preferences. Other factors include drilling costs, availability of trained crews and appropriate equipment, and project schedule requirements. Recognize that it may be very difficult to fulfill all of the sampling/drilling objectives with a single drilling method. The drilling method selected may compromise some of the objectives of the drilling program.

5.1 Drilling Objectives

The primary consideration in selecting any drilling method is to ensure the selected method is capable of meeting the objective(s) of the drilling/sampling program. It is common to have more than one objective for the drilling/sampling program and it may be difficult to satisfy all of the program objectives.

For example, if sample collection (soil or groundwater) is the objective, the selected method must be capable of collecting, in an appropriate and approved manner, the necessary samples. Additionally, the contaminants of concern may influence the drilling and sampling method.

Alternatively, if the objective of the drilling program is to install vapor or groundwater extraction wells, the selected method must be suitable for the installation of the designed well. It is important to not only consider the physical limitations of a particular drilling technique (i.e., depth and diameter), but examine the consequences of the drilling method with the drilling objective (i.e., smearing of the borehole walls rendering wells ineffective or inefficient).

5.2 Site Conditions

Site conditions can limit the drilling methods available for a particular program. Site conditions to be considered include both subsurface and surface conditions.

5.2.1 Subsurface Conditions

The subsurface stratigraphy of a site is a fundamental consideration when selecting a particular drilling method. The drilling equipment selected must be capable of effectively and economically penetrating the strata at the site to meet the project objectives. Particular stratigraphy that may pose problems for certain drilling methods include tight clayey soils, swelling clays, flowing sands, caliche, gravels, cobbles, lost circulation zones, and bedrock.

In addition to stratigraphy, the site hydrology must also be considered. If multiple water-bearing zones are expected, a conductor casing may be needed to seal off shallow water-bearing zones and prevent potential cross contamination. The need for conductor casings can affect the selection of a particular drilling method. Wells that deeply penetrate aquifers can also affect the selection of a particular drilling method.

5.2.2 Surface Conditions

Surface conditions can affect access to the site and the amount of available work space (both horizontal and vertical or overhead space). These in turn can affect the selection of a particular method or type of drill rig. Limited access and work space may require smaller or remotely powered drill rigs. The site terrain is a very important factor in choosing the drilling method as it is very expensive and difficult to mobilize large and/or heavy equipment over rugged terrain. For sites such as these, drill rigs (typically hollow-stem auger) are mounted on all-terrain equipment.

In addition to access and work space, the work environment must also be considered. This includes both weather and other site activities. Extremely hot or cold climates may require use of special drilling equipment or methods. Sites such as refineries where explosive atmospheres could exist may also require very special equipment.

5.3 Waste Generation

Drilling operations typically generate significant volumes of waste that must be handled, stored, and eventually disposed. This is of particular concern when drilling into contaminated or hazardous materials. The type and volume of wastes generated during drilling differs for different drilling methods. The different handling and disposal requirements of drilling wastes can greatly affect project costs. The different drilling methods can also require vastly different volumes of groundwater be removed to fully develop the well.

RIDGECREST SOLAR 1, LLC
STANDARD OPERATING PROCEDURES
KERN COUNTY, CALIFORNIA

SOP-14

FIELD DOCUMENTATION

STANDARD OPERATING PROCEDURES

SOP-14
FIELD DOCUMENTATION

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DISCLAIMER

THE FOLLOWING STANDARD OPERATING PROCEDURE PROVIDES GENERAL GUIDANCE FOR AECOM PERSONNEL FOR TECHNICAL ISSUES ADDRESSED DURING ENVIRONMENTAL SITE INVESTIGATION AND REMEDIATION ACTIVITIES. IT IS NOTED, HOWEVER, THAT EACH SITE IS UNIQUE AND THESE GUIDELINES ARE NOT A SUBSTITUTE FOR COMMON SENSE AND GOOD MANAGEMENT PRACTICES BASED ON PROFESSIONAL TRAINING AND EXPERIENCE. IN ADDITION, INDIVIDUAL CONTRACT TERMS MAY AFFECT THE IMPLEMENTATION OF THIS STANDARD OPERATING PROCEDURE. AECOM PERSONNEL RESERVE THE UNRESTRICTED RIGHT TO CHANGE, MODIFY OR NOT APPLY THESE GUIDELINES IN THEIR SOLE, COMPLETE, AND UNRESTRICTED DISCRETION TO MEET CERTAIN CIRCUMSTANCES, CONTRACTUAL REQUIREMENTS, SITE CONDITIONS, OR JOB REQUIREMENTS.

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) is a general reference for the required documentation to be completed by company personnel during field investigations. Subject to the requirements of the contract, records in the form of field logbooks, reports, and forms should normally be completed for the various field activities. Records should be maintained on a daily basis as the work progresses, and should contain enough information to allow the Field Event to be completely reconstructed. All field records must be accurate, objective, and legible, because it is part of the client's product and may potentially serve as a legal document. As the field logbook is often the only record of the work conducted during the Field Event, it should normally be photocopied at least every week.

Sample field documentation forms are attached.

2.0 DEFINITIONS

None

3.0 RESPONSIBILITIES

All field team members are responsible for recording daily activities. An in-depth description of the documentation mentioned below is given in later sections.

The **Field Team Leader** (FTL) is responsible for completing the FTL logbook, Daily Quality Control Reports (DQCRs), documentation concerning supervision of team members, and duplication and distribution of applicable records. The FTL will be supervised by a qualified Nevada Certified Environmental Manager [C.E.M.]).

The **Rig Geologist/Sampling Team** is responsible for completing the drilling logbook; lithologic logs; well construction diagrams; sampling documentation such as sample labels, sample register, and chain-of-custody (COC) forms.

The **Water Sampling/Development Team** is responsible for completing the water sampling/development logbook; groundwater sampling/development logs; and sampling documentation such as sample labels, sample register, and COC forms.

The **Aquifer Data Collection Team** is responsible for completing the aquifer logs (e.g., slug tests, step-drawdown tests, pump tests), water level records, and data organization/tracking (e.g., downloading of data from data loggers).

4.0 FIELD DOCUMENTATION GUIDELINES

Field documentation serves as the primary foundation for all field data collected that will be used to evaluate the project site. Field documentation must be accurate, legible, and written in indelible ink. Absolutely no pencils or erasures are to be used. Mistakes are to be crossed out with one line, dated, and initialed. Skipped pages or blank sections at the end of a page should be crossed out with an "X" covering the entire page or blank section, dated and initialed. The person making the correction should write "No Further Entries," and date and initial the page. The responsible field team member should sign and log the date and time after the last entry for the day. To further assist in the organization of the field books, logs, or forms, the date and the significant activity description (e.g., boring or well number) should be written at the top of each page. Each project job number should have its own field book. In addition, all original field documentation should be included with the project files.

The descriptions of field data and documentation given below serve as a guideline; individual projects will vary in documentation needs, depending on the circumstances surrounding the project and the needs of the client.

4.1 Field Logbooks

The field logbook should be a bound, weatherproof book with consecutively numbered pages that serves primarily as a daily log of the activities carried out during the investigation. All entries should be made in indelible ink. A field logbook should be completed for each operation undertaken during the investigation, such as field team leader notes, drilling, groundwater sampling/development, and site visitors. The logbook serves as a diary of the events of the day.

Field activities will vary from project to project; however, the concept and general information to be recorded will be generally consistent. The following sections describe the minimum information that should normally be recorded in the three logbooks in which field activities are documented.

FTL Logbook

The FTL's responsibilities include the general supervision, support, assistance, and coordination of the various field investigation activities. A large portion of the FTL's day is spent rotating between operations in a supervisory role. Records of the FTL's activities, as well as a summary of the field team's activities, are maintained in a logbook. The FTL's logbook will be used to fill out DQCRs, and as such should contain all information required in these reports (Section 3.3). Items to be documented include the following:

- Record of tailgate meetings
- Personnel and subcontractors on job site and time spent on the site

- Field operations and personnel assigned to these activities
- Site visitors
- Log of the FTL's activities—time spent supervising each operation and summary of daily operations as provided by field team members
- Problems encountered and related corrective actions
- Deviations from the sampling plan
- Records of communications—discussions of job-related activities with the client, subcontractor, field team members, and project manager
- Information on addresses and contacts
- Record of invoices signed and other billing information
- Field observations

Rig Geologist/Sampling Team Logbook

The rig geologist or sampling team leader is responsible for recording the following information:

- Health and safety activities
  - Calibration records for health and safety equipment (type of photoionization detector (PID), calibration gas used and associated readings, noise dosimeters, etc.)
  - Personnel contamination prevention and decontamination procedures
  - Record of daily tailgate safety meetings
- Weather
- Calibration of field equipment
- Equipment decontamination procedures
- Personnel and subcontractors on the job site and time spent on the site
- Site name and well or soil boring number
- Drilling activities
  - Sample location (sketch)
  - Drilling method and equipment used
  - Borehole diameter
  - Drill cuttings disposal/containerization (number of drums, roll off-bins, etc.)
  - Type and amount of drilling fluids used (mud, water, etc.)
  - Depth and time at which first groundwater was encountered, depth to water at completion of drilling, and the stabilized depth to water—absence of water in the boring should also be noted
  - Total drilling depth of well or soil boring

  - Type and amount of materials used for well installation
  - Well construction details—depth of grout (mixture, weight), bentonite seal, filter pack, etc. (include type and amount used, calculate estimated amount that should be used)
  - Type and amount of material used to backfill soil borings
  - Time and date of drilling, completion, and backfilling
  - Name of drilling company, driller, and helpers

- Sampling
  - Date and time of sample collection
  - Sample interval
  - Types of samples taken
  - Number of samples collected
  - Analyses to be performed on collected samples

- Disposal of contaminated wastes (personal protective equipment, paper towels, Visqueen®, etc.)
- Field observations
- Problems encountered and corrective action taken
- Deviations from the sampling plan
- Site visitors

Groundwater Sampling/Development Logbook

The groundwater sampling and development team members are responsible for recording the following information:

- Health and safety activities
  - Calibration records for health and safety equipment (i.e., type of PID, calibration gas used and readings, noise dosimeters etc.)
  - Personnel contamination prevention and decontamination procedures
  - Record of daily tailgate safety meetings

- Weather
- Calibration of field equipment
- Equipment decontamination procedures
- Personnel and subcontractors on job site and time spent on the site
- Equipment decontamination procedures
- Disposal of contaminated wastes (personal protective equipment, paper towels, Visqueen®, etc.)
- Site name and well number

- Water levels and product levels—time and datum that water levels are measured (i.e., top of casing); purging of the well (include calculations, well volumes) with the following information:
  - Measured field parameters (temperature, pH, conductivity, odor, color, cloudiness, etc.)
  - Amount of water purged
  - Purge method—indicate bailer/pump, diameter and length of bailer, material that the bailer is composed of, type of pump, new nylon rope, etc.
- Purge water disposal and containment (Baker tank/ drums, number used, identification, etc.)
- PID readings from inside of well, purged water, and breathing zone (Note: see SOP-39 for additional information on PID principles and procedures.)
- Background PID readings
- Well sampling
  - Number of samples collected and type of containers used
  - Date and time of sample collection
  - Type of analyses
  - Quality assurance/quality control (QA/QC) samples collected; names given to blind samples
- Field observations
- Problems encountered and corrective actions taken
- Deviations from the sampling plan
- Site visitors

4.2 Tailgate Safety Meetings

Tailgate safety meetings are held at the beginning of each day before the start of work. All personnel, subcontractors, and others who will be on the job site are required to attend. The meetings are usually conducted by the FTL, on-site safety officer, or other qualified team member. The topics discussed at the meeting include the following:

- Directions to the hospital
- Protective clothing and equipment
- Chemical hazards
- Physical hazards
- Special equipment
- Emergency procedures

- Emergency phone numbers

All site personnel are required to sign the tailgate safety meeting form (Attachment 1). The original form is kept on site, and a copy sent to the home office.

4.3 Daily Quality Control Reports

The preparation of DQCRs (Attachment 2) is the responsibility of the FTL. DQCRs are completed on a daily basis to summarize the events of the day and supplement the information that is already recorded in the field logbook. DQCRs should be completed regardless of the duration of the field effort. Copies of the report are distributed to the Tronox Project Manager, Project Geologist, field office file, and home office file. Information recorded in this report should include the following.

- Date and weather information—date, daily temperatures, wind speed and direction, humidity
- Personnel and time spent on site
- Subcontractors and time spent on site
- Special equipment on site—PID, Smeal water sampling rig, hollow-stem auger Rig, pH meter, conductivity meter, etc.
- Work and sampling performed—personnel performing specific site activities, a summary of samples collected, and a thorough explanation of the work completed
- Quality control activities—e.g., decontamination procedures, QA/QC samples taken, calibration of field equipment
- Health and safety levels and activities—field parameter measurements, including calibration of equipment; daily tailgate safety meetings, level of protection used, etc.
- Problems encountered/corrective actions taken—any technical difficulties (e.g., problems encountered during drilling or equipment breakdowns); any problems that could potentially affect the quality of the samples should be included
- Special notes—any information that does not fit under the categories listed above, but is important to record; information that would be useful for future sampling, (e.g., base contacts made, visitors on site, etc.)
- Next day activity expectations
- Date/Signature of individual completing the report

4.4 Boring Logs

The preparation of drill logs is the responsibility of the field team members assigned to the drill rig. A detailed description of well logging is provided in the SOP for Lithologic Logging, SOP-17. Several examples of drilling logs are given in the attachments for SOP-17. An example lithologic log form is

shown in Attachment 3. The exact format depends on the job and the client; however, the following basic information should normally be recorded on the log regardless of the format:

- Project and site name
- Name of driller and drilling company
- Type of drill rig used
- Drill rig contamination procedures
- Well/soil boring ID and location (sketch)
- Drilling and backfilling dates and times
- Reference elevation for all depth measurements
- Total depth of completed soil boring/well
- Depth of grouting, sealing, and grout mixes
- Signature of the logger.
- Description of unconsolidated materials
  - Geologic lithology description
  - Descriptive Unified Soil Classifications System (USCS) classification
  - USCS symbol
- Color (use appropriate soil color chart)
  - Penetration resistance (consistency or density)
  - Moisture content
  - Grain size information
  - Miscellaneous information (odor, fractures, visible contamination, etc.)
- Description of consolidated materials
  - Geologic rock description
  - Rock type
  - Relative hardness
  - Density
  - Texture
  - Color (use appropriate rock color charts)
  - Weathering
  - Bedding
  - Structures (fractures, joints, bedding, etc.)
  - Miscellaneous information (presence of odor, visible contamination, etc.)

- Stratigraphic/lithologic changes; depths at which changes occur
- Depth intervals at which sampling was attempted and amount of sample recovered
- Blow counts
- Depth intervals from which samples are retained
- Analyses to be performed on collected samples
- Depth at which first groundwater was encountered, depth to water at completion of drilling, and the stabilized depth to water. The absence of water in the boring should also be noted.
- Loss and depth of drilling fluids, rate of loss, and total volume of loss
- Use of drilling fluids
- Drilling and sampling problems
- PID readings

4.5 Well Construction Diagrams

The preparation of well construction diagrams is also the responsibility of field team members assigned to the drilling operations. This topic is further discussed in the SOP for Well Installation, SOP-02. An example well construction log form is shown in Attachment 4. The exact format of the diagram is dependent on the job and the client; however, the following basic information should be recorded and/or illustrated on the diagram regardless of the format.

- Project and site name
- Well identification number
- Name of driller and drilling company
- Depth and type of well casing
- Description of well screen and casing
- Borehole diameter
- Any sealing off of water-bearing strata
- Static water level upon completion of the well and after development
- Drilling and installation dates
- Type and amount of annulus materials used; depth measurements of annulus materials
- Other construction details (filter pack type and interval, location of centralizers, etc.)

- Surface elevation and reference elevation of all depth measurements

4.6 Groundwater Sampling and Development Logs

The groundwater sampling and development log should be used any time a well is developed or sampled (Attachment 5). The following information should be recorded on the log.

- Project name and site
- Well identification number
- Equipment decontamination procedures
- The date and time of sampling or development
- The water level and reference elevation
- Volume of water to be purged
- Pertinent well construction information (total depth, well diameter, etc.)
- Measurement of field parameters such as pH, turbidity, conductivity, and temperature, as well as the times at which the readings were taken.
- Type of purging and sampling equipment used
- Type of samples collected
- Sampler's initials

4.7 Aquifer Testing Logs

The aquifer testing team is responsible for setting up, collecting, tracking, and organizing data. The information listed below should normally be included. An example aquifer testing log form is shown in Attachment 6. The Aquifer Testing SOP-04 contains more details and the various book references related to the project site.

- Well number/identification (data logger identification)
- Data logger information/parameter setup
- Water level (include date, time, and measurement reference (such as top of casing)
- Type of aquifer test (slug, step-drawdown, pump test, etc.)
- Slug test (include length and diameter of slug for volume calculations)
- Start time of test
- Duration of test

- Pump tests (include disposal/containment of water information)
- Field observations and problems
- Tester's name

4.8 Documentation of Sampling Activities

Documentation to be made during sampling activities includes sample labels, sample seals, COC records, air waybill and identification of courier, and sample register. An example sampling documentation and tracking form is shown in Attachment 7.

4.8.1 Sample Labels

A sample label, written in indelible ink, should be affixed to all soil and water sample containers. Required information on sample labels may vary from job to job; however, the following should be included at a minimum:

- Sample number
- Type of sample (grab or composite)
- Type of preservative, if applicable
- Date and time of collection
- Project location
- Analyte(s)
- Initials of sampling personnel

4.8.2 Custody Seals

Custody seals consist of security tape with the initials of the sampler and the date placed over the lid of each cooler containing samples. The tape should be placed such that the seal must be broken to gain access to the contents. Custody seals should not be placed directly onto the volatile organic compound (VOC) sample bottles. Custody seals should be placed on coolers prior to the sampling team's release to a second or third party (e.g., shipment to the laboratory).

4.8.3 Chain-of-Custody Records

COC procedures allow for the tracing of possession and handling of individual samples from the time of field collection through laboratory analysis. The COC is documented through a record that lists each

sample and the individuals responsible for sample collection, shipment, and receipt. A sample is considered in custody if it is any of the following:

- In a person's possession.
- In view after being in physical possession.
- Locked or sealed so that no one can tamper with it after it has been in an individual's physical custody.
- In a secured area, restricted to authorized personnel.

A COC record is used to record the samples taken and the analyses requested. It is the legal record for maintaining accountability of control over the sample. Information recorded includes time and date of sample collection, sample number, and the type of sample, the sampler's signature, the required analysis, and the type of containers and preservatives used. A copy of the COC record should be retained by the sampler prior to release to a second or third party. Shipping receipts should be signed and filed as evidence of custody transfer between field sampler(s), courier, and laboratory.

The COC record will be properly signed and the date of collection and shipment recorded, along with the sample site identifications and requested analyses for each sample.

4.8.4 Sample Register

The sample register is a field record book with consecutive prenumbered pages. A full description of each sample is recorded in the book. The information included in the sample register should include the following:

- Sample number (identification)
- Duplicate and split sample numbers (identification)
- Location of sample
- Client
- Project number
- Collection method
- Number and size of bottles for each analysis
- Destination of the sample
- Type of analysis
- Date and time of collection

- Name of sampler

Other observations may be included as the situation dictates for a thorough record that could be used to reconstruct the events concerning that sample. All information must be recorded in indelible ink. Mistakes are to be crossed out with one line, dated, and initialed. Skipped pages or blank sections at the end of a page should be crossed out with an “X” covering the entire page or blank section, dated and initialed.

ATTACHMENT 1

TAILGATE SAFETY MEETING FORM

HEALTH AND SAFETY PRE-ENTRY BRIEFING ATTENDANCE FORM

Project Name _____
Project Location _____

Conducted by:		**Date Performed:**	
Topics Discussed:	1. Review of the content of the HASP (Required)		
	2.		
	3.		
	4.		

Printed Name	Signature	Representing

ATTACHMENT 2

DAILY QUALITY CONTROL REPORT

DAILY QUALITY CONTROL REPORT

Date:	Report No.:
AECOM PM:	Day:
Location:	Weather:
Project:	
Job No.:	Wind:
	Humidity:

Personnel Onsite:

Equipment Onsite:

Work Performed (including sampling):

QC Activities (including field calibrations):

DAILY QUALITY CONTROL REPORT (continued)

H&S Levels and Activities:

Problems Encountered and Corrective Action Taken:

Special Notes:

Tomorrow's Expectations:

Prepared by: _____ Title: _____

Distribution:

1. Project Manager (via email)
2. AECOM Project Manager
3. Field Office
4. Project File

Attachments:

ATTACHMENT 3

EXAMPLE LITHOLOGIC LOG FORM

AECOM

Client:		***BORING ID:***
Project Number:		
Site Location:		
Coordinates:	*Elevation:*	*Sheet: 1 of 1*
Drilling Method:		*Monitoring Well Installed:*
Sample Type(s):	*Boring Diameter:*	*Screened Interval:*

Weather:	*Logged By:*	*Date/Time Started:*	*Depth of Boring:*
Drilling Contractor:	*Ground Elevation:*	*Date/Time Finished:*	*Water Level:*

Depth (ft)	Geologic sample ID	Sample Depth (ft)	Blows per 6"	Recovery (inches)	Headspace (ppm)	U.S.C.S	**MATERIALS: Color, size, range, MAIN COMPONENT, minor component(s), moisture content, structure, angularity, maximum grain size, odor, and Geologic Unit (If Known)**	Lab Sample ID	Lab Sample Depth (Ft.)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

NOTES:

Date	Time	Depth to groundwater while drilling

Checked by _____ Date:_____

ATTACHMENT 4

EXAMPLE WELL CONSTRUCTION LOG FORM

AECOM

Well ID:

Low Flow Ground Water Sample Collection Record

Client: _____ Date: _____ Time: Start _____ am/pm
Project No: _____ Finish _____ am/pm
Site Location: _____
Weather Conds: _____ Collector(s): _____

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length _____ c. Length of Water Column _____ (a-b)

Casing Diameter/Material _____

b. Water Table Depth _____ d. Calculated System Volume (see back) _____

2. WELL PURGE DATA

a. Purge Method: _____

b. Acceptance Criteria defined (see workplan)

- Temperature	3%	-D.O.	10%
- pH	± 1.0 unit	- ORP	± 10mV
- Sp. Cond.	3%	- Drawdown	< 0.3'

c. Field Testing Equipment used: Make Model Serial Number

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (feet)	Color/Odor

(continued on back)

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☐	☐	☐
Have parameters stabilized	☐	☐	☐

If no or N/A - Explain below.

_____

3. SAMPLE COLLECTION: Method: _____

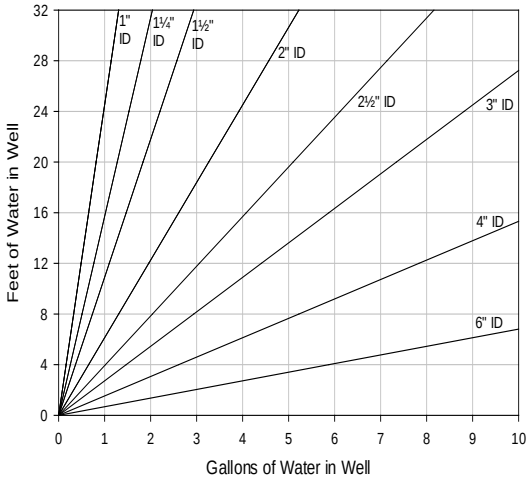
Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time

Comments _____

Signature _____ Date _____

Purge Volume Calculation:

Well ID:



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (ft)	Color/Odor

ATTACHMENT 5

GROUNDWATER SAMPLING AND WELL DEVELOPMENT FORMS

AECOM

Well ID:

Low Flow Ground Water Sample Collection Record

Client: _____ Date: _____ Time: Start _____ am/pm
Project No: _____ Finish _____ am/pm
Site Location: _____
Weather Conds: _____ Collector(s): _____

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length _____ c. Length of Water Column _____ (a-b)

Casing Diameter/Material _____

b. Water Table Depth _____ d. Calculated System Volume (see back) _____

2. WELL PURGE DATA

a. Purge Method: _____

b. Acceptance Criteria defined (see workplan)

- Temperature	3%	-D.O.	10%
- pH	± 1.0 unit	- ORP	± 10mV
- Sp. Cond.	3%	- Drawdown	< 0.3'

c. Field Testing Equipment used: Make Model Serial Number

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (feet)	Color/Odor

(continued on back)

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☐	☐	☐
Have parameters stabilized	☐	☐	☐

If no or N/A - Explain below.

_____

3. SAMPLE COLLECTION: Method: _____

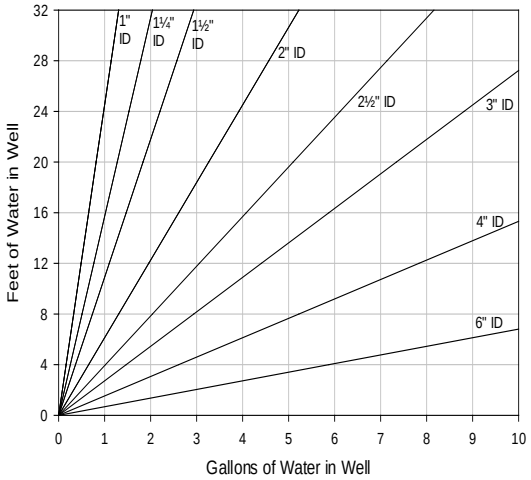
Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time

Comments _____

Signature _____ Date _____

Purge Volume Calculation:

Well ID:



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (ft)	Color/Odor

ATTACHMENT 6
AQUIFER TESTING FORM

AQUIFER TEST DATA SHEET
(OBSERVATION WELLS)

Page ___ of ___

PROJECT NAME: _____ PROJECT NO: _____ PIEZO NO: _____
DATE: _____ PUMP DEPTH: _____ TEST NO: _____
TYPE OF TEST: _____ PUMPED WELL NO: _____ DISTANCE FROM PUMPING WELL: _____
MEASURING EQUIPMENT: _____ HYDROGEOLOGIST: _____

Time Data	Water Level Data	Time Data Continuation	Water Level Data Continuation
Pump On: Date/Time_____ Pump Off: Date/Time_____ Duration of Aquifer Test: Pumping:_____ Recovery:_____	Pretest Water Level_____ Static Water Level:_____ Measuring Point:_____ Elevation of Measuring Point:_____		

Date	Time	Depth to Water (ft)	Pressure Transducer (XD)	Flow Rate (gpm)	Date	Time	Depth to Water (ft)	Pressure Transducer (XD)	Flow Rate (gpm)

Conversion Factors: 1 PSI = 2.31 feet 1 cubic foot = 7.48 gallons

ATTACHMENT 7

SAMPLING DOCUMENTATION AND TRACKING FORM

Sample Tracking and Documentation Form

Project: _____ **Site:** _____

Location ID	Sample ID	Method	Matrix	Date Sampled	Time Sampled	Date Shipped	Cooler No.	Lab Dest.	Fedex Tracking No.	QA/QC Samples

Field Duplicates:

Splits (LIMS # _____):

Sample Tracking and Documentation Form

Project: _____ **Site:** _____

Location ID	Sample ID	Method	Matrix	Date Sampled	Time Sampled	Date Shipped	Cooler No.	Lab Dest.	Fedex Tracking No.	QA/QC Samples
Equipment Rinsate Blanks:										
Equipment Rinsate Blanks Splits (LIMS #_____):										
Trip Blanks										

QA/QC CODES:

1 = Primary Lab Duplicate
2 = Primary Lab Duplicate and QA Laboratory Split
3 = Primary Lab Rinsate Blank
4 = Primary Lab Rinsate Blank and QA Lab Rinsate Blank Split
5 = Matrix Spike and Duplicate (MS/MSD)

AECOM

Client:		***BORING ID:***
Project Number:		
Site Location:		
Coordinates:	*Elevation:*	*Sheet: 1 of 1*
Drilling Method:		*Monitoring Well Installed:*
Sample Type(s):	*Boring Diameter:*	*Screened Interval:*

Weather:	*Logged By:*	*Date/Time Started:*	*Depth of Boring:*
Drilling Contractor:	*Ground Elevation:*	*Date/Time Finished:*	*Water Level:*

Depth (ft)	Geologic sample ID	Sample Depth (ft)	Blows per 6"	Recovery (inches)	Headspace (ppm)	U.S.C.S	**MATERIALS: Color, size, range, MAIN COMPONENT, minor component(s), moisture content, structure, angularity, maximum grain size, odor, and Geologic Unit (If Known)**	Lab Sample ID	Lab Sample Depth (Ft.)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

NOTES:

Date	Time	Depth to groundwater while drilling

Checked by _____ Date:_____

RIDGECREST SOLAR 1, LLC
STANDARD OPERATING PROCEDURES
KERN COUNTY, CALIFORNIA

SOP-15

FIELD LOGBOOK

STANDARD OPERATING PROCEDURES

SOP-15
FIELD LOGBOOK

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1.0 INTRODUCTION

The field logbook is a controlled document that contains information about all major on-site activities associated with investigation and remediation projects. The field logbook serves as the primary documentation of all field activities and events. Information recorded in the field logbook is described in Section 4.0, Methods. Site-specific procedures described in project work plans supersede this Standard Operating Procedure (SOP). Some site conditions and/or client requirements may necessitate deviations from this SOP.

The site logbook is initiated at the start of the first on-site activity (e.g., initial reconnaissance survey or site walk). Entries are made each day field activities occur. The site logbook is part of the permanent project file maintained by AECOM, and is submitted to the project manager, who sends it to the project file at the completion of field activities. The site logbook may be admitted as evidence in cost recovery or other legal proceedings, so it is critical that this document be properly maintained.

2.0 DEFINITIONS

Field Logbook	The field logbook (also called field notebook) is a bound, waterproof notebook with consecutively numbered pages that cannot be removed.

3.0 RESPONSIBILITIES

Field logbooks are issued to field team members by the field team leader (FTL) or Project Manager. Each field team member in possession of a field logbook is responsible for keeping it current, accurate, straightforward, and relevant (see Section 4.0, Methods), and for submitting the field logbook to the FTL or Project Manager when the field work is completed. The Project Manager or designee reviews the field logbook for completeness, legibility, and relevance at the end of the field effort.

4.0 METHODS

During each field day, all site activities, personnel, visitors, and problems are recorded in the field logbook. The following paragraphs include lists of types of information included, when applicable, and methods for maintaining the field logbook.

The cover of each site logbook contains the following information:

- project name
- client name

- Contractors project number
- project manager's name
- applicable work plan (s)
- sequential book number
- start date
- end date

The beginning of each daily entry includes the following:

- date
- day of week
- location
- personal protective equipment (PPE) level
- start time
- weather
- personnel
- subcontractors
- visitors
- equipment
- Contractors job number and cost code for that day's activities

Daily site logbook entries include but are not limited to the following, as applicable:

- arrival and surveying, decontamination, inspection, or other field activity
- equipment calibration

- materials used
- sampling activities and methods
- sample numbers, dates, times, locations, and analyses
- sketches of work locations, sample locations, excavations, etc.
- sketches of well construction details
- sample shipment information (chain-of-custody form numbers, carrier, time)
- start and completion times of each work activity
- storage and disposal of wastes
- field measurements
- health and safety issues (PPE level, time of tailgate safety meeting, etc.)
- unusual events
- accidents and near misses
- work progress
- work problems
- corrective actions
- variations from project plans or standard procedures
- communication with the client or others
- communication with the project manager or other Contractors staff
- references to other project logs (purge, sample, equipment calibration, quality control, photograph, equipment, borehole, construction, development, etc.)

Because the site logbook and its contents are admissible as evidence in legal proceedings, the following guidelines are also important:

- Unnecessary or irrelevant information or opinions are not recorded.
- Language used in the site logbook is always professional.
- Pages are not removed from the site logbook.
- All entries are in waterproof blue or black ink.
- The person entering information signs each page on which information is recorded.
- Blank portions of pages, and pages that have been inadvertently left blank, are crossed out and signed.
- The words “End of Day” and the signature of the person making the entry appear at the end of each daily entry.
- The field logbook is reviewed and signed by the FTL or Project Manager when the field work is completed.

RIDGECREST SOLAR 1, LLC
STANDARD OPERATING PROCEDURES
KERN COUNTY, CALIFORNIA

SOP-17

SOIL LOGGING

STANDARD OPERATING PROCEDURES

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SOIL LOGGING

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DISCLAIMER

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1.0 INTRODUCTION

This Standard Operating Procedure (SOP) is applicable to logging soils at all sites requiring soil investigation by AECOM personnel. The SOP is based on the Unified Soils Classification System (USCS) and the American Society for Testing and Materials (ASTM) Standard D2488-00 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM, 2000). Variance from the logging procedures described herein shall be warranted only if specifically required in writing by a particular client or regulatory agency. A solid working knowledge of this SOP is important for Tronox Contractors field personnel to standardize logging procedures and to enable subsequent correlations between borings at a site, allowing for accurate and thorough site characterization.

The information in this SOP is summarized in two soil logging field guides (attached). Laminated copies of these guides are available for field personnel; use of the field guides is strongly recommended. Other field guidance references may also be used according to personal preference; however, such references should be based on the USCS. Note that many references (for example, AGI Data Sheet grain-size scales) base soil classifications on the Wentworth Scale. Such scales may vary significantly from the USCS and may lead to inaccurate or inconsistent soil descriptions.

2.0 DEFINITIONS

Use of the USCS requires familiarity with the grain size ranges that define a particular type of soil, as well as several other physical characteristics. The grain size definitions and physical characteristics upon which soil descriptions are based are presented below. This information is also presented in tabular format on the field guides.

2.1 GRAIN SIZES

USCS grain sizes are based on U.S. standard sieve sizes, which are named as follows:

- Standard sieves with larger openings are named according to the size of the openings in the sieve mesh. For example, a "3-inch" sieve contains openings that are 3 inches square.

- Standard sieves with smaller openings are given numbered designations that indicate the number of openings per inch. For example, a "No. 4" sieve contains 4 openings per inch.

The following grain size definitions are paraphrased from the ASTM Standard D2488-00. Field personnel should familiarize themselves with the grain size definitions and refer to the appropriate field guide for a visual reference.

Boulders	Particles of rock that will not pass a 12-inch (300-mm) square opening
Cobbles	Particles of rock that will pass a 12-inch (300-mm) square opening and be retained on a 3-inch (75-mm) sieve
Gravel	Particles of rock that will pass a 3-inch (75-mm) sieve and be retained on a No. 4 (4.75-mm) sieve with the following subdivisions: – Coarse gravel passes a 3-inch (75-mm) sieve and is retained on a 3/4-inch (19-mm) sieve – Fine gravel passes a 3/4-inch (19-mm) sieve and is retained on a No. 4 (4.75-mm) sieve
Sand	Particles of rock that will pass a No. 4 (0.19-inch or 4.75-mm) sieve and be retained on a No. 200 (0.003-inch or 75-µm) sieve with the following subdivisions: – Coarse sand passes a No. 4 (0.19-inch or 4.75-mm) sieve and is retained on a No. 10 (0.08-inch or 2-mm) sieve – Medium sand passes a No. 10 (0.08-inch or 2-mm) sieve and is retained on a No. 40 (0.017-inch or 425-µm) sieve – Fine sand passes a No. 40 (0.017-inch or 425-µm) sieve and is retained on a No. 200 (0.003-inch or 75-µm) sieve
Silt	Soil passing a No. 200 (0.003-inch or 75-µm) sieve that is nonplastic or very slightly plastic and that exhibits little or no strength when air dried. Individual silt particles are not visible to the naked eye.
Clay	Soil passing a No. 200 (0.003 inch or 75-µm) sieve that can be made to exhibit plasticity within a range of water contents and that exhibits considerable strength when air-dried. Individual clay particles are not visible to the naked eye.

2.2 PHYSICAL CHARACTERISTICS

The following physical characteristics are used in the USCS classification for fine-grained soils. A brief definition of each physical characteristic is presented below. Tables 1 through 4 present descriptions of field tests that may be performed to estimate these properties in a field sample. However, with the exception of plasticity, the tests are generally too time consuming to perform regularly in the field. A determination of the type of fine-grained soil present in the sample can generally be made on the basis of plasticity, as described in Section 4.1.2.

Dry Strength	The ease with which a dry lump of soil crushes between the fingers (Table 1).
Dilatancy Reaction	The speed with which water appears in a moist pat of soil when shaking in the hand, and disappears while squeezing (Table 2).
Toughness	The strength of a soil, moistened near its plastic limit, when rolled into a 1/8-inch diameter thread (Table 3).

Plasticity — The extent to which a soil may be rolled into a 1/8-inch. thread, and re-rolled when drier than the plastic limit (Table 4).

Table 1. Criteria for Describing Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with mere pressure of handling.
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure.
High	The dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb and a hard surface.
Very High	The dry specimen cannot be broken between the thumb and a hard surface.

Table 2. Criteria for Describing Dilatancy

Description	Criteria
None	No visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing.

Table 3. Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

Table 4. Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A 1/8-inch (3-mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The

Description	Criteria
	thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

3.0 RESPONSIBILITIES

This section presents a brief definition of field roles and the responsibilities generally associated with them. This list is not intended to be comprehensive; additional personnel may be involved in other aspects of the project. Project team member information is usually included in project-specific plans (e.g., work plan, field sampling plan, quality assurance plan), and field personnel should always consult the appropriate documents to determine project-specific roles and responsibilities. In addition, one person may serve in more than one role on any given project.

The **Project Manager** or **Task Leader** defines the objectives of field work; selects site-specific monitoring well design and installation methods with input from the Project Hydrogeologist and Field Team Leader; and maintains close supervision of activities and progress.

The **Project Hydrogeologist** selects site-specific drilling/sampling options, helps prepare technical provisions for drilling.

The **Field Team Leader** implements the selected drilling program and may also review boring logs.

The **Drilling Rig Geologist** records the boring logs and supervises the drilling subcontractor.

The **Quality Manager** performs field and logging process audits.

4.0 SOIL LOGGING PROCEDURES

The following aspects of a project must be considered before sampling and soil logging commences. This information is generally summarized in a project-specific work plan or field sampling plan, which should be thoroughly reviewed by field personnel prior to the initiation of work.

- Purpose of the soil logging (e.g., initial investigation, subsequent investigation, remediation)
- Known or anticipated hydrogeologic setting including lithology (consolidated/unconsolidated, depositional environment, presence of fill material), physical characteristics of the aquifer (porosity/permeability), type of aquifer (confined/unconfined), recharge/discharge conditions, aquifer thickness and ground water/surface water interrelationships
- Drilling conditions
- Previous soil boring or borehole geophysical logs

- Soil sampling and geotechnical testing program
- Characteristics of potential chemical release(s) (chemistry, density, viscosity, reactivity, and concentration)
- Health and Safety protection requirements
- Regulatory requirements

The procedures used to determine the correct soil sample classification are described below. These procedures are presented in tabular and flow chart form on the field guides.

4.1 Field Classification of Soils

The following soil classification procedures are based on the ASTM Standard D2488-00 for visual-manual identification of soils (ASTM, 2000). The flow chart is Attachment 1 to this SOP and presented in the field guide can be used to assign the appropriate soil group name and symbol. When naming soils, the proper USCS soil group name is given, followed by the group symbol. For clarity, it is recommended that the group symbol be placed in parentheses after the written soil group name.

Soil identification using the visual-manual procedures is based on naming the portion of the soil sample that will pass a 3-inch (75-mm) sieve. Therefore, before classifying a soil, any particles larger than 3 inches (cobbles and boulders) should be removed, if possible. Estimate and note the percentage of cobbles and boulders.

Using the remaining soil, the next step is to estimate the percentages, by dry weight, of the gravel, sand, and fine fractions (particles passing a No. 200 sieve). The percentages are to be estimated to the closest 5 percent. In general, the soil is *fine-grained* (e.g., a silt or a clay) if it contains 50 percent or more fines, and *coarse-grained* (e.g., a sand or a gravel) if it contains less than 50 percent fines. If one of the components is present but estimated to be less than 5 percent, its presence is indicated by the term *trace*. For example, “trace of fines” would be added as additional information following the formal USCS soil description.

4.1.1 Procedure for Identifying Coarse-Grained Soils

Coarse-grained soil contains less that 50 percent fines. If it has been determined that the soil contains less than 50 percent fines, the soil is a *gravel* if the percentage of gravel is estimated to be more than the percentage of sand. The soil is a *sand* if the percentage of gravel is estimated to be equal to or less than the percentage of sand.

If the soil is predominantly sand or gravel but contains an estimated 15 percent or more of the other coarse-grained constituent, the words "with gravel" or "with sand" is added to the group name. For example: "gravel with sand (GP)." If the sample contains any cobbles or boulders, the words “with cobbles” or “with cobbles and boulders” are added to the group name. For example: "silty gravel with cobbles (GM)."

5 Percent or Less Fines

The soil is a “clean gravel” or “clean sand” if the percentage of fines is estimated to be 5 percent or less. “Clean” is not a formal USCS name, but rather a general descriptor for implying little to no fines. Clean sands and gravels are given the USCS designation as either *well-graded* or *poorly-graded*, as described below.

Identify the soil as a *well-graded gravel* (GW) or as a *well-graded sand* (SW) if it has a wide range of particle sizes and substantial amounts of the intermediate particle sizes. Identify the soil as a *poorly-graded gravel* (GP) or as a *poorly-graded sand* (SP) if it consists predominantly of one grain size (uniformly graded), or has a wide range of sizes with some intermediate sizes obviously missing (gap- or skip-graded).

Note: When using the USCS designation, keep in mind the difference between grading and sorting. The term grading is used to indicate the range of particles contained in the sample. For example, a poorly-graded sand containing predominantly one grain size would be considered well-sorted, and vice-versa. One notable exception to this general rule is a skip-graded (bimodally distributed) sample; a sand containing two distinct grain sizes would be considered both poorly-sorted and poorly-graded. The USCS uses only the *grading* descriptor in soil naming, not the sorting descriptor.

≥ 15 Percent Fines

The soil is a *silty* or *clayey gravel* or a *silty* or *clayey sand* if the percentage of fines is estimated to be 15 percent or more. For example, identify the soil as *clayey gravel* (GC) or a *clayey sand* (SC) if the fines are clayey. Identify the soil as a *silty gravel* (GM) or a *silty sand* (SM) if the fines are silty. The coarse grained descriptor "poorly-graded" or "well-graded" is not included in the soil name, but rather, should be included as additional information following the formal USCS soil description.

>5 Percent but <15 Percent Fines

If the soil is estimated to contain greater than 5 percent but less than 15 percent fines, give the soil a dual identification using two group symbols. The first group symbol corresponds to a clean gravel or sand (GW, GP, SW, SP) and the second symbol corresponds to a clayey/silty gravel or sand (GC, GM, SC, SM). The group name corresponds to the first group symbol, and include the words "poorly-graded" or

"well-graded", plus the words "with clay" or "with silt" to indicate the character of the fines. For example, "poorly-graded gravel with silt (GP-GM)".

4.1.2 Procedure for Identifying Fine-Grained Soils

Fine-grained soil contains 50 percent or more fines. The USCS classifies inorganic fine-grained soils according to their degree of plasticity (no or low plasticity, indicated with an "L"; or high plasticity, indicated with an "H") and other physical characteristics (defined in Section 2.2 and Tables 1 through 4). As indicated in Section 2.2, the field tests used to determine dry strength, dilatancy, and toughness are generally too time consuming to be performed on a routine basis. Field personnel should be familiar with the definitions of the physical characteristics and the concepts of the field tests; however, field classifications will generally be based primarily on plasticity. If precise engineering properties are necessary for the project (i.e., construction, modeling, etc.), geotechnical samples should be collected for laboratory testing. The results of the laboratory tests should be compared to the field logging results. Soil classifications based on plasticity are as follows:

- Lean clay (CL) soil has medium to high dry strength, no or slow dilatancy, and medium toughness and plasticity.
- Fat clay (CH) soil has high to very high dry strength, no dilatancy, and high toughness and plasticity.
- Silt (ML) soil has no to low dry strength, slow to rapid dilatancy, and low toughness and plasticity, or is nonplastic.
- Elastic silt (MH) soil has low to medium dry strength, no to slow dilatancy, and low to medium toughness and plasticity. They will air dry more quickly than lean clay and have a smooth, silky feel when dry.
- Organic soil (OL or OH) soil contains enough organic particles to influence the soil properties. Organic soils usually have a dark brown to black color and may have an organic odor. Organic soils will often change color, from black to brown for example, when exposed to the air. Organic soils normally will not have a high toughness or plasticity.

4.1.3 Other Modifiers For Use With Fine-Grained Soils

15 percent to 25 percent coarse-grained material

If the soil is estimated to have 15 percent to 25 percent sand or gravel, or both, the words "with sand" or "with gravel" (whichever is predominant) is added to the group name. For example: "lean clay with sand (CL)" or "silt with gravel (ML)". If the percentage of sand is equal to the percentage of gravel, use "with sand."

≥30 percent coarse-grained material

If the soil is estimated to have 30 percent or more sand or gravel, or both, the words "sandy" or "gravelly" is added to the group name. Add the word "sandy" if there appears to be the same or more sand than gravel. Add the word "gravelly" if there appears to be more gravel than sand. For example: "sandy silt (ML)", or "gravelly fat clay (CH)".

4.1.4 Procedure for Identifying Borderline Soils

To indicate that the soil may fall into one of two possible basic groups, a borderline symbol may be used with the two symbols separated by a slash. For example, a soil containing an estimated 50 percent silt and 50 percent fine grained sand may be assigned a borderline symbol "SM/ML". Borderline symbols should not be used indiscriminately. Every effort should be made to first place the soil into a single group and then to estimate percentages following the USCS soil description.

4.2 Descriptive Information for Soils

After the soil name and symbol are assigned, the soil color, consistency/density, and moisture content is to be described in that order. Other information is presented later in the description, as applicable.

4.2.1 Color

Color is an important property in identifying organic soils, and may also be useful in identifying materials of similar geologic or depositional origin in a given location. The Munsell Soil Color Charts should be used, if possible.

When using the Munsell Soil Color Charts, a general color, such as brown, gray, red, is first assigned to the soils. Then go to the correct area in the charts and assign the applicable color name and Munsell symbol. The ability to detect minor color differences varies among people, and the chance of finding a perfect color match in the charts is rare. Keeping this in mind should help field personnel avoid spending unnecessary time and confusion going through the chart pages. In addition, attempting to describe detail beyond the reasonable accuracy of field observations could lead to making poorer soil descriptions than by simply expressing the dominant colors (Munsell Soil Color Chart, 1992).

If the color charts are not being used or are unavailable, again attempt to assign general colors to soils. Comparing a particular soil sample to samples from different locations in the borehole will help keep the eye "calibrated". For example, by holding two soils together, it may become evident that one is obviously greenish-brown, while another is reddish.

4.2.2 Consistency/Density

For intact fine-grained soil, describe consistency as very soft, soft, medium stiff, stiff, very stiff, or hard, based on the blows per foot using a 140 pound hammer dropped 30 inches (Table 5). If blow counts are not available, perform the field test described in Table 6 to determine consistency.

For coarse-grained soils, describe density based on blows per foot as very loose, loose, medium dense, dense, and very dense (Table 5). If blow counts are not available, attempt to estimate the soil density by observation, since a practical field test is not available. Be sure to clearly indicate on the field boring log if blow counts could not be obtained.

Table 5. Density/Consistency Based on Blow Counts

Density (Sand and Gravel) Blows/ft[a]				Consistency (Silt and Clay) Blows/ ft[a]			
Term	**1.4" ID**	**2.0" ID**	**2.5" ID**	**Term**	**1.4" ID**	**2.0" ID**	**2.5" ID**
Very Loose	0 – 4	0 – 5	0 – 7	Very Soft	0 – 2	0 – 2	0 – 2
Loose	4 – 10	5 – 12	7 – 18	Soft	2 – 4	2 – 4	2 – 4
Medium Dense	10 – 29	12 – 37	18 – 51	Medium Stiff	4 – 8	4 – 9	4 – 9
Dense	29 – 47	37 – 60	51 – 86	Stiff	8 – 15	9 – 17	9 – 18
Very Dense	>47	>60	>86	Very Stiff	15 – 30	17 – 39	18 – 42
				Hard	30 – 60	39 – 78	42 – 85
				Very Hard	>60	>78	>85

[a] 140 lb. Hammer dropped 30 inches

Table 6. Criteria for Describing Consistency

Description	Criteria
Very Soft	Thumb will penetrate soil more than 1 inch (25 mm)
Soft	Thumb will penetrate soil about 1 inch (25 mm)
Firm	Thumb will indent soil about ¼ inch (6 mm)
Hard	Thumb will not indent soil but readily indented with thumbnail
Very Hard	Thumbnail will not indent soil

4.2.3 Moisture

Describe the moisture condition of the soil as dry (absence of moisture, dusty, dry to the touch), moist (damp but no visible water), or wet (visible free water, saturated).

4.2.4 Grain Size

Describe the maximum particle size found in the sample in accordance with the following information:

- Sand-size—describe as fine, medium, or coarse. (See Section 2 for sand size definitions.)
- Gravel-size—describe the diameter of the maximum particle size in inches.
- Cobble or boulder-size—describe the maximum dimension of the largest particle.

For gravel and sand components, describe the range of particle sizes within each component. For example, "about 20 percent fine to coarse gravel, about 40 percent fine to coarse sand".

4.2.5 Odor

Due to health and safety concerns, **NEVER** intentionally smell the soil. This could result in exposure to volatile contaminants that may be present in the soil. If, however, an odor is noticed, it should be described if organic or unusual (e.g., petroleum product or chemical). Soils containing a significant amount of organic material usually have a distinctive odor of decaying vegetation (sometimes a hydrogen sulfide [rotten egg] smell). Organic vapor readings from a photoionization detector (PID) or similar instrument should be noted on the field boring log (Note: see SOP-39 for additional information on PID principles and procedures.). The project-specific health and safety plan should then be consulted to determine the appropriate level of protection necessary to continue field work.

4.2.6 Cementation

Describe the cementation of intact coarse-grained soils as weak, moderate, or strong, in accordance with the following criteria:

- Weak—crumbles or breaks with handling or little finger pressure
- Moderate—crumbles or breaks with considerable finger pressure
- Strong—will not crumble or break with finger pressure

The presence of calcium carbonate may be confirmed on the basis of effervescence with dilute hydrochloric acid (HCl) if calcium carbonate or caliche is believed to be present in the soil. Proper health

and safety precautions must be followed when mixing, handling, storing, or transporting HCl. For further information, see I/HW Health and Safety Procedure 630.24, "Procedure for Hydrochloric Acid Handling for Soil Logging."

4.2.7 Angularity

The angularity of the sand (coarse sizes only), gravel, cobbles, and boulders, as angular, subangular, subrounded, or rounded are described in accordance with the following criteria:

- Angular particles have sharp edges and relatively planar sides with unpolished surfaces.
- Subangular particles are similar to angular description but have rounded edges.
- Subrounded particles have nearly plane sides but have well-rounded corners and edges.
- Rounded particles have smoothly curved sides and no edges.

A range of angularity may be stated, such as "subrounded to rounded."

4.2.8 Structure

Describe the structure of intact soils in accordance with the criteria in Table 7.

Table 7. Criteria for Describing Structure

Description	Criteria
Stratified	Alternating layers of varying materials or color with layers at least 6 mm thick; note thickness
Laminated	Alternating layers of varying materials or color with the layers less than 6 mm thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down in small angular lumps that resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogenous	Same color and appearance throughout

4.2.9 Lithology

Describe the lithology (rock or mineral type) of the sand, gravel, cobbles, and boulders, if possible. It may be difficult to determine the lithology of fine and medium-grained sand or particles that have undergone alteration.

4.2.10 Additional Comments

Additional comments may include the presence of roots or other vegetation, fossils or organic debris, staining, mottling, or oxidation; difficulty in drilling, and caving or sloughing of the borehole walls. Also, when drilling in an area known or suspected to contain imported fill material, every effort should be made to identify the contact between fill and native soils. If a soil is suspected to be fill, this should be clearly indicated on the log following the soil description. Stratigraphic units and their contacts should be noted wherever possible.

4.2.11 Bedrock Descriptions

If the soil boring penetrates bedrock, the boring log should indicate the rock type, color, weathering, fracturing, competency, mineralogy, age (if known), and any other miscellaneous information available. Definitions of these terms are not included in this SOP, because only a small percentage of drilling activities conducted by Tronox Contractors for Tronox penetrate bedrock. If bedrock drilling is planned, the field team leader, with the concurrence of the project manager, makes arrangements to provide the field team with appropriate definitions and indicate the types with information that should be collected.

4.3 Additional Boring Log Information

The boring log form (example shown in Attachment 2) should be used unless a different form is required by the client. Information in the log heading should be complete and accurate. In addition to soil descriptions, the following information should be included, at a minimum:

- Boring or monitoring well number
- Project name and job number
- Site name
- Name of individual who logged the boring
- Name of boring log reviewer
- Drilling contractor
- Drill rig type and method of drilling (for example, "CME 75, hollow stem auger")
- Name of drilling company
- Name of driller and helper
- Borehole diameter and drill bit type

- Type of soil sampler (for example, Modified California, continuous core, etc.)
- Time and date that drilling started and finished
- Time and date that the well was completed or the soil boring backfilled, as appropriate
- Method of borehole abandonment
- Sketch map of boring or well location with estimated distances to major site features such as property lines or buildings, and north arrow

Soil sample information should include the depth interval that was sampled, the blow counts per 6 inches, the amount of soil recovered, and the portion submitted for analysis or testing, if any. The sample identification number may also be noted on the log.

The degree to which soil samples are collected during a field effort depends on the overall scope and purpose of the investigation, which should be clearly defined before the field effort commences. Additional soil samples may need to be collected if, for example, soils are very heterogeneous or unexpected conditions such as perched water zones or zones of contamination are encountered.

If groundwater is encountered during drilling, the depth to water and the time and date of the observation should be recorded. If the first water encountered is a perched zone, the depth, time, and date that any additional groundwater zones are encountered should also be recorded. Depth to water after drilling, the measuring point, and the date and time of the measurement(s) must be noted. Additional measurements of depth to groundwater, including depth and time, may be beneficial.

If a monitoring well is installed, the construction details such as casing material type, screen length and slot size should be noted on the boring log. The annulus fill material (sand pack, bentonite, grout, etc.) should also be recorded.

If the soil boring is abandoned, the backfill material used (e.g., grout, bentonite, etc.) and volume used, should be recorded on the boring log.

5.0 OTHER APPLICABLE SOPs

Several other AECOM SOPs contain information related to soil boring and logging activities. The following is a list of these SOPs:

Drilling Methods
Monitoring Well Design and Installation
Sample Management/Preservation
Soil Sampling
Trenching and Test Pitting
Field Documentation

Site Logbook

6.0 REFERENCES

ASTM, 2000, Standard D2488-00 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

ATTACHMENT 1
FIELD CLASSIFICATION GUIDES

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions			Group Symbols	Typical Names	Field Identification Procedures (excluding particles larger than 3 inches and basing fractions on estimated weights)			Information Required for Describing Soils
1	2		3	4	5			6
Coarse-grained Soils More than half of meterila is larger than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to the naked eye.	Gravels More than half of coarse fraction is larger than No. 4 sieve size. (For visual classification, the 1/4-in. size may be used as equivalent to the No. 4 sieve size.)	Clean Gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.			For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions, and drainage characteristics.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.			
		Gravels with Fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixture.	Nonplastic fines or fines with low plasticity (for identification procedures see ML below)			Give typical name: Indicate approximate percentage of sand and gravel, maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbol in parentheses.
			GC	Clayey gravels, gravel-sand-clay mixtures.	Plastic fines (for identification see CL below)			
	Sands More than half of coarse fraction is smaller than No. 4 sieve size	Clean Sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.	Wide range in grain size and substantial amounts of all intermediate particle sizes.			
			SP	Poorly graded sands or gravelly sands, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.			Example: Silty sand, gravelly; about 20% hard, angular gravel particles 1/2 in. maximum size; rounded and subangular sand grains, course to fine; about 15% nonplastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM).
		Sands with Fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mistures.	Nonplastic fines or fines with low plasticity (for identification procedures see ML below)			
			SC	Clayey sands, sand-clay mixtures.	Plastic fines (for identification procedures see CL below)			
Fine-grained Soils More than half of material is smaller than No. 200 sieve size.					Identification Procedures on Fraction Smaller than No. 40 Sieve Size			
					Dry Strength (Crushing characteristics)	Dilatancy (Reaction to shaking)	Toughness (Consistency near PL)	
	Silts and Clays Liquid limit is less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.	None to slight	Quick to slow	None	For undisturbed soils add information on structure, stratification, consistency in undisturbed and remolded states, moisture and drainage conditions.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	Medium to high	None to very slow	Medium	
	Silts and Clays Liquid limit is greater than 50		OL	Organic silts and organic silty clays of low plasticity.	Slight to medium	Slow	Slight	Give typical name; indicate degree and character of plasticity; amount and maximum size of coarse grains; color in wet condition; odor, if any; local or geologic name and other pertinent descriptive information; and symbol in parentheses.
			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	Slight to medium	Slow to none	Slight to medium	
			CH	Inorganic clays of high plasticity, fat clays.	High to very high	None	High	
			OH	Organic clays and silts of medium to high plasticity.	Medium to high	None to very slow	Slight to medium	Example: Clayey silt, brown; slighty plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML).
Highly Organic Soils			Pt	Peat and other highly organic soils.	Readily identified by color, odor, spongy feel and frequently by fibrous texture.			

ATTACHMENT 2

EXAMPLE BORING LOG FORM

AECOM

Client:		***BORING ID:***
Project Number:		
Site Location:		
Coordinates:	*Elevation:*	*Sheet: 1 of 1*
Drilling Method:		*Monitoring Well Installed:*
Sample Type(s):	*Boring Diameter:*	*Screened Interval:*

Weather:	*Logged By:*	*Date/Time Started:*	*Depth of Boring:*
Drilling Contractor:	*Ground Elevation:*	*Date/Time Finished:*	*Water Level:*

Depth (ft)	Geologic sample ID	Sample Depth (ft)	Blows per 6"	Recovery (inches)	Headspace (ppm)	U.S.C.S	**MATERIALS: Color, size, range, MAIN COMPONENT, minor component(s), moisture content, structure, angularity, maximum grain size, odor, and Geologic Unit (If Known)**	Lab Sample ID	Lab Sample Depth (Ft.)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

NOTES:

Date	Time	Depth to groundwater while drilling

Checked by _____ Date:_____

Appendix F

Preliminary Closure Plan for Land Treatment Unit

AECOM
Environment

Prepared for:
Ridgecrest Solar 1, LLC

Preliminary Closure Plan for Land Treatment Unit
Ridgecrest Solar Power Project
Kern County, California
Appendix F of the Application/ Report of Waste Discharge

January 2010

60139696-5450-Closure

AECOM
Environment

Prepared for:
Ridgecrest Solar 1, LLC

Preliminary Closure Plan for Land Treatment Unit
Ridgecrest Solar Power Project
Kern County, California
Appendix F of the Application/ Report of Waste Discharge

Prepared By Brian Ho

Reviewed By Roy Hauger, PE

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List of Acronyms

BLM	Bureau of Land Management
CIWMB	California Integrated Waste Management Board
HTF	heat transfer fluid
IWVWD	Indian Wells Valley Water District
LTU	land treatment unit
mg/kg	milligrams per kilogram
ROW	Right-of-Way
ROWD	Report of Waste Discharge
RSPP	Ridgecrest Solar Power Project
RWQCB	Regional Water Quality Control Board
SSG	solar steam generator

1.0 Introduction

This document presents a Preliminary Closure Plan for a land treatment unit (LTU) for the proposed Ridgecrest Solar Power Project (RSPP or Project), located in the high northern Mojave Desert in northeastern Kern County, California, about five miles southwest of the City of Ridgecrest, California (**Figure 1**). Ridgecrest Solar 1, LLC (formerly Solar Millenium LLC) is proposing to construct, own and operate the RSPP. The Project right-of-way (ROW), for which a ROW grant sought by the Applicant from the Bureau of Land Management (BLM), will extend across approximately 3,995 acres of public lands owned by the Federal government. The Project facilities will occupy 1,944 acres of the 3,995-acre site, and there will be a total disturbance area (including areas outside the facility fence line), of approximately 1,944 acres. The LTU will be used to receive, temporarily store, and treat soil contaminated with heat transfer fluid (HTF) released from the process to the environment. This Closure Plan is specific to the LTU associated with the Project.

A notice to terminate will be sent to the Regional Water Quality Control Board (RWQCB) 60 days prior to closing the LTU. The notice will include the final closure activities. The LTU will be closed using the schedule of actions explained below.

1.1 Purpose

This plan is intended to be a standalone separable document to the Report of Waste Discharge (ROWD) application for the Project, in accordance with the California Integrated Waste Management Board (CIWMB) Title 27 Regulations, Division 2, Subdivision 1, Chapter 4, Subchapter 4, Section 21769; State Water Resources Control Board Closure; and Post-Closure Maintenance Plan Requirements.

The procedures described for closure are designed to ensure public health and safety, environmental protection, and compliance with applicable regulations. It is assumed that closure would begin 30 years after the commercial operation date of the solar plant. A Certification of Closure will be submitted for approval to the RWQCB to ensure the LTU has been closed in accordance with the approved final Closure Plan.

1.2 Objectives

The Project goals for LTU facility closure are as follows:

- Remove all improvements within 3 feet of final grade; and
- Restore the lines and grades in the disturbed area of the Project Site to match the natural gradients.

The proposed implementation strategy to achieve the goals for site facility closure is as follows:

- Use industry standard demolition means and methods to decrease personnel and environmental safety exposures by minimizing time and keeping personnel from close proximity to actual demolition activities to the extent practical;
- Plan each component of the closure such that personnel and environmental safety are maintained while efficiently executing the work;
- Specify in detail how each major effort will be performed and integrated to achieve the Project goals;
- Train field personnel for decommissioning actions to be taken in proportion to the personnel, Project or environmental risk for those actions;
- Evaluate the execution of the decommissioning and restoration plan through Project oversight and quality assurance; and
- Document implementation of the plan and compliance with environmental requirements.

2.0 Site Background

The Project is a concentrating solar electric generating facility proposed on an approximately 3,995-acre site in Kern County, California. The Project will use well-established parabolic trough solar thermal technology to produce electrical power using a steam turbine generator fed from a solar steam generator (SSG). The SSG receives HTF from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

The Project proposes to use dry cooling for power plant cooling. Water for process water make up, and other industrial uses such as mirror washing will be supplied by the local municipal water district via a new pipeline. This source will also be used to supply water for employee use (e.g., drinking, showers, sinks, and toilets). Water received from the Indian Wells Valley Water District (IWVWD) will meet the requirements of the California Department of Health Services for potable water supplies and will not require further treatment for this purpose. Power cycle makeup, mirror washing water, and cooling of ancillary equipment will require onsite treatment for reduction of dissolved solids, and this treatment varies according to the quality required for each of these uses. A sanitary septic system and on-site leach field will be used to dispose of sanitary wastewater.

The power generation cycle will not produce cooling tower blowdown because the plant will be dry cooled. A small auxiliary cooling tower will generate a small amount of blowdown which will be reused on site. No off-site backup cooling water supply is planned at this time.

The Project will include a LTU to treat soil contaminated with HTF. The unit will be designed in accordance with Lahontan RWQCB requirements. The LTU will cover an area of approximately 500-feet by 350-feet (4 acres).

2.1 Land Treatment Unit

The LTU will not incorporate a liner containment system or leak detection and removal system, but will be constructed with a prepared base consisting of a minimum of 2 feet of compacted, low permeability, lime-treated native material. This base will serve as a competent platform for land treatment activities, and will serve to slow the rate of surface water infiltration in the treatment area. The compacted and native soil beneath the LTU is designated as a “treatment zone” to a depth of 5 feet. Although the LTU will be taking vehicle traffic, no hard surface will be required, as there is no liner system to protect.

The LTU will be surrounded on all sides by a 2-foot high (minimum) compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run on) of surface stormwater into the LTU or runoff of stormwater from the unit.

The site plan design details, and cross section details of the LTU are shown in **Figures 2, 3, and 4**.

3.0 Closure Strategy

The closure for the LTU consists of the following major elements:

- Documentation and establishment of health and safety procedures;
- Prior to initial facility operation, collecting samples from the compacted native soil for laboratory analysis;
- Conducting pre-closure activities such as final closure and restoration planning that addresses the "as-found" site conditions at the start of the Project;
- Demolishing the aboveground structures (dismantling and removing of improvements and materials) in a phased approach while still using some items until the end of the Project;
- Demolishing and removing of belowground facilities as needed to meet the closure goals;
- Cleaning up of soils, if needed, with special attention applied to the LTU to ensure that clean closure is achieved;
- Disposing of materials in appropriate facilities for treatment/disposal or recycling (if needed); and
- Re-contouring lines and grades to match the natural gradient and function.

The plan is to close the LTU, by contouring the area to return it to near original conditions while disturbing as little of the other areas as is practical.

3.1 Health and Safety Procedures

The health and safety procedures to be established prior to decommissioning are listed below:

- General safety and hazard responsibilities;
- An effective hazard communications program;
- Task hazard analysis and control;
- Personal protection equipment requirements;
- Occupational and environmental monitoring requirements;
- Medical and other emergency procedures;
- Operational issues;
- Personnel training;
- Incident reporting; and
- Self audit and compliance procedures.

3.2 Land Treatment Closure Schedule of Actions

Baseline Sampling

Baseline sampling will be conducted in the compacted native materials prior to the initiation of LTU activities. Samples will be collected on 50-foot by 50-foot grid spacing. Laboratory analysis will include total petroleum hydrocarbons, Title 22 metals, biphenyl, diphenyl oxide, and general chemistry.

Soil Segregation

If contaminated soil remains in the LTU when it is time to close the LTU, the contaminated soil may be at various stages of treatment, depending on length of time in each unit. In order to properly handle and dispose of the contaminated soil, representative soil samples will be collected from the LTU to determine HTF concentrations. Soil will be segregated based on the following criteria:

- For concentrations below 100 milligrams per kilograms (mg/kg) of HTF, the soil will be used as back fill material on site.
- For concentrations below 10,000 mg/kg of HTF but above 100 mg/kg, the soil will be stored and treated in the LTU until concentrations are below 100 mg/kg of HTF.
- Although not expected, any soil with concentrations above 10,000 mg/kg of HTF will be collected and containerized pending disposal at a Class I waste disposal facility.

The LTU soils will continue to be managed, maintained, monitored, and reported as outlined in the Waste Discharge Report for the LTU. Once soil concentrations are below 100 mg/kg, the soil will be used as fill material on the property.

For closure, the soil will be characterized by collecting samples on a 100 by 100 foot grid and analyzing them for Title 22 metals and HTF constituents using EPA Method 8015M. For the cost estimate it was assumed that soil within the treatment unit would be sampled on a 100 by 100 foot grid and that samples would be collected from two depths, one of the soil within the compacted lime treated soil layer (typically less than 3 feet bgs) and another sample from the compacted native soil layer at the base of the LTU (typically from 3 to 5 feet bgs). The purpose of this sampling is to identify any remaining impacted soil and to verify and document that the soil that is not removed is acceptable to leave in place.

Site Restoration

The LTU will be backfilled with soil to grade. The LTU design uses native soil only; therefore, no demolition is required. Bermed areas will be leveled and used as the primary backfill material.

4.0 Additional Information

Additional Plan information, as required per the CIWMB Title 27 is detailed in the following sections.

4.1 Contingency in the Event of a Release

For unauthorized discharges of hazardous material, or for public health or environmental emergencies caused by a discharge or threatened waste discharge, local emergency responders and the Office of Emergency Services will be notified. For all other unauthorized discharges or threatened discharges that are not an immediate threat to public health or the environment, notification will be made to the RWQCB by telephone within 24 hours of an adverse condition. An adverse condition includes a discharge or threatened discharge, such as:

- Release of wastewater outside a lined area;
- Suspected or actual evaporation pond liner leak; and
- Violation of discharge specifications.

Written notification to the RWQCB will occur within seven business days of an unauthorized discharge. The RWQCB Lahontan Region's guidance document titled Reporting Unauthorized Waste Discharges (Spills and Leaks) dated October 23, 2002 will be followed.

An evaluation monitoring program may be required, pursuant to Section 20425 of Title 27 to evaluate evidence of a release if detection monitoring and/or verification procedures indicate evidence of a release.

4.2 Financial Responsibility

The waste management unit (i.e., LTU) is considered Class II. At Class II units for which the CIWMB does not require a closure fund, the RWQCB requires the establishment of an irrevocable closure fund (or provide other means) pursuant to the CIWMB-promulgated sections of Title 27, Chapter 6 but with the RWQCB named as beneficiary, to ensure closure of each classified unit in accordance with an approved plan meeting all applicable State Water Resources Control Board-promulgated requirements of Title 27, Chapter 6, Subchapter 2.

4.3 Cost Analysis

A detailed cost estimate to close the LTU is provided in Appendix A. Unit costs are based on RS Means Building Construction Cost Data 2001 Western Version and adjusted by ENR Historical Cost Index to obtain present value (2009) unit costs. The total cost estimate is **$70,000**. A letter of credit will be used to demonstrate financial assurance for the closure costs.

4.4 Closure Schedule

A closure schedule will be determined at a future date under separate cover of the Final Closure Maintenance Plan.

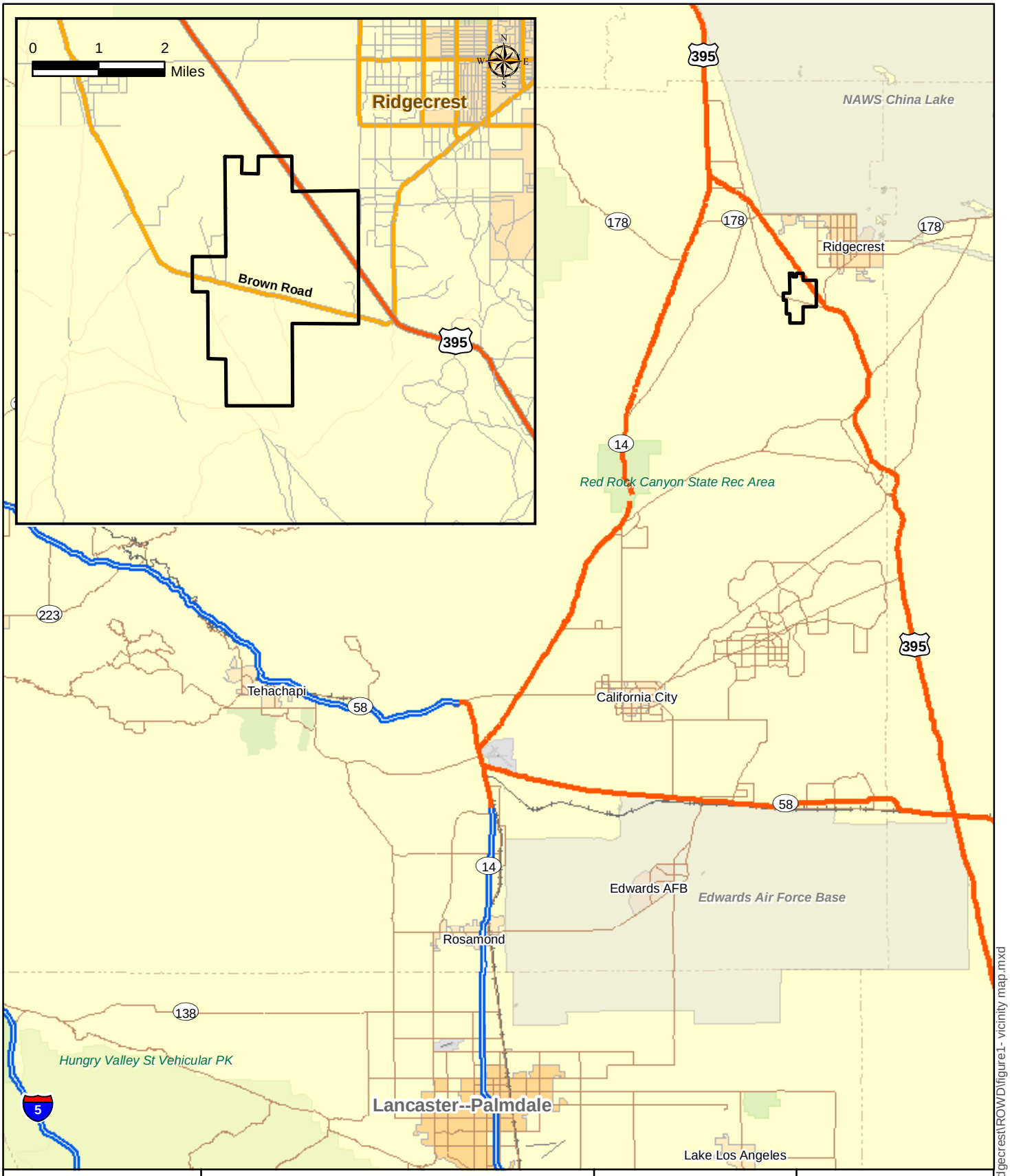
4.5 Final Treatment Procedures

All waste and contaminated materials will be removed off site and all facilities will be remediated in accordance with Section 3.2 detailed previously. At this time it is anticipated that the LTU will be clean closed and no post closure monitoring will be required, however, if impacts remain or the regulatory agencies require it, post closure monitoring will be satisfied with the requirements identified in the Post Closure Maintenance Plan. Final finishing of the surface of the LTU will be sculptured to blend with the surrounding terrain and establish native vegetation consistent with surrounding parcels.

4.6 Land Use of Closed Unit

The land use of the closed unit after closure has not been determined. At present it is anticipated that the facilities will be left as vacant, non-irrigated open land that has been remediated. Based on the plan to clean close the LTU, future use should not be restricted any more than surrounding parcels. Any future development will need to undergo the standard review and approval process in effect at that time.

Figures



Map Location

0 5 10
Miles

Ridgecrest Solar Power Plant

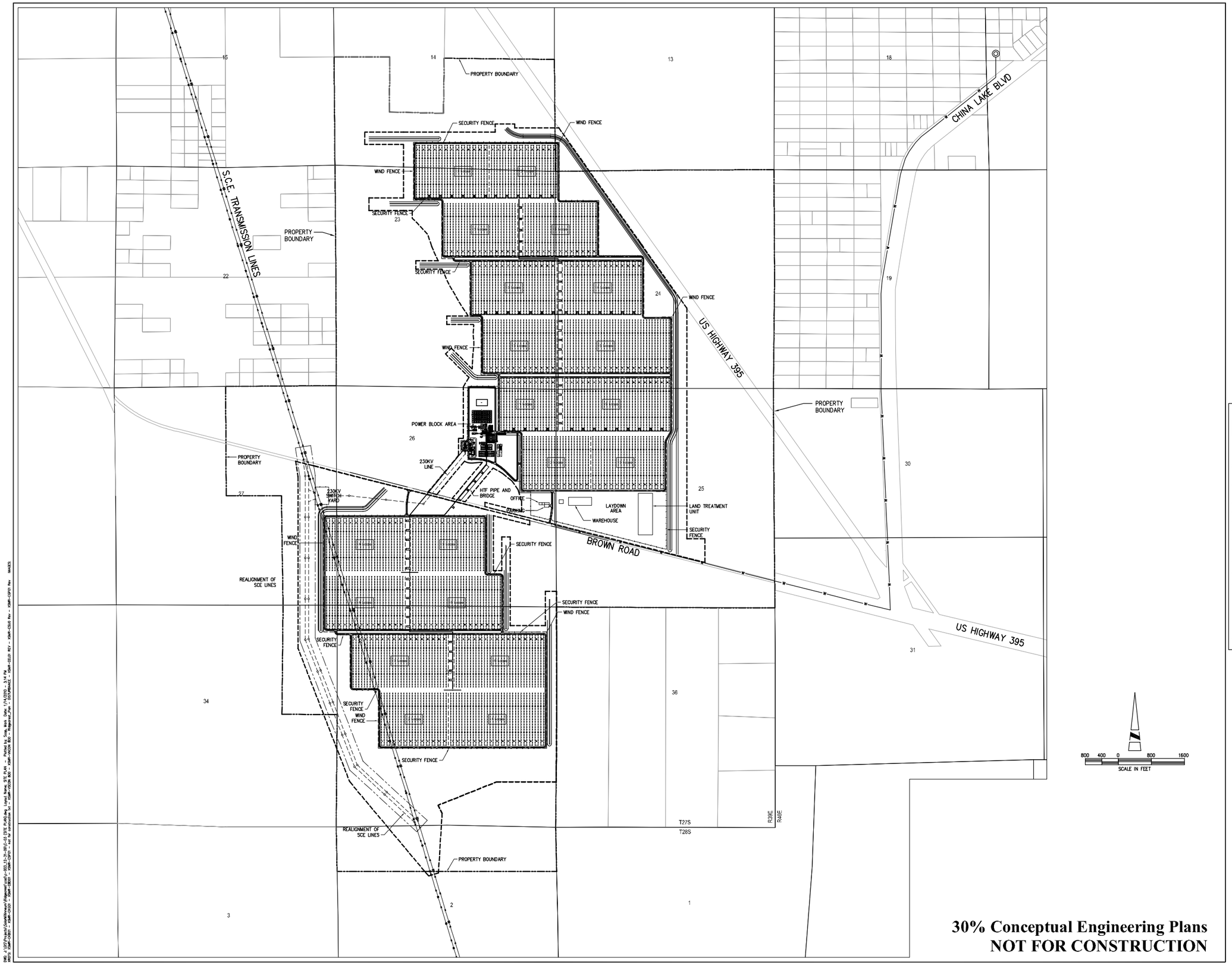
Figure 1
Regional Location and Vicinity Map

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

J:\GIS\Projects\SolarMillinneum\Ridgecrest\ROW\D\figure1- vicinity map.mxd



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Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- SOLAR FIELD PARABOLIC TROUGH
- BALANCE OF PLANT FACILITIES
- PROPOSED ACCESS ROAD (PAVED)
- PROPOSED ACCESS ROAD (GRAVEL)
- RAILROAD
- PROPOSED GAS
- PROPOSED WATER
- PROPOSED TELEPHONE
- PROPOSED ELECTRIC
- EXISTING ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED WIND FENCE
- EXISTING CONTOURS (10 FOOT INTERVALS)
- PROPOSED DRAINAGE CHANNEL/FLOW DIRECTION
- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- HEADER PIPING
- ACCELERATION LANE

Ridgecrest Solar Power Project

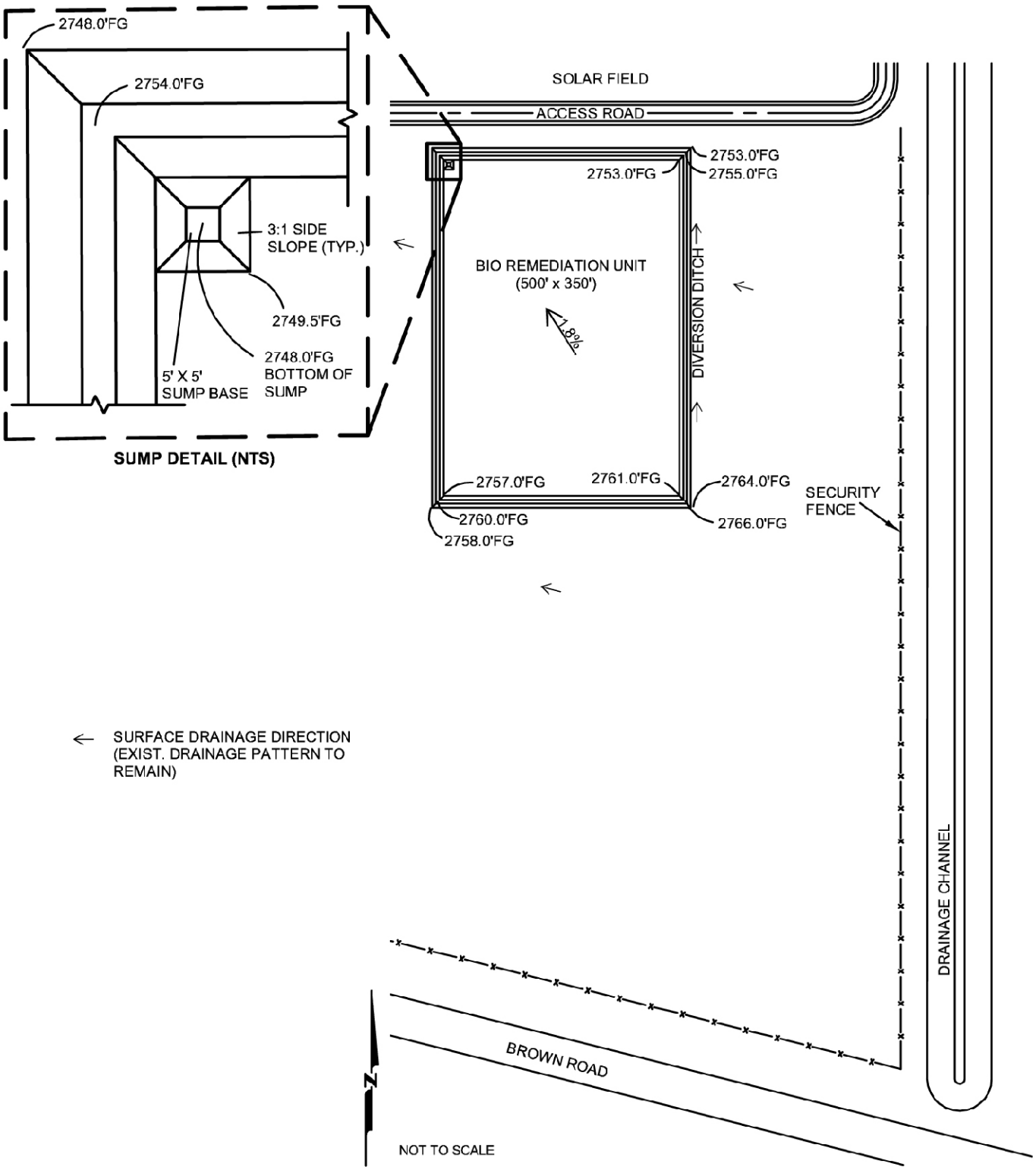
Kern County, California

Preliminary Site Plan

Figure 2

Date: 12/18/09

Sheet: .



Map Location

Ridgecrest Solar Power Plant

Figure 3
Land Treatment Unit Details

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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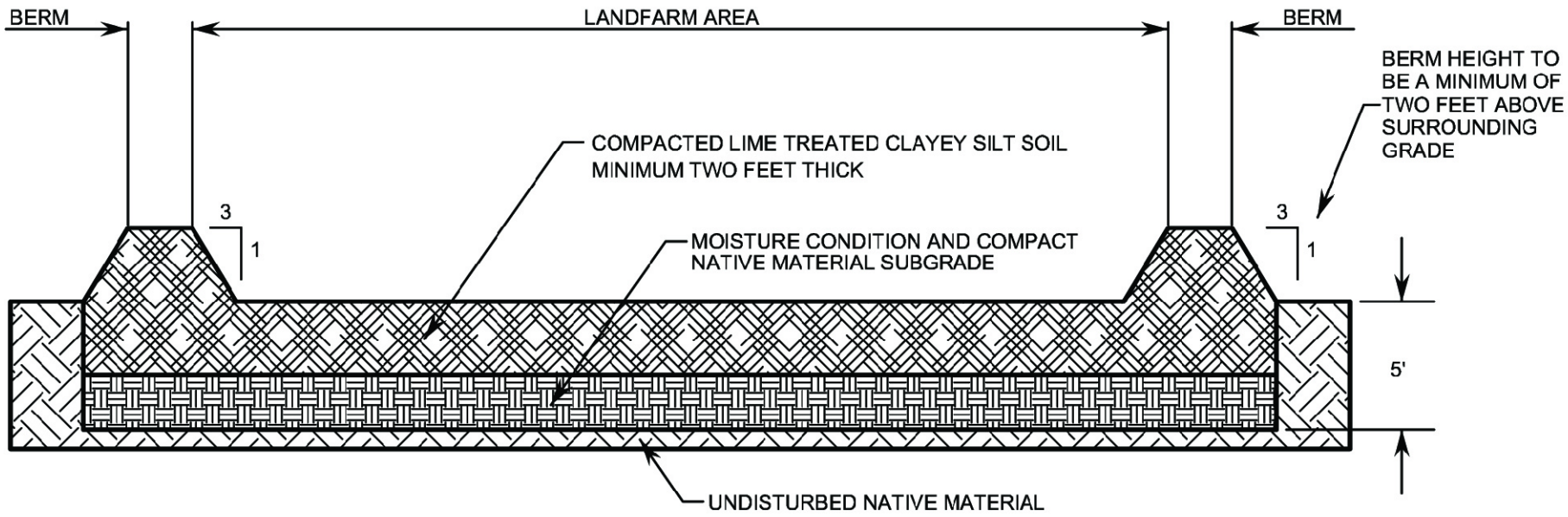

1 / - - LANDFARM UNIT-SECTION
N.T.S.

NOTES:

1. THE COMPACTED AND NATIVE SOIL BENEATH THE LAND FARM UNIT IS DESIGNATED AS A "TREATMENT ZONE" TO A DEPTH OF 5 FEET.
2. THE LIME TREATED LAYER IS TO BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 AND HAVE A LOW PERMEABILITY (CLAYEY SILT) MATERIAL.
3. THE CROSS SECTION IS A TYPICAL SECTION.
4. SEE TEXT FOR FURTHER DETAILS.

Map Location

Rdgecrest Solar Power Project

Figure 4
Cross-Section Details of Land Treatment Unit

Solar Millennium

AECOM

Project: 60139696
Date: Januaryr 2010

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Appendix A

Cost Estimate

Ridgecrest Solar 1, LLC
Land Treatment Unit Closure Costs

Item	Closure Cost Estimate (each)	Quantity	Subtotal Closure Cost Estimate
Bioremediation Unit and Land Farm Unit	$70,000	1	$70,000
	Total Closure Cost Estimate		**$70,000**

Ridgecrest, CA
Order-of-Magnitude Cost Estimate-Closure of Land Farm

Activities sequence to close land farm unit

1. Sample Land Farm Units to demonstrate it is acceptable to use soil as fill material
2. Sample Clay/Silt layer to demonstrate that it is acceptable to leave in place
3. Demo berms and return to interior of land farm

		Unit Cost	Unit Quantity	Unit	Number	Cost Reference
Costs						
1. Sample Land Farm Units treated soils to demonstrate that they are acceptable to leave in place						
Sample Collection	Day	$1,800	1	1	$1,575	20 per day
Sample Analysis	Each	$250	18	1	$4,375	TPH by 8015 & Title 22; Estimate (100x100' grid)
Report of Analytical	Each	$5,000	1	1	$5,000	ROM Estimate
				Total	**$10,950**	
2. Sample Clay/Silt layer of pad to demonstrate that it is acceptable to leave in place						
Sample Collection	Day	$1,800	2	1	$3,150	ROM Estimate; 20 per day
Sample Analysis (1 ft & 5 ft)	Each	$250	35	1	$8,750	TPH by 8015 & Title 22; Estimate (100x100' grid)
Report of Analytical	Each	$5,000	1	1	$5,000	ROM Estimate
				Total	**$16,900**	
3. Demo berms and return to interior of land farm						
Mobilization	LS	$5,000	1	1	$5,000	ROM Estimate
Excavate (Dozer, 300' haul, common earth)	CYD	$8	2,323	1	$17,708	Means 02315-410-4420
				Total	**$22,708**	
Subtotal Field Activities Costs					**$50,558**	
Contingency	(0% of All of the Above Costs)				$0	
				Total	**$50,558**	
Total Field Activities Costs					**$60,000**	
Engineering and Oversite						
Engineering	(1% of Total Construction Cost)				$1,000	Means 01107-300-1200 (min.)
Permitting	(1% of Total Construction Cost)				$1,000	Means 01310-150-0010 (min.)
Construction Management	(5% of Total Construction Cost)				$3,000	Means 01107-200-0010 (min.)
Closure Report	(8% of Total Construction Cost)				$5,000	Means 01310-150-0010
Total Engineering and Oversite Cost					**$10,000**	
T O T A L C O S T					**$70,000**	

Assumptions

No need for construction support facilities since site has infrastructure

Berms are constructed by removal of native material from leachate sump & interior of land farm

	Height (ft)	Top of Berm	Bottom of	Cross s	Length	Volume (CYD)
Volume of berm material is ~	3	3	21	36	1742	2323

Assume that berms are 3 feet high average

Accumulated HTF material has all degraded to below 100 mg/kg and is acceptable as fill

	# of LTUs Required		1			
Land Farm Area	Width	350	feet	Length	500	feet
	Area	175000	Square Fe	Area	4.02	acres
Compacted Clay/Silt	Thickness	2	feet	Vol	12963	Cubic Yards

Assume that Compact Clay/Silt can remain as it is not impacted

Notes

Unit Costs are from RS Means Building Construction Cost Data 2001 Western Version

Unit Costs are adjusted by the City Cost Index; 1.13 Means page 612 for Installation index for Riverside, CA

Unit Costs are adjusted by the ENR Historical Cost Index to become 2008 costs

Compare Construction Cost Index since closure is mostly labor and not materials purchase

ENR Construction Cost Index for Los Angeles in December 2000	7068
ENR Construction Cost Index for Los Angeles in Aug 2009 (est)	9766
Historical Cost adjustment is 2009 #/ 2000 #	1.38
Combined adjustment is	1.57

Ridgecrest
Kern County
Ridgecrest, CA 93555

Inquiry Number: 2657316.2
December 11, 2009

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

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Attachment DR-WASTE-243

Aerials and Topographic Maps

Date EDR Searched Historical Sources:

Aerial Photography December 11, 2009

Target Property:

Kern County

Ridgecrest, CA 93555

Year	***Scale***	***Details***	***Source***
1952	Aerial Photograph. Scale: 1"=555'	Flight Year: 1952	Robinson
1984	Aerial Photograph. Scale: 1"=690'	Flight Year: 1984	USGS
1994	Aerial Photograph. Scale: 1"=666'	Flight Year: 1994	USGS
2005	Aerial Photograph. 1" = 604'	Flight Year: 2005	EDR

INQUIRY #: 2657316.2
YEAR: 1952
= 555'
N
EDR Environmental Data Resources Inc

INQUIRY #: 2657316.2
YEAR: 1984
= 690'
N

INQUIRY #: 2657316.2
YEAR: 1994
= 666'
N
EDR Environmental Data Resources Inc

INQUIRY #: 2657316.2
YEAR: 2005
= 604'
N
EDR Environmental Data Resources Inc

Ridgecrest
Kern County
Ridgecrest, CA 93555

Inquiry Number: 2657316.1
December 11, 2009

The EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

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800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

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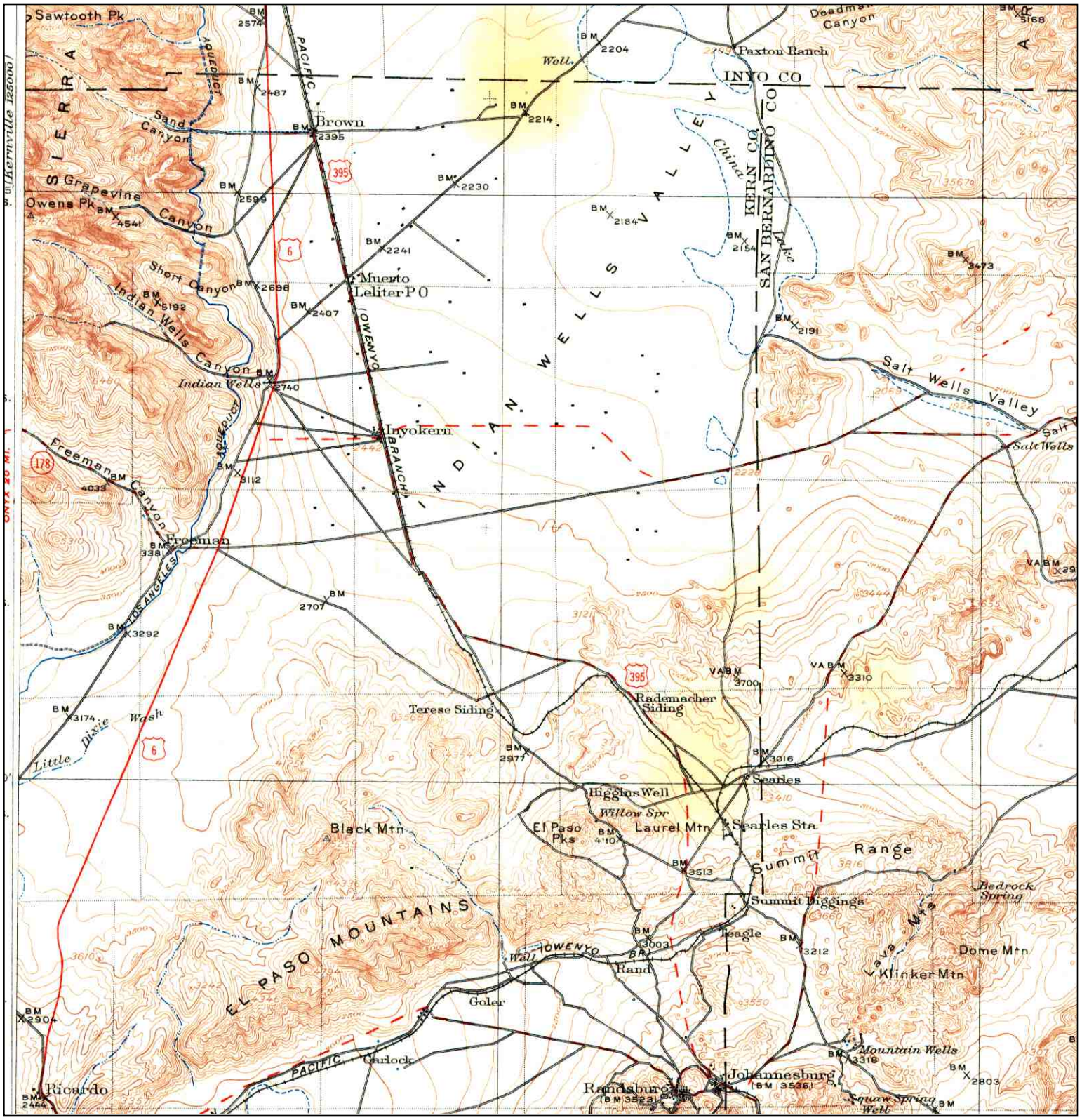
Historical Topographic Map



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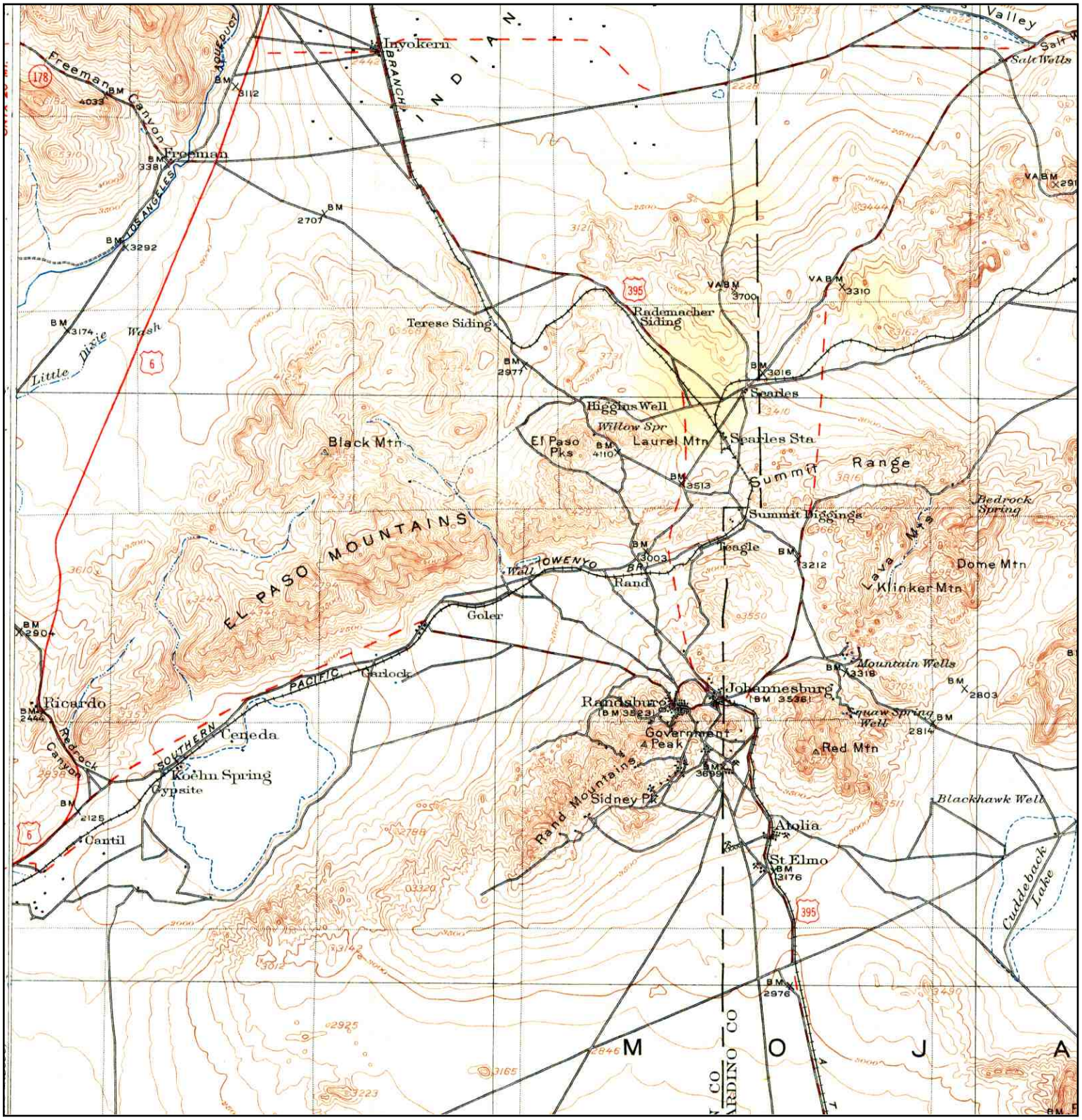

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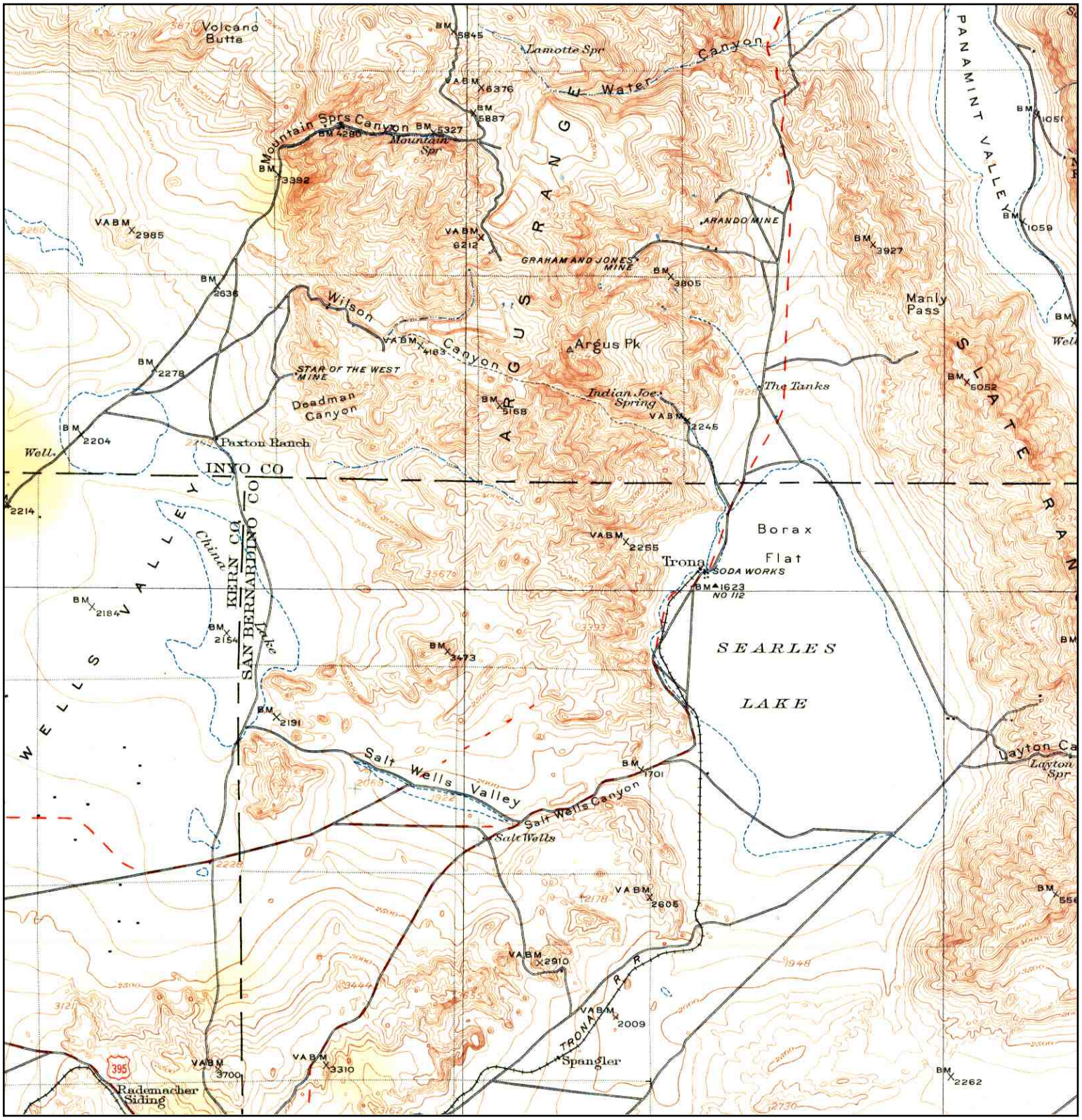

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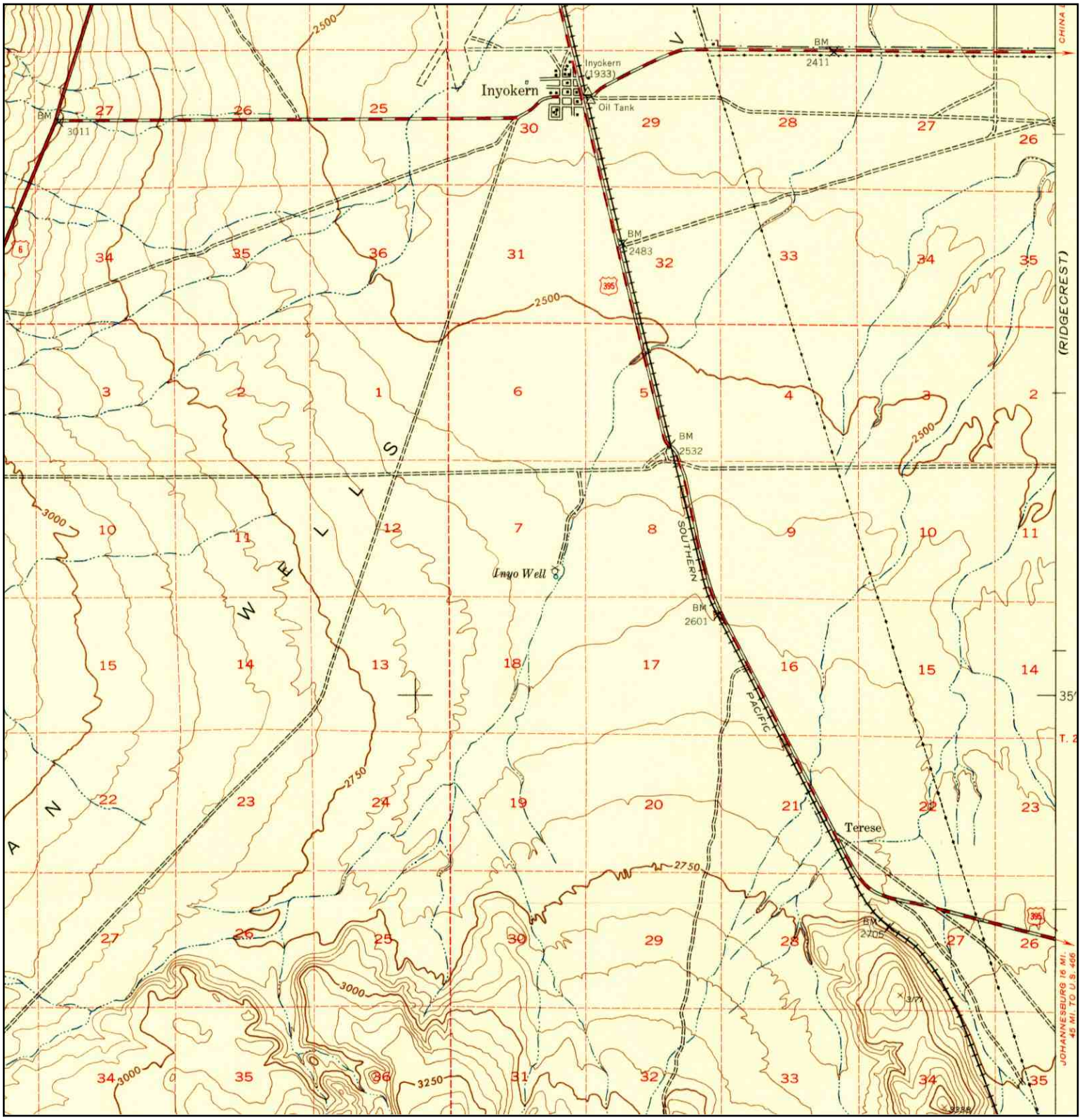

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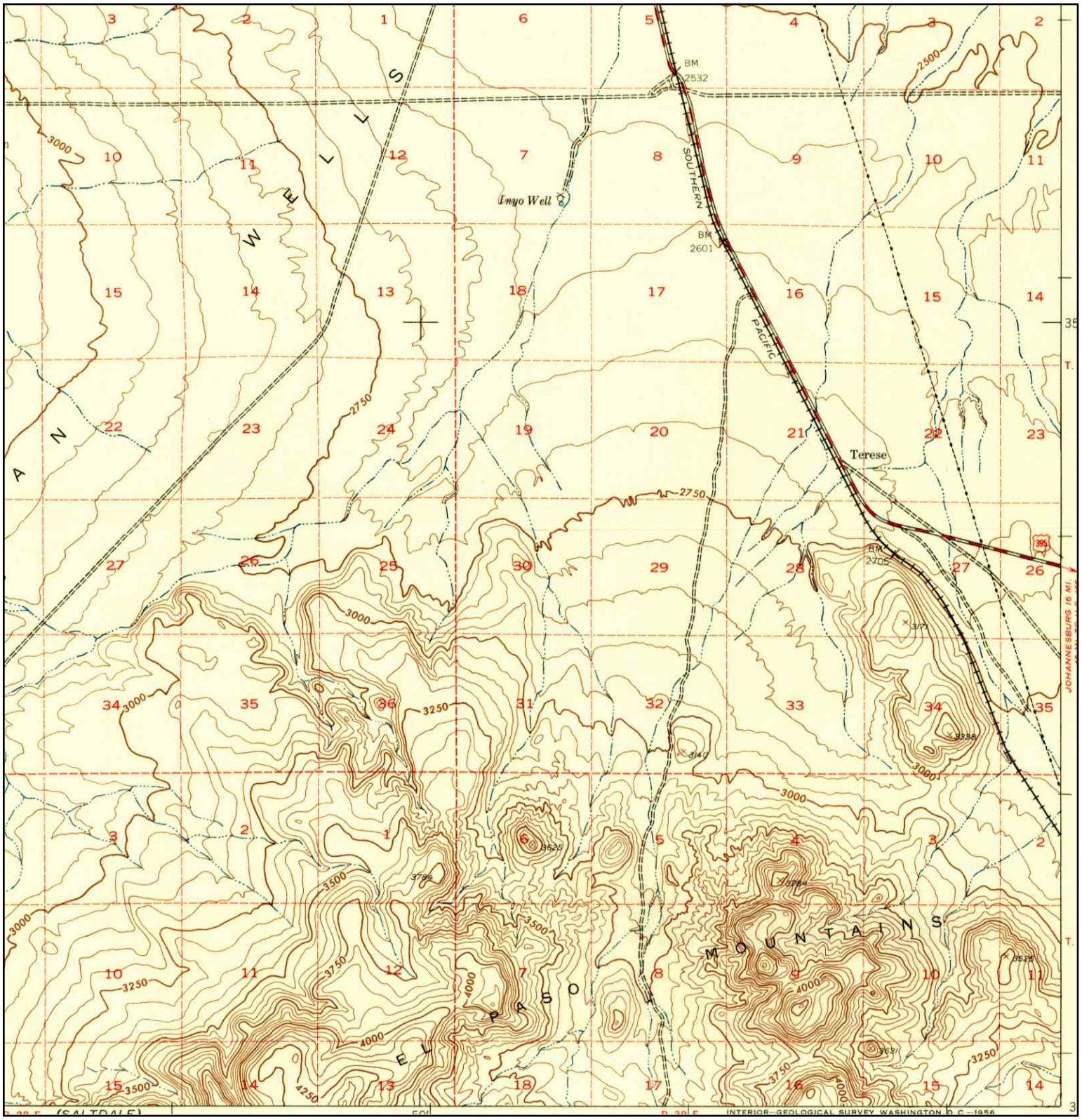

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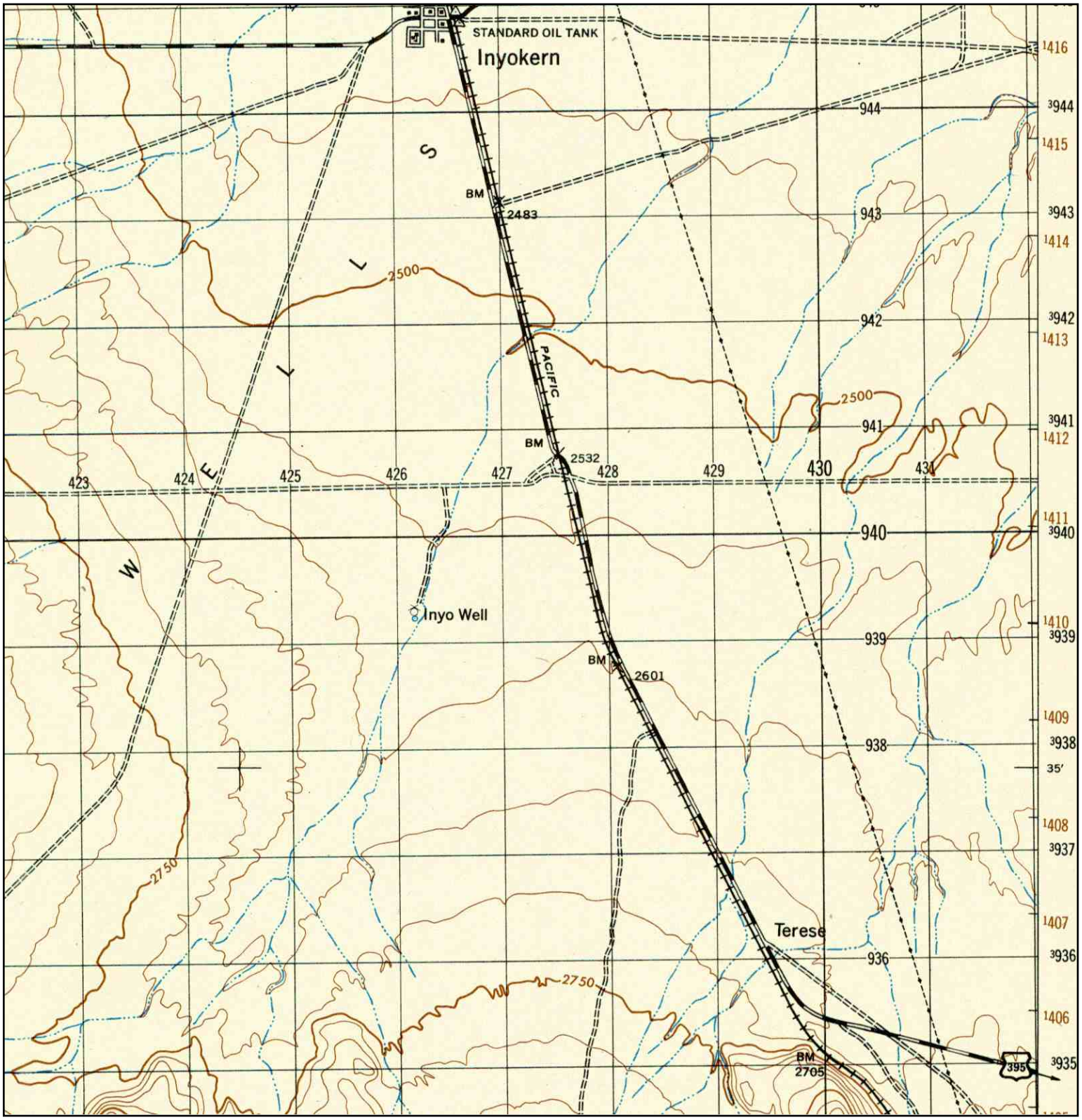

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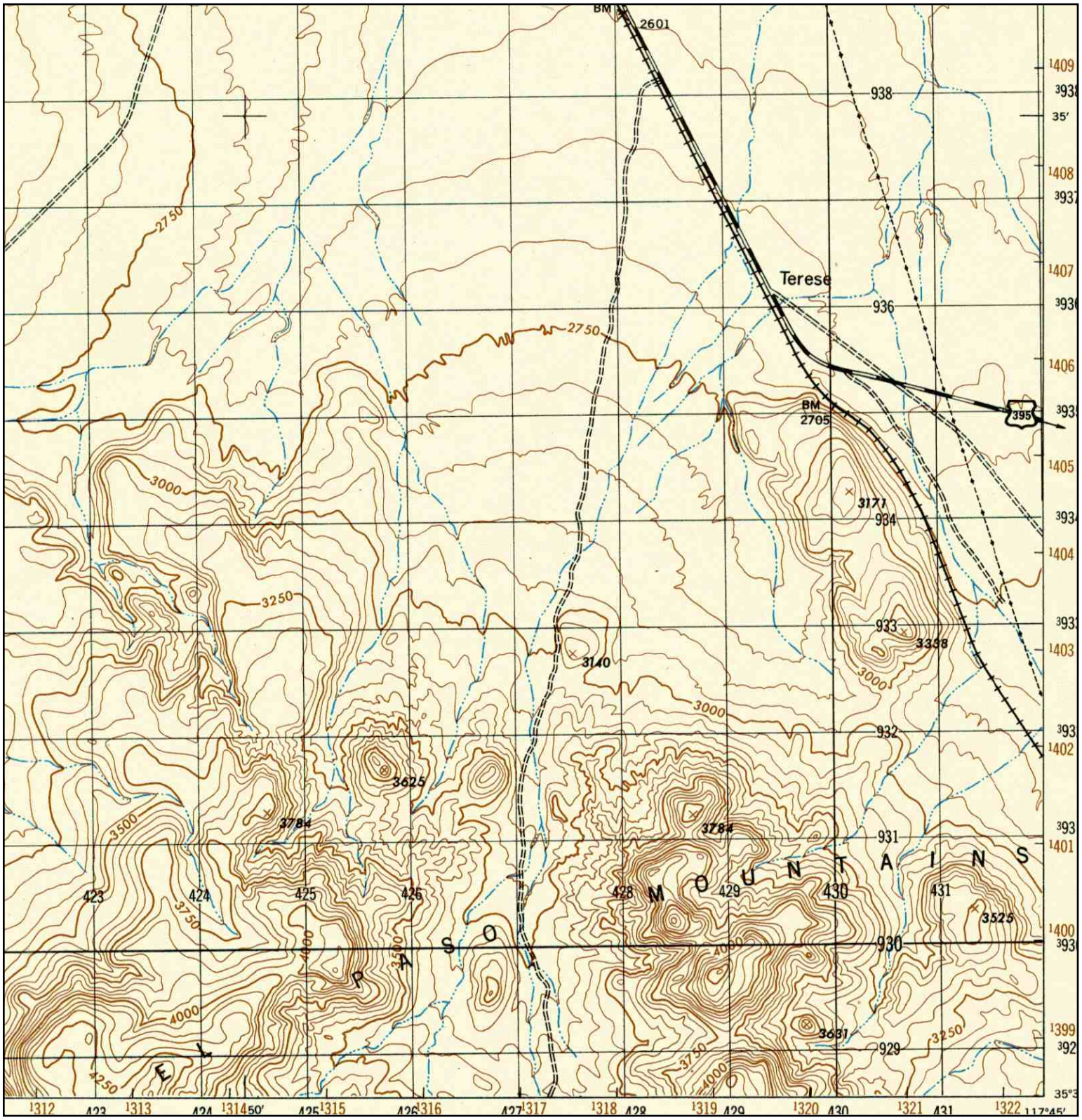

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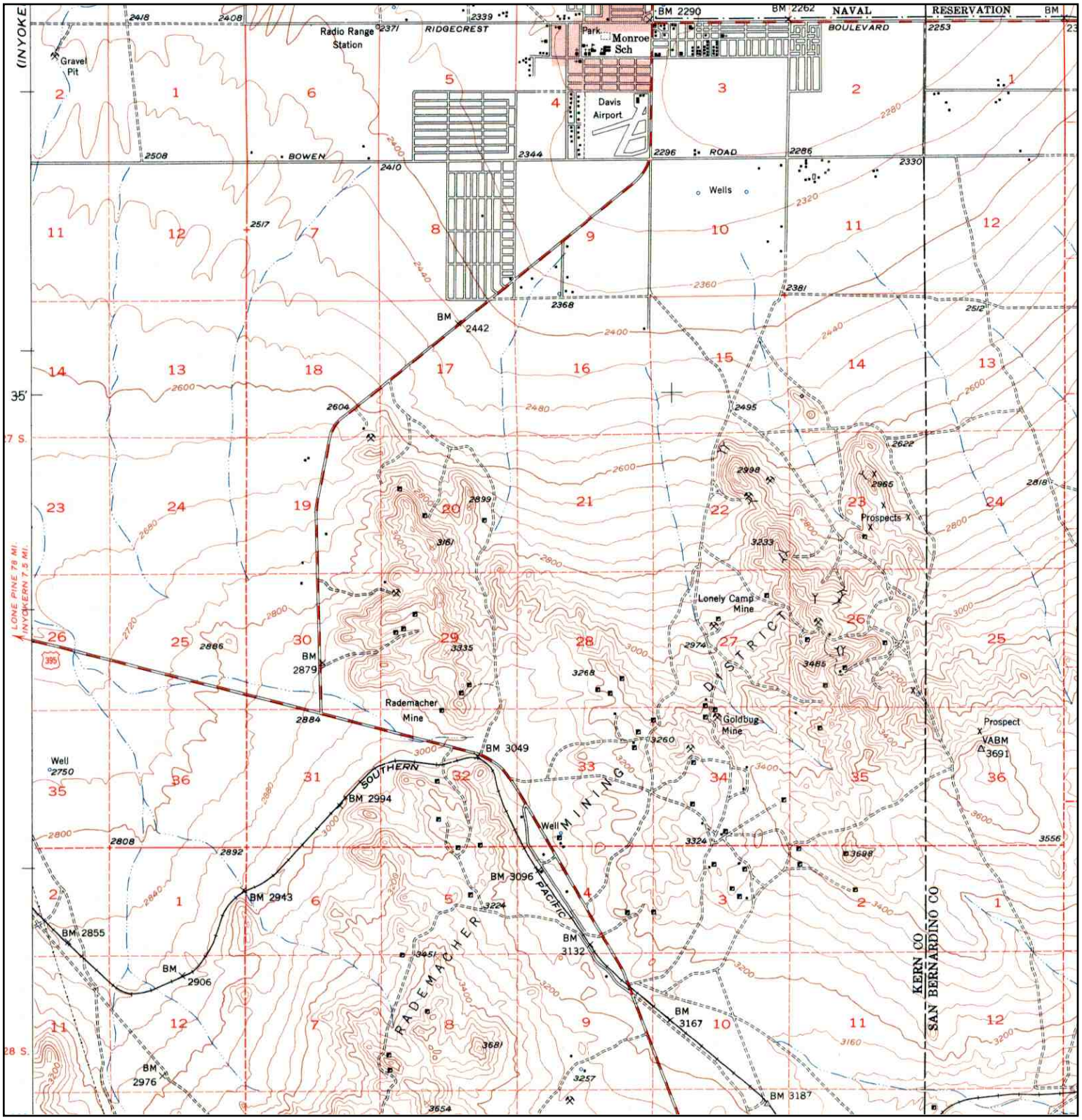

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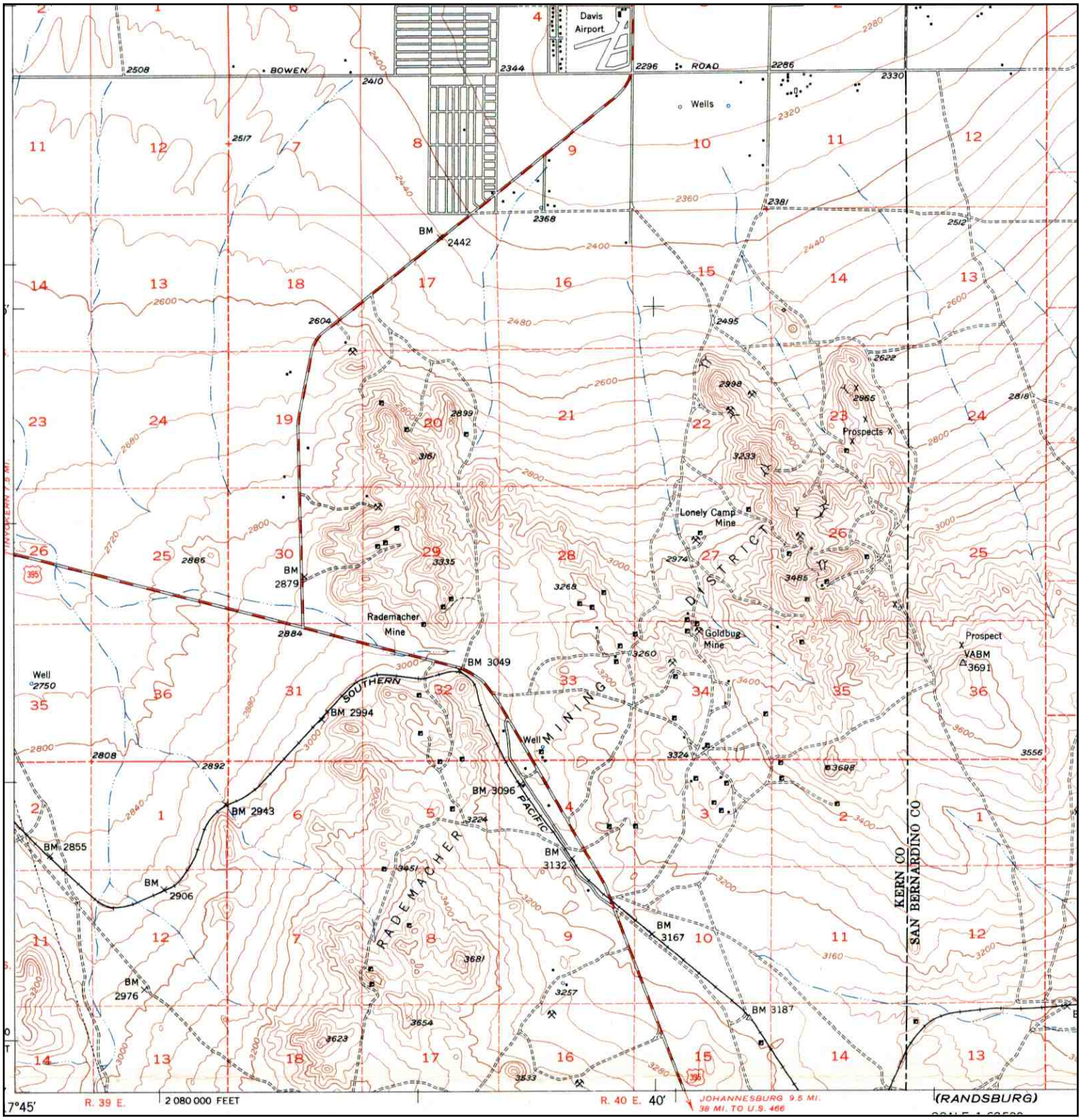

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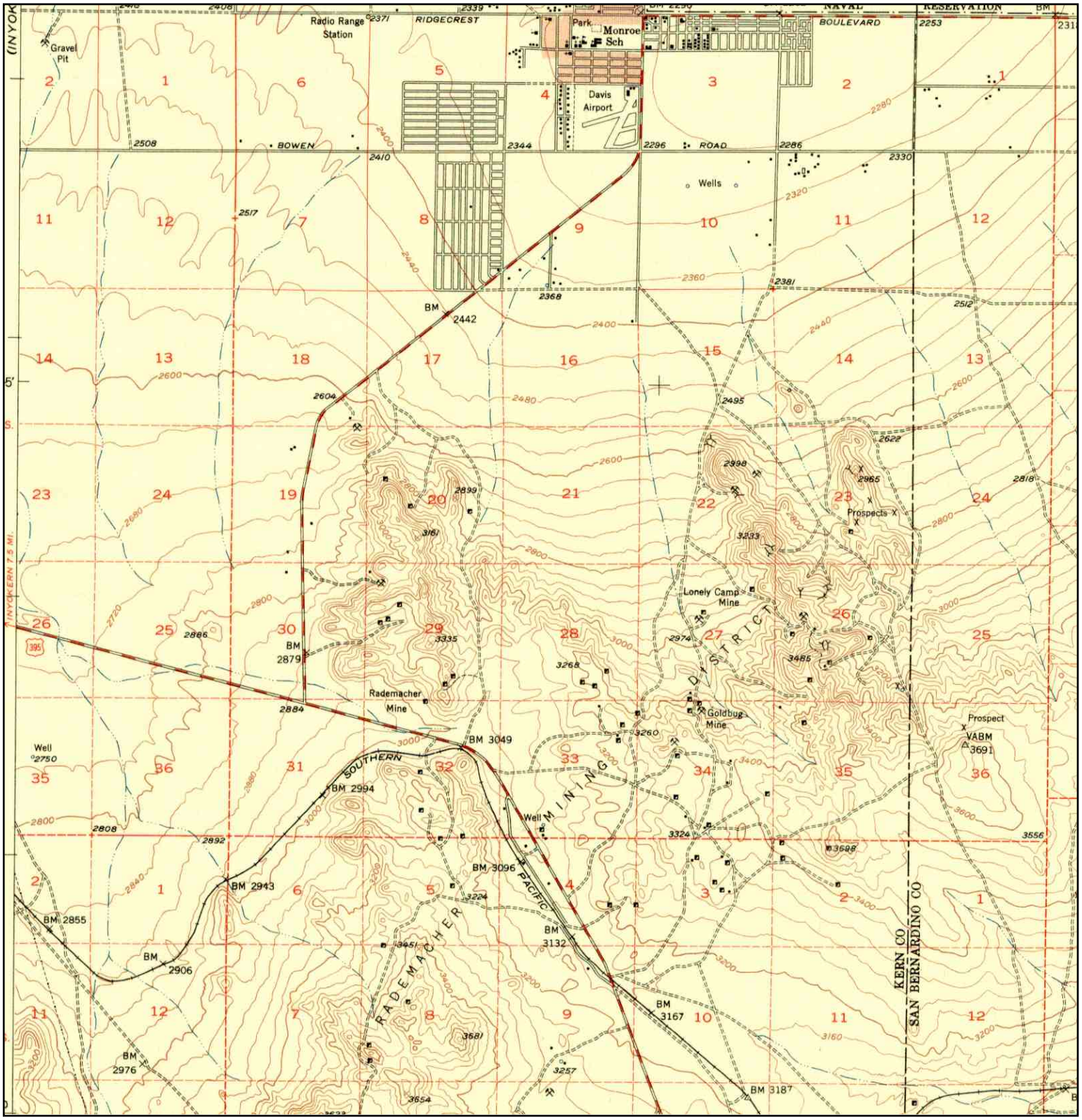

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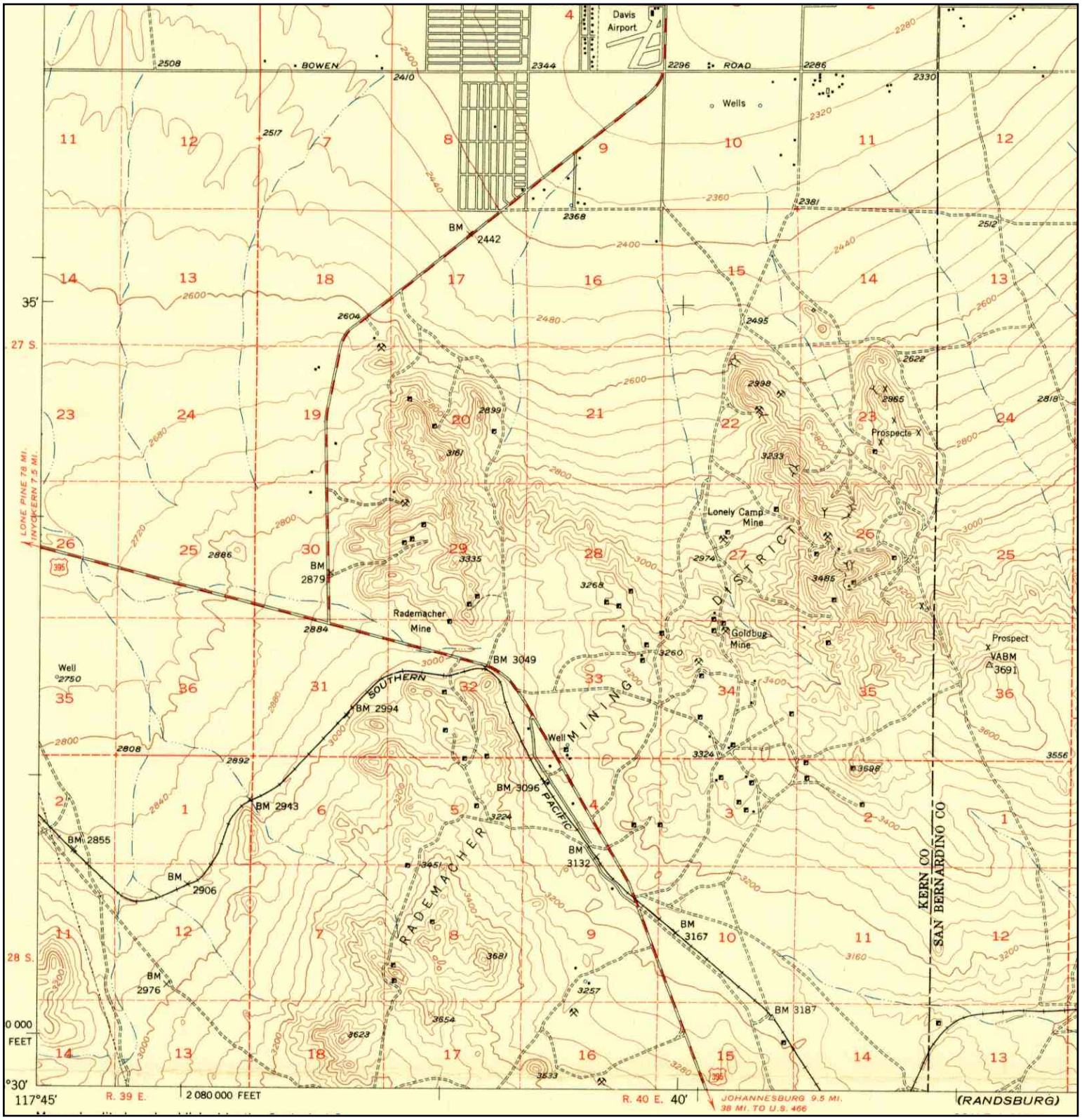

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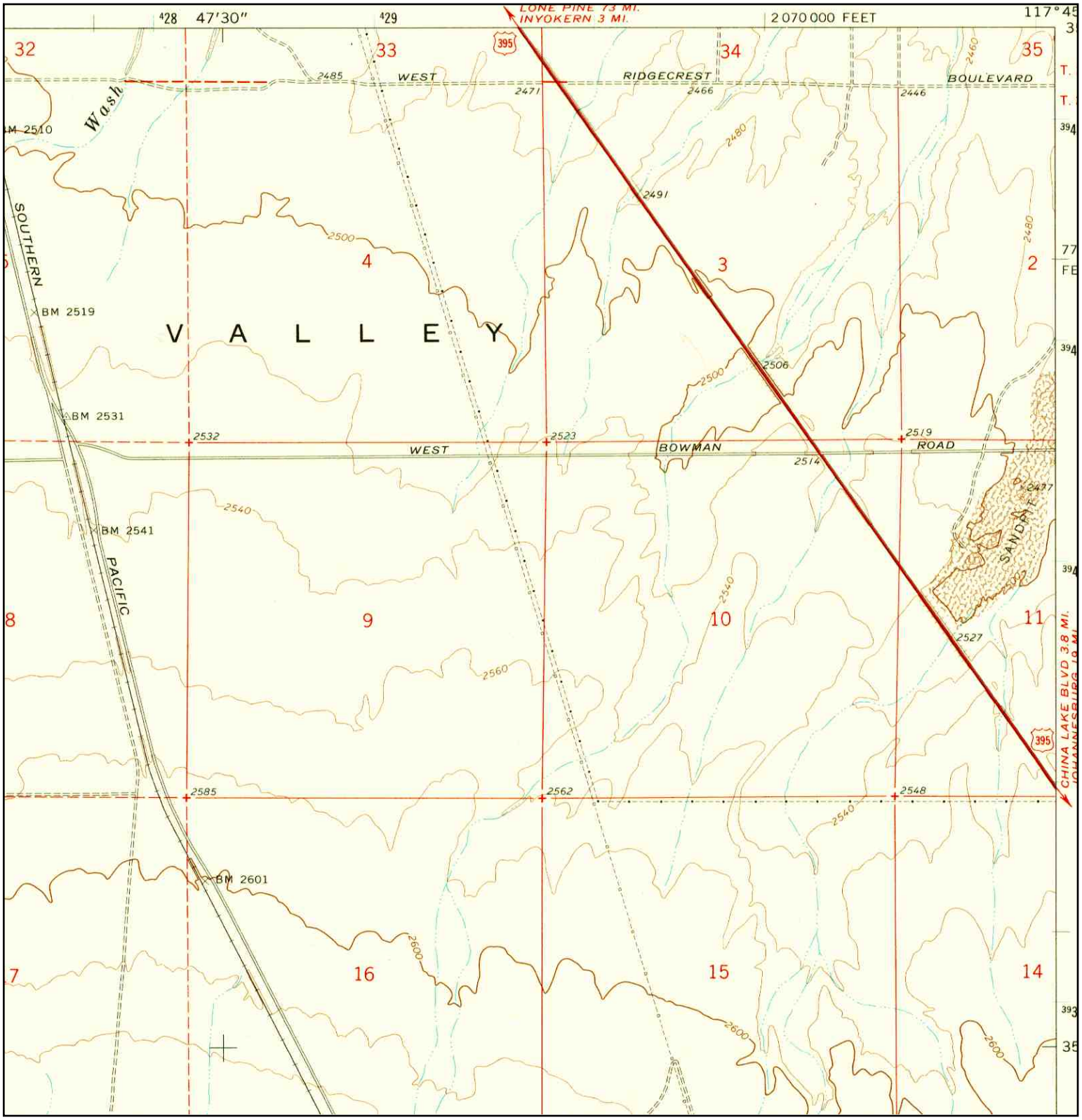

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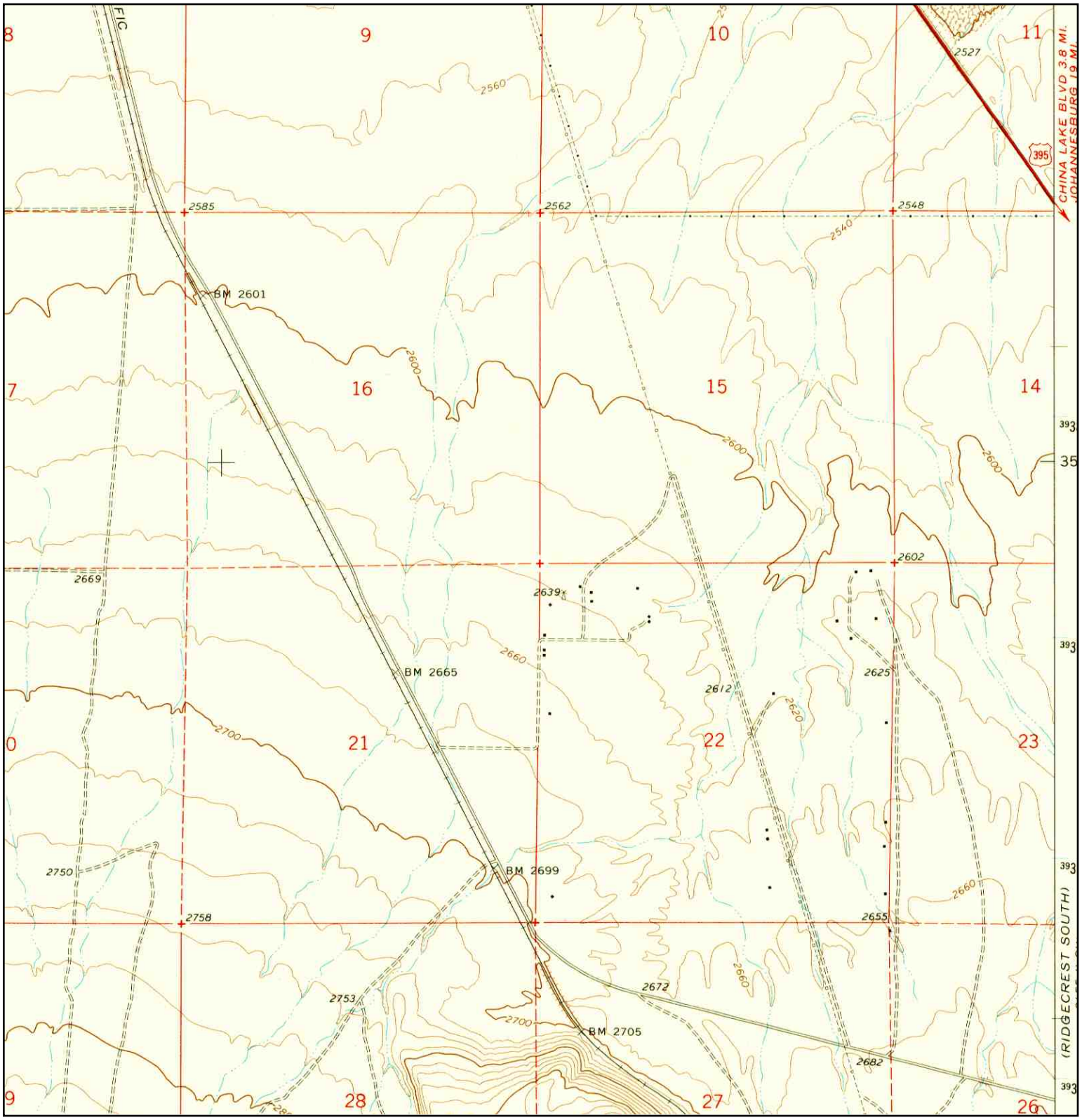

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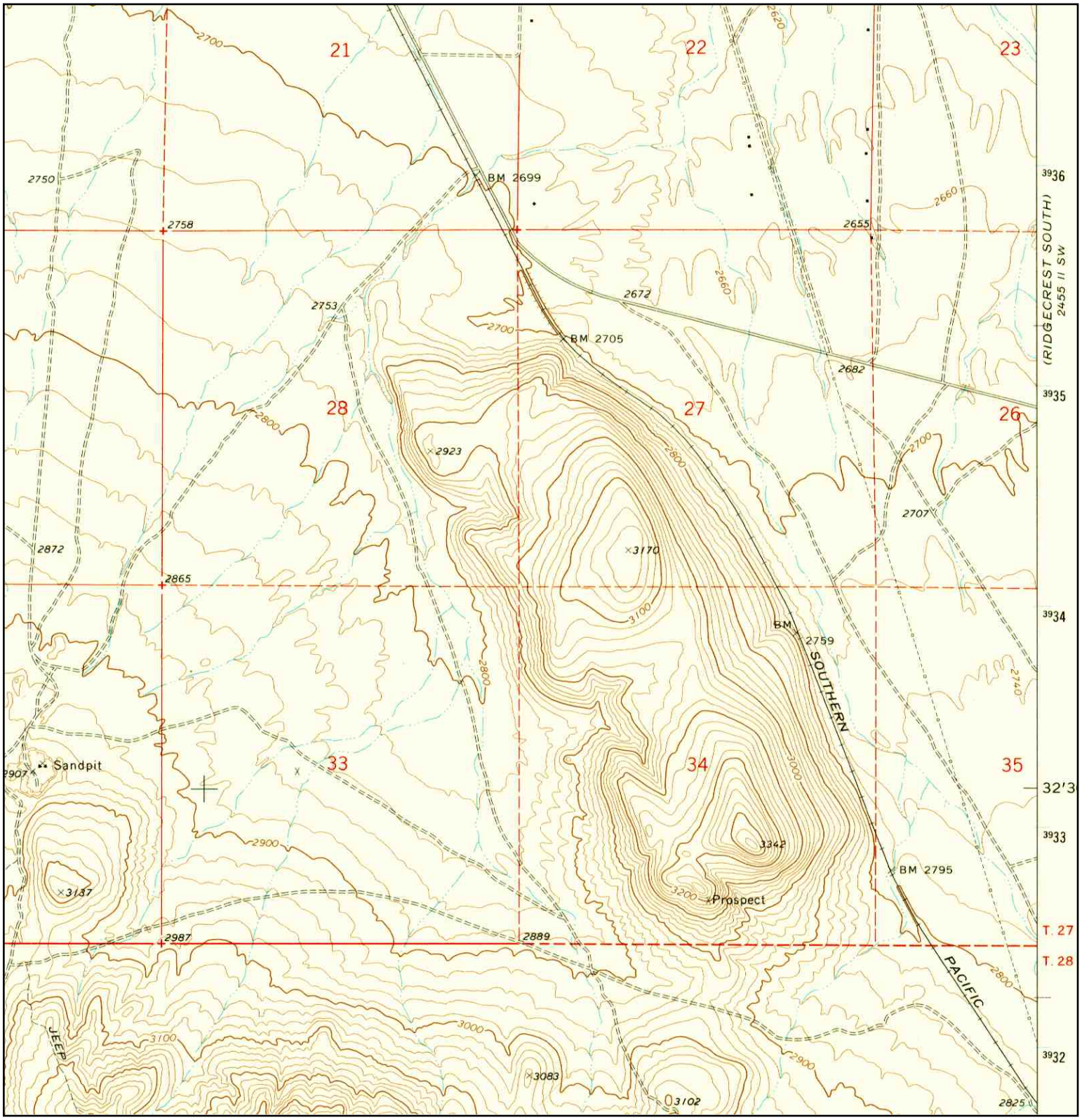

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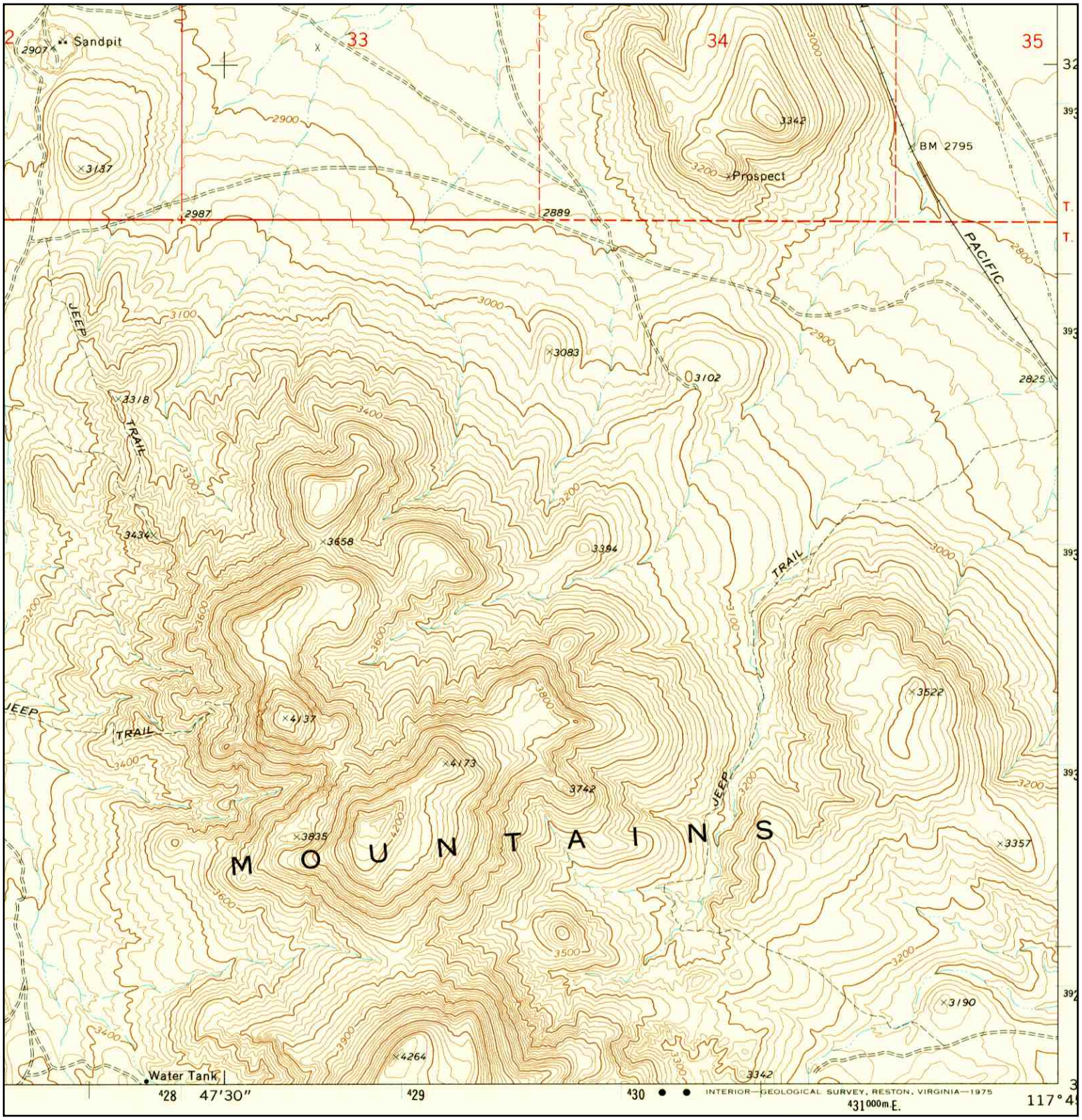

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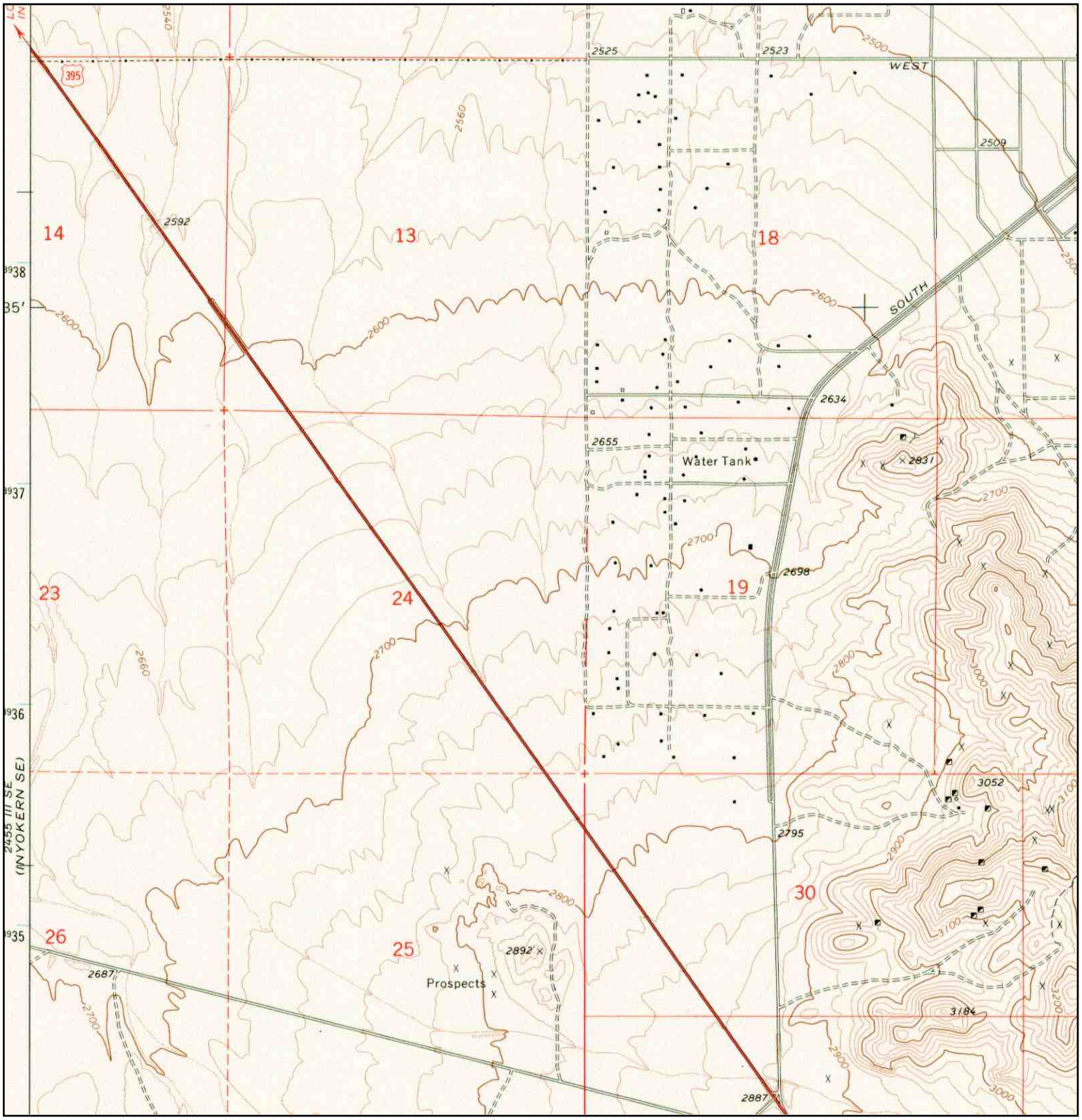

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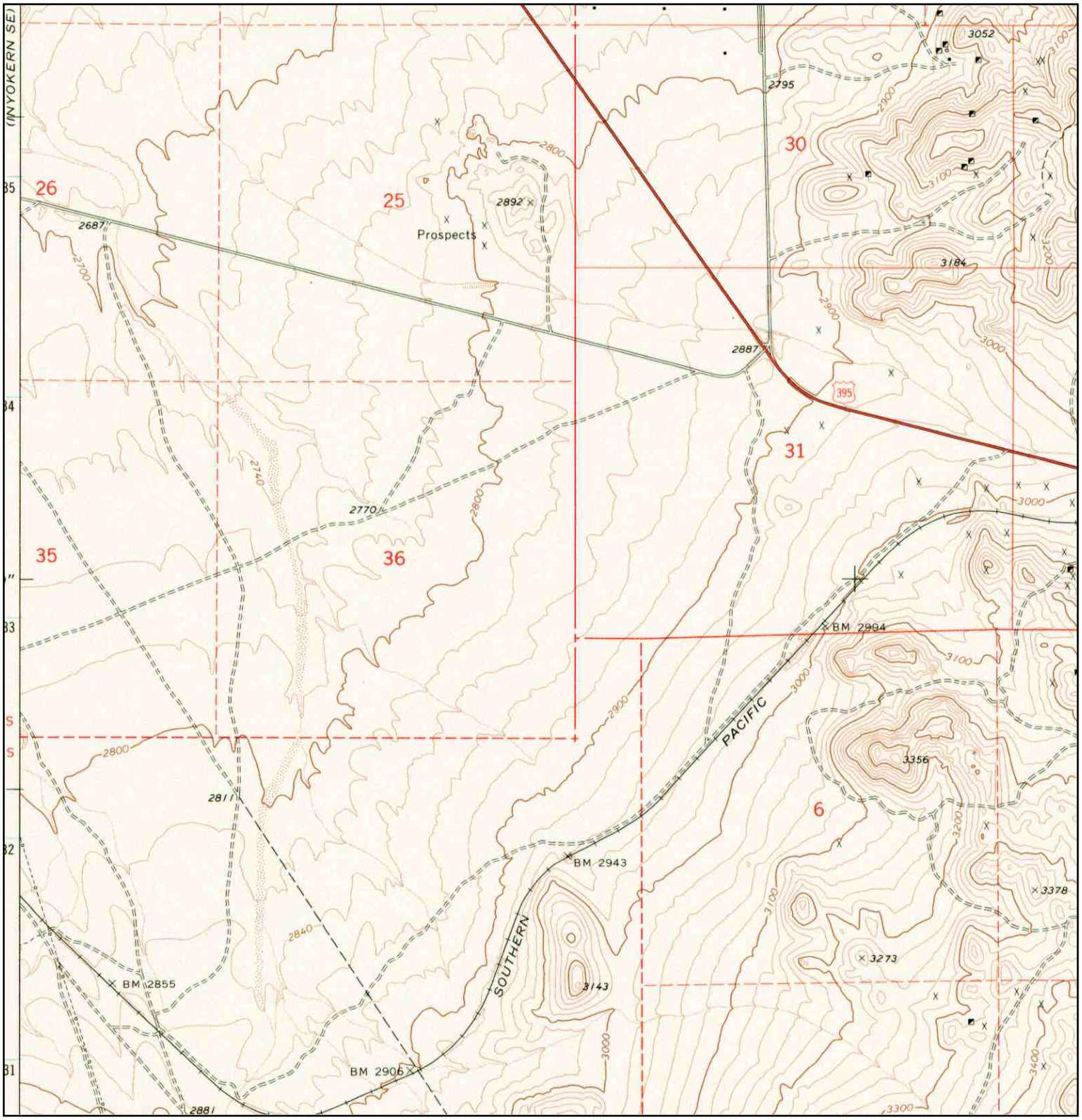

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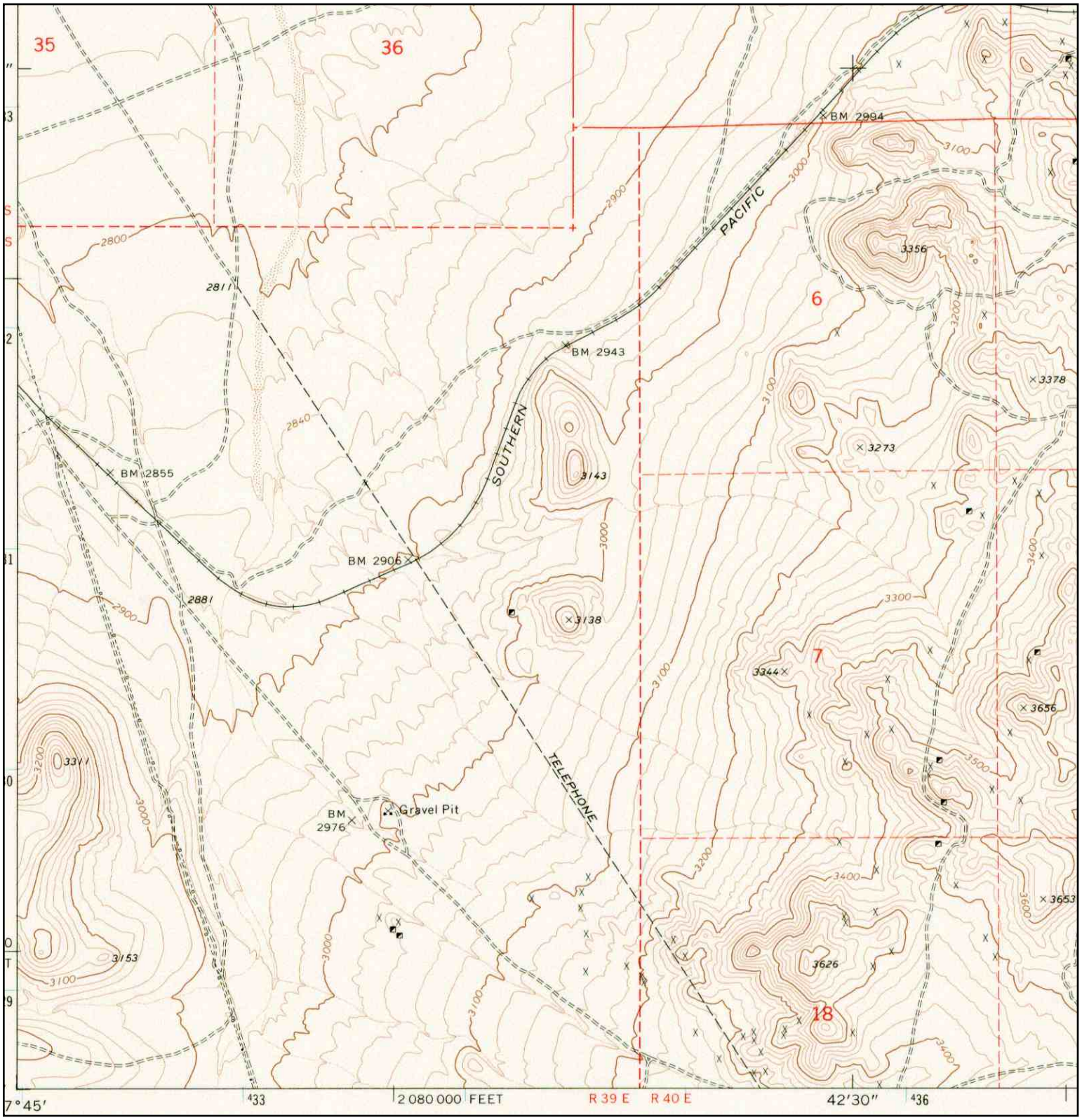

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DR-LURW-249

Information Required:

Please provide a figure identifying the number and location of potential existing and future connections along the proposed waterline route by Assessor's Parcel Number (APN) and type of use (Zoning/General Plan designation). Identify any existing non-conforming use.

Response:

Please refer to Figure DR-LURW-249-1 through -3, provided at the end of this section, which depicts the Assessor's Parcel Number (APN) and type of land use along the water pipeline route. Land uses near the water pipeline consist of scattered residential development, located in areas zoned Estate District (E). The E District is used to designate areas suitable for larger lot residential living environment, and permits underground water facilities. There are no non-conforming land uses along the water pipeline route.

DR-LURW-250

Information Required:

Please provide potential water usage if those customers identified in the request above are allowed to tap into the supply, annually and over the life of the project.

Response:

As discussed below in the response to DR-LURW-251, the total potential growth that could occur under existing general plan designations along the proposed waterline route would be approximately 47 dwelling units. According to the Indian Wells Valley Cooperative Groundwater Management Water Conservation Committee Public Advisory (October 2004), the current average consumption is 0.72 acre feet per connection. Thus, potential growth along the water pipeline route could result in a water demand of 33.84 afy, or approximately 1,015.2 af of water over the 30 year lifespan of the Project. However, as discussed below, these households would be built out over a long period of time and would take approximately 53 years for all of the adjacent properties to be built out. Thus, peak water demand during the life of the Project for potential users would very likely be less than 33.84 afy.

DR-LURW-251

Information Required:

Please discuss the potential for additional development and annexation of lands southwest of the existing Ridgecrest city limits and sphere of influence/planning area, and the impact that availability of public water along South China Lake Blvd. would have on any future development.

Response:

The proposed waterline to be installed from the existing Indian Wells Valley Water District (IWVWD) storage tank would pass through Bureau of Land Management (BLM) and private lands. This analysis examines the potential for population growth and the secondary impacts of that growth in the scenario in which IWVWD annexes lands along the proposed waterline and offers the opportunity for public water connection to homes and businesses along that alignment.

The proposed waterline would be located near private lands zoned E(5) and E(20) adjacent to the northeast portion of the Project site, and zoned E(20) RS and A-1 MH adjacent to the southeast portion of the Project site. As shown in Figure DR-S&W-153, the lands to the northeast are currently within the IWVWD boundary and would be eligible for service with or without the Project. While the Project would improve the opportunity for these private lands to connect to IWVWD water service, much of the area adjacent to the northeast is currently developed with approximately 52 dwelling units on approximately 350 acres of private lands. As shown on the Assessor Map (Figure DR-LURW-249-1), most of this area contains 5-acre parcel sizes. If the entire area were to build out at a density of 1dwelling unit per 5 acres, it would yield a total of 70 dwelling units, or an increase of 18 dwelling units over the existing condition.

The area to the southeast that is zoned E(20) RS (approximately 530 acres) and A-1 MH (approximately 54 acres) would have the potential to develop with approximately 29 dwelling units based on the existing zones that allow a maximum of 1 dwelling unit per 20 acres. This area to the southeast is proposed for annexation by the IWVWD as shown in Figure DR-S&W-153.

The potential for a significant growth-inducing impact from the extension of the waterline would be based on the secondary effects that may result from development of the adjacent private properties. These potential secondary impacts include impacting existing biological resources within the development areas and the increase in demand for public services and utilities. With regard to biological resources, the Project site and the adjacent potential growth areas consists of Mojave Creosote Bush Scrub, a non-sensitive vegetation community.

With regard to impacts to public services and facilities, the total potential growth that could occur under existing general plan designations in this area would be approximately 47 dwelling units. Based on the average Ridgecrest household size of 3.03 persons per the 2000 census (http://factfinder.census.gov), the estimated total local population growth from the adjacent properties would be approximately 142 persons.

Population data for Ridgecrest shows that the population was 27,951 on January 1, 2008 and had increased to 28,353 on January 1, 2009, an increase of 402 persons, which is an annual growth rate of 1.4 percent. Population growth of 142 persons would be an increase of 0.05 percent over the 2009 population. Based on the average annual growth rate for Ridgecrest of 1.4 percent applied to the Project's potential growth-inducing impact of 142 persons, this would be the equivalent of 2 persons per year and the period for buildout of the adjacent properties would be approximately 71 years. If examining from a historic population growth perspective (over a longer period of time), where the city population in 1980 was 15,929 and had increased to 28,353 by 2009, the annual average population increase would be 1.9 percent. Averaged over this longer period, the addition of 142 persons would be the equivalent of 2.7 persons per year and the period for buildout of the adjacent properties would be approximately 53 years.

Based on the absence of sensitive vegetation communities and the area's historic slow rate of population growth, the impact from the secondary effects of growth on biological resources and public services and utilities would be less than significant.

DR-LURW-252

Information Required:

Identify recommended actions to mitigate the growth-inducing impacts associated with this action.

Response:

As evaluated in response to DR-LURW-251, growth-inducing impacts would be less than significant and no mitigation would be required.

DR-LURW-253

Information Required:

Please identify parties to the annexation process and provide a proposed timetable for IWVWD annexation of adjacent lands.

Response:

The information requested will be provided to the CEC by February 10, 2010.

DR-LURW-254

Information Required:

(a) Please provide a table indicating width and jurisdiction for road and/or utility rights-of-way and easements that would be used for installation of the proposed water lines and any other public utilities. Include information for project alternatives, if different from the preferred project alternative.

(b) Please specify whether ROWs or easements currently exists, if facilities will be constructed above or below ground, and if existing ROWs or easements are sufficient to accommodate the proposed construction.

(c) Please specify height of any above-ground installations.

Response:

The information requested will be provided to the CEC by February 10, 2010.

DR-LURW-255

Information Required:

Amend AFC Land Use Figure 5.7-1 to reflect changes in preferred project ROW and facilities boundaries, and indicate off-site route(s) needed for any telephone or other utility connections. Site configuration should represent the amended project boundaries, as presented at the January 5-6 workshops.

Response:

The information requested will be provided to the CEC by February 10, 2010.

DR-LURW-256

Information Required:

Please discuss any ROWs that would need to be expanded or new ROWs that might be needed to accommodate off-site utility installation(s). Identify the process(es) to amend existing ROWs or other agreements, if necessary; jurisdictional agency; and the status of any actions already taken or negotiations currently in progress.

Response:

The information requested will be provided to the CEC by February 10, 2010.

DR-LURW-257

Information Required:

Please provide a discussion of existing trails into and through the proposed BLM ROW area and proposed project site, supported by on-site surveys. Identify potential impacts to existing recreational opportunities and established sites.

Response:

There are six open designated routes that traverse the Project right of way, with four of the routes (EP0222, EP0223, EP0234, EP0235) located within the Project footprint, and two of the routes located outside of the Project footprint (EP 0236, EP 02265) (see Figure DR-LURW-258).

Open designations are used for intensive off-highway vehicle (OHV) use areas where there are no special restrictions or where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel (43 CFR 8342.1). The Applicant is working with the BLM to clarify unofficial routes that traverse through and around the Project site. Of particular interest to the BLM are north-south and east-west trails. The Applicant is in the process of conducting GPS ground surveys to confirm designated OHV routes and to locate existing casual use OHV routes. The Applicant expects to provide this information to the CEC by February 19, 2010.

As described in Section 5.7 Land Use of the AFC, existing recreational opportunities on the Project site include organized equestrian, OHV group events, mountain biking, horseback riding, hiking, running, camping, rock hounding, target shooting, hunting (upland game including quail, doves, rabbits and coyotes), wildflower and wildlife viewing. Recreational uses on the site will no longer be available once the Project is constructed. The Project study area is located within the Cantil-Common sheep allotment area and sheep grazing has occurred for a few days on the site in 2008 and 2009. The site constitutes a small portion of the allotment and is not heavily grazed. Refer to Response DR-LURW-261 for a discussion of existing sites and trails into and through the proposed project site and BLM ROW that have historically been used for religious purposes by Native American tribal members.

DR-LURW-258

Information Required:

Please provide Figure(s)/Table(s) depicting the location(s), type and frequency of use, general route conditions, destination(s), and current BLM designation (if applicable) for existing OHV and other established access trails into and through the proposed project ROW area and project site. Site configuration should represent the amended project boundaries, as presented at the January 5-6 workshops. Include information for project alternatives, if different from the preferred project alternative. Mapping of trail routes should reflect GPS ground survey findings and on-site visual observations.

Response:

Figure DR-LURW-258 depicts mapped OHV trails near the reconfigured Project site. As stated above, the Applicant is conducting GPS ground surveys to identify unmapped trails, and will provide an updated figure depicting these trails by February 19, 2010. At this time, the Applicant will also provide a table with the requested information.

DR-LURW-259

Information Required:

Please identify and discuss recommended reroutes and/or alternative routes or sites to mitigate loss of access and recreational value. Evaluate alternatives for comparability to existing facilities and availability and consistency with the BLM Route designation minimization criteria. Alternative routing should not closely parallel project boundaries or join existing access trails in a manner that would encourage users to follow existing access trails to the closure point, skirt the project fenceline (resulting in a proliferation of unofficial trails), and rejoin the original route on the other side of the project.

Response:

The Applicant is working with the BLM to protect trail access around the Project site. This will be done by conducting an inventory of existing trails around the site and identifying trails to enhance and protect around the site to ensure overall connectivity of OHV trails around the Project site, generally connectivity east-west and north-south. Figure DR-LURW-258 highlights potential routes that continue to provide access and connectivity for north/south and east/west. These are Applicant's initial recommendation to the BLM to supplement the routes that would potentially be impacted by the Project development. The Applicant will provide an updated map with proposed OHV reroutes around the Project site by February 19, 2010.

DR-LURW-260

Information Required:

Several of the existing routes would dead-end at the project security fence, once the project is constructed. Please recommend measures to remediate terrain along decommissioned routes, from rerouted portion of route to fenceline or from fenceline to point of access. Provide justification for any areas where remediation would not occur.

Response:

Once the Applicant has identified proposed OHV reroutes around the Project site, the Applicant will be able to identify OHV routes to decommission. As appropriate, the Applicant would revegetate and regrade the decommissioned routes. It may be appropriate to provide signage at the entrance to decommissioned routes to warn OHV users from entering into those areas. The Applicant will provide further information on remediation along decommissioned routes, and justification for any area where remediation would not occur with the map of proposed OHV reroutes by February 19, 2010.

DR-LURW-261

Information Required:

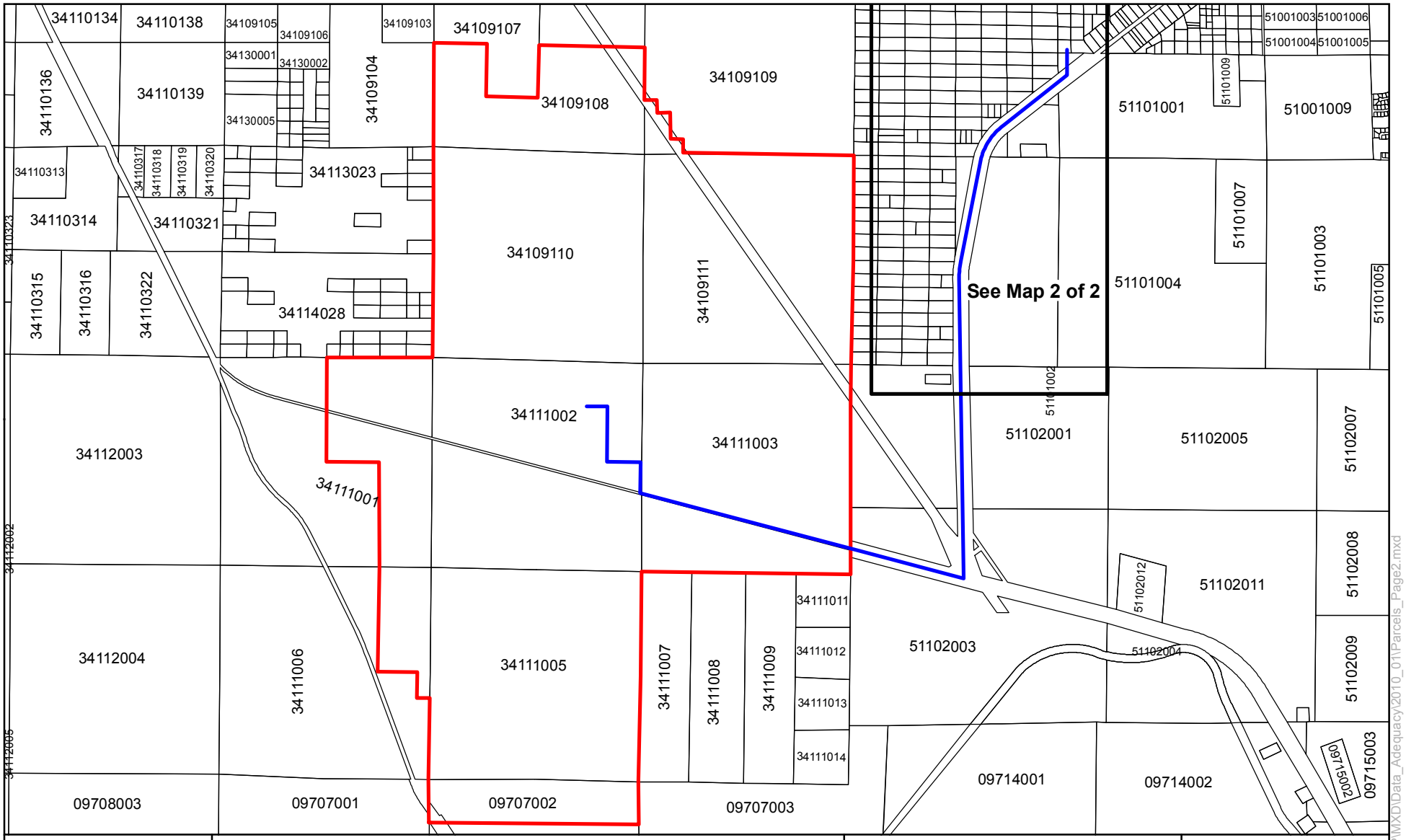
Please provide a discussion of existing sites and trails into and through the proposed project site and BLM ROW that have historically been used for religious purposes by Native American tribal members, including the type and frequency of use and importance to traditional Native American religious practices. Incorporate recommendations to accommodate continued use or mitigate loss of use.

Response:

Use of the RSPP area appears to revolve around relatively informal OHV and pedestrian routes. Results of the Class III archaeological survey of the RSPP did not identify any prehistoric trail alignments, and Native American cultural sites identified within the RSPP consist of sparse lithic scatters resulting from lithic reduction as part of the tool-making process. The Sacred Lands file search provided by the Native American Heritage Commission did not identify any sacred sites within the RSPP. Similarly, correspondence and communication conducted as part of the formal Native American contact program for RSPP did not yield any information on sites and trails of religious significance from the Native American contacts consulted. Ongoing consultation, however, has indicated that the RSPP serves as a meeting point for and conduit to the El Paso Mountains for various tribal groups. To date, no additional information on specific locations and routes has been identified. In order to provide this information, the Applicant will be contacting tribal representatives, specifically those who have raised these concerns, to obtain information regarding the location and use of site and trails within the RSPP and the potential for acceptable alternative sites and routes outside the RSPP. Information obtained as part of this process will be submitted by February 19, 2010.

Attachment

Land Use/Recreation/Wilderness Figures



Map Location

Legend

- Water Line
- Parcels
- Right-of-Way

1 inch equals 3,500 feet

0 1,750 3,500 7,000 Feet

N W E S

Ridgecrest Solar Power Project
DR-Land Use-249-1
Parcel Map

Map 1 of 2

Solar Millennium

AECOM

Date: January 2010

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Map Location

Legend

Water Line

Parcels

1 inch = 1,000 feet

0 1,000 2,000 Feet

N W E S

Ridgecrest Solar Power Project
DR-Land Use 249-1
Parcel Map

Map 2 of 2

Solar Millennium

AECOM

Date: January 2010

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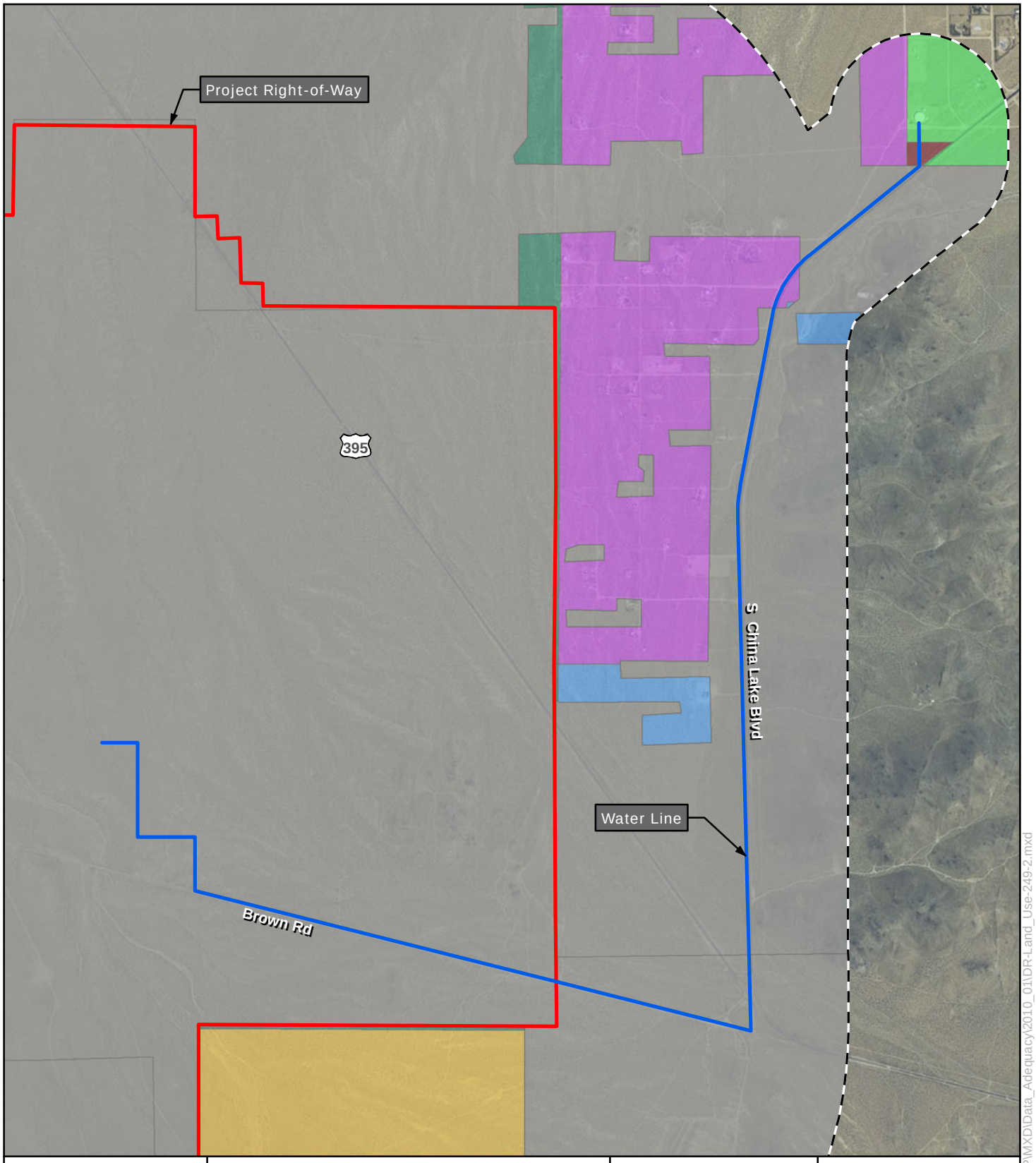

Map Location

Legend

- Water Line
- Project Right-of-Way
- 1 Mile Study Area
- BLM Jurisdiction
- E(10)
- E(2 1/2)
- E(20)
- E(20) RS
- E(5)
- OS

1 inch = 2,000 feet

0 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project DR-Land Use 249-2 Kern County Zoning

Source: Kern County, 2009

Solar Millennium

AECOM

Date: January 2010

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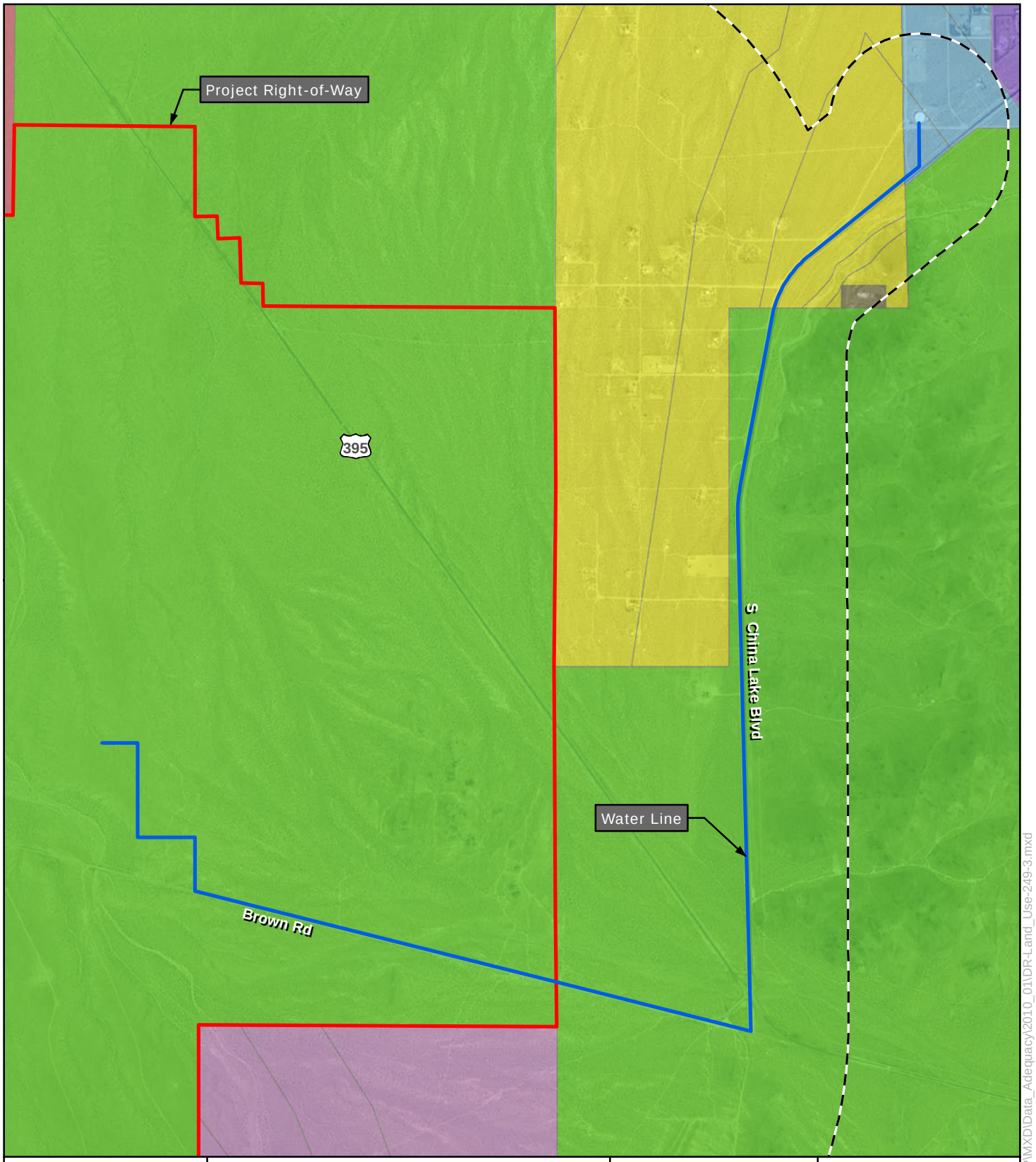

Map Location

Legend

- Water Line
- Project Right-of-Way
- 1 Mile Study Area
- General Commercial
- Maximum 1 Unit/Net Acre
- Minimum 2.5 Gross Acres/Unit
- Minimum 20 Gross Acres/Unit
- Minimum 5 Gross Acres/Unit
- Resource Management (Min. 20 Acre Parcel Size)
- State or Federal Land

1 inch = 2,000 feet

0 2,000 4,000 Feet

N W E S

Ridgecrest Solar Power Project DR-Land Use 249-3 Kern County General Plan

Source: Kern County, 2009

Solar Millennium

AECOM

Date: January 2010

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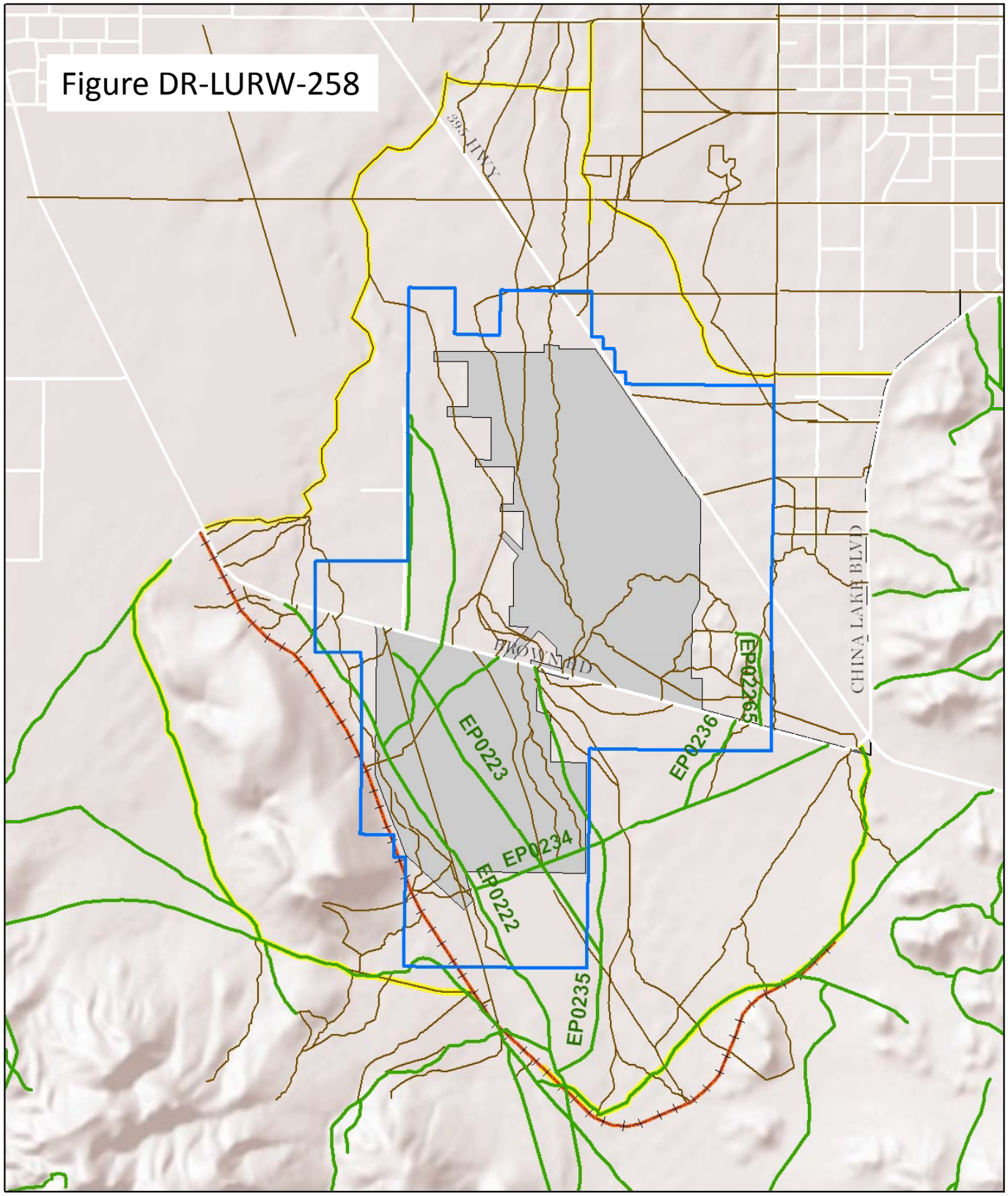


SMLLC Project ROW
Disturbance Area
New Proposed Rails-to-Trail Path
Designated Official OHV Trails (per WEMO)
Unofficial OHV Trails
Existing Connectivity Options

0 0.25 0.5 1
Miles

Data Sources: BLM

DR-NOISE-262

Information Required:

Please discuss how noise impacts will change with the new configuration.

Response:

The following analysis evaluates how noise impacts will change with the RSPP reconfiguration, as compared to the noise analysis presented in Section 5.8 Noise of the Application for Certification (AFC), submitted to the California Energy Commission (CEC) on September 1, 2009. To address resource management agencies' comments, the Applicant has reconfigured the site plan to minimize the impacts to natural stormwater flows across the El Paso Wash. The reconfiguration includes the relocation of the power block north of Brown Road, closer to the few residences that are near the site. Thus, there are potential changes to Project noise levels generated during construction and operation of the Project, and to the resulting noise levels at these sensitive noise receptors.

As described below, the distance between the reconfigured noise sources and residences is substantial enough to completely avoid construction and operational noise levels above significance thresholds. In other words, although the reconfiguration will move Project noise sources closer to sensitive receptors, those changes will not result in any significant noise impacts.

Sensitive Noise Receptors

As a result of the reconfiguration of the RSPP, the residence closest to the Project boundary is now 2,500 feet east of the revised eastern boundary, instead of a residence approximately 3,200 feet west of the original northwest boundary (see Figure DR-NOISE-262 provided at the end of this section). The relocation of the power block approximately 3,300 feet north-northwest from the south side of Brown Road to the north side moves the power block closer to the few residences in proximity to the site. The residence nearest the power block remains the residence west of the site, but the power block is now 1,300 feet closer to that residence (6,300 feet with the original project versus 5,000 feet with the reconfiguration). Impacts to these sensitive noise receptors are discussed below.

The several other residences close to the site, approximately 3,250 to 3,575 feet east of the previous eastern site boundary, are also closer to the revised power block location (10,000 feet originally, 7,500 feet with the reconfiguration). However, as discussed below, this distance is sufficient to attenuate noise levels below significance at these eastern residences. In addition, vehicle traffic noise of U.S. Highway 395 in between the Project and residences to the east elevate day-night ambient noise levels at the residences in proximity to the highway. This makes the Project construction and operational noise less noticeable to these residences, as compared to the residence to the west without nearby highway traffic noise.

Project Size and Configuration

The proposed equipment of the power block has only changed in terms of the air-cooled condenser (ACC), which has a larger footprint and more fans, but is not different in height. Some of the other equipment was shifted to accommodate the increase in the ACC footprint. The previous ACC had an area of 296 feet by 245 feet with 35 cells; the revised ACC is 480 feet by 300 feet with 48 cells, a cell increase of 37 percent. In addition, the ACC configuration has changed from a single area configuration to a "split design" with the header pipe separating the ACC into two areas. Operation of the ACC produces one of the highest noise levels of the plant; however, the 37 percent increase in the number of ACC cells would generate an increase of only 1.4 decibels (dBA) at the ACC.

Potential Noise Impacts

Construction

The nearest noise sensitive human receptor to the revised Project site boundary is a residence approximately 2,500 feet east of the eastern boundary/solar field. The anticipated noise levels from construction equipment and vehicles of 85 dBA Equivalent Continuous Noise Level (Leq) at 50 feet, when the activities are occurring at the site boundary near the nearest residence, would attenuate over distance to approximately 52 dBA Leq at the eastern residence, assuming intervening topography or structures. There are topographic changes (slopes and ridges) between the site boundary and the residence for the U.S. Highway 395 right of way, including its vehicle traffic noise which would elevate ambient noise levels, further reducing the effects of the construction noise.

As shown in Table 5.8-5 of the AFC, the average ambient Leq at the residence east of the site (now the nearest from the revised site boundary) is approximately 46 dBA Leq. The difference between this ambient level and highest potential construction noise level at the residence of 52 dBA Leq (when construction is at the nearest site boundary) would be slightly greater than a 3-dBA change (which is barely perceptible to the human ear). Therefore, the potential average Project construction noise level at the residence when construction is nearest the site boundary would be barely noticeable. Moreover, construction near the site boundary from grading activities and solar collector installation would occur near the residence for a very short time and then move to another location on the site, further away from the residence.

The Kern County Noise Ordinance does not limit construction noise levels. Rather, the ordinance limits only the hours of construction activities when the noise is audible to a person within 150 feet of the construction and if the construction activity is within 1,000 feet of an inhabited residence. Typical construction noise levels of 85 dBA Leq are audible at 150 feet (76 dBA Leq). However, because the Project construction activities are 1,000 feet from an inhabited residence, they not are subject to these time limits.

The majority of site construction activities, including stationary construction noise, would be concentrated in the center of the site at the power block (approximately 5,000 feet east of the nearest residence). Construction noise from activities at the power block would attenuate over this distance to approximately 45 dBA Leq at the western residence. The average ambient Leq at the western residence nearest the power block was measured at approximately 52 dBA Leq, which is less than a 3-dBA change from ambient noise levels and therefore not perceptible at the residence. However, when construction activity occurs at and near the site boundary, increased noise levels may be occasionally noticeable at the residence during daytime hours. This activity near the site boundary would occur for a brief period while the solar arrays are constructed about the site during a portion of the overall 28-month construction schedule. For these reasons, construction activities are not expected to result in significant noise impacts on sensitive receptors.

As part of the process of readying the Project's steam turbine for startup, a process known as a "steam blow" is initiated. A series of these "steam blows", lasting two or three minutes each, are performed daily several times for two or three weeks. High-pressure steam blows can produce extremely high noise levels (up to 130 dBA at 100 feet). Even with silencing, noise levels would still be loud. There are newer, quieter steam blow techniques that use lower pressure steam over a continuous period of about 36 hours and result in peak noise levels of approximately 80 dBA at 100 feet. The Project will use a low-pressure steam blow technique with reduced noise levels. Under the site reconfiguration, the power block in the interior of the plant site would be approximately 1,300 feet closer to the nearest residence (west of the site), at approximately 5,000 feet away. The low-pressure steam blow sound level would attenuate over this distance to approximately 46 dBA at the western residence, which would be 2 dBA higher than the estimated noise level for the original distance in the AFC. The steam blows would still be a temporary (36-hour), one-time event for the start-up of the plant. For these reasons, the steam blows will yield less than significant noise impacts on the nearest (and other) sensitive receptors.

Operation

The results of the modeling are shown on Figure DR-NOISE-262 as daytime operational noise contour lines in increments of 5 dBA Leq from 90 dBA Leq at the Project's loudest daytime noise source, radiating out to 45 dBA Leq contour. The original figure (Figure 5.8-1 of AFC Section 5.8, Noise) has been revised to relocate these contours over the new power block location. With the changes in the plant's ACC, an increase of 1.4 dBA was approximated and is included in this analysis. Although the nearest residence to the power block (western residence) is still located outside of the 45-dBA Leq contour, the residence is now closer to that contour. Based on the distance of approximately 5,000 feet from the approximate center of the power block to the nearest residence, the modeled daytime operational plant noise levels would attenuate over this distance to approximately 44 dBA Leq at the residence. Adding the 1.4-dBA increase estimated for the revised Project's expanded ACC results in an estimated revised plant noise level of approximately 45 dBA Leq, which is 3 dBA higher than the plant noise at the nearest residence in the AFC, during daylight hours. This increase is not a significant impact by itself or when combined with the originally-projected 42-dBA noise level.

During the hours between sunset and sunrise, the Project would be in the shutdown mode with its noisiest components not operational. Project noise during the non-daylight hours is anticipated to be approximately 20 dBA lower than during the daytime (25 dBA Leq). Comparing this estimated non-daylight noise level with the corresponding background noise level (L90) of the lowest measured Leq of 36 dBA at the quietest time of the night (3:00 A.M.) shows that there would be no increase over the existing lowest L90 noise level as a result of the plant reconfiguration. The CEC's significance criterion provides that an increase of less than 5 dBA in the L90 at a noise-sensitive receptor during the quietest hours of the night would be considered an insignificant impact. Since the revised resulting noise level of the Project operation at the residence would represent *no* increase in dBA Leq, there would be no significant operational noise impact.

The corresponding Day/Night Average Sound (Ldn) for the modeled Project noise at the residence would be approximately 45 dBA Ldn. When combined with the measured ambient Ldn at the residence of 52 dBA Ldn, the resultant future Ldn with the Project would be 53 dBA Ldn (combining a difference of 6-9 dBA results in an increase of one dBA to the higher Ldn value). The future Ldn with the Project of 53 dBA Ldn would be less than the maximum Ldn of 65 dBA Ldn considered to be compatible with residential uses, as established by the Noise Element of the Kern County General Plan. The increase of 1 dBA Ldn above the ambient Ldn of 52 dBA would be less than a 3-dBA increase, and therefore not a perceptible increase above existing noise levels or levels projected for the original Project configuration.

Noise impacts of the revised Project would remain less than significant for the same reasons as in the AFC, as follows:

- While there may be occasional higher noise levels during construction (when construction activity occurs at/near the closest site boundary), average construction noise levels would be barely perceptible at the residence nearest the site boundary. This is because average construction noise levels would attenuate to levels slightly higher than ambient levels. In addition, the construction period itself would be temporary; use of heavy equipment and other activities with high noise emissions would be limited to daytime hours; the Project would use low noise, longer duration steam blow techniques; all practicable noise abatement measures would be implemented for noise-producing equipment; and if needed, acceptable mitigation would be arranged with the residence owner.

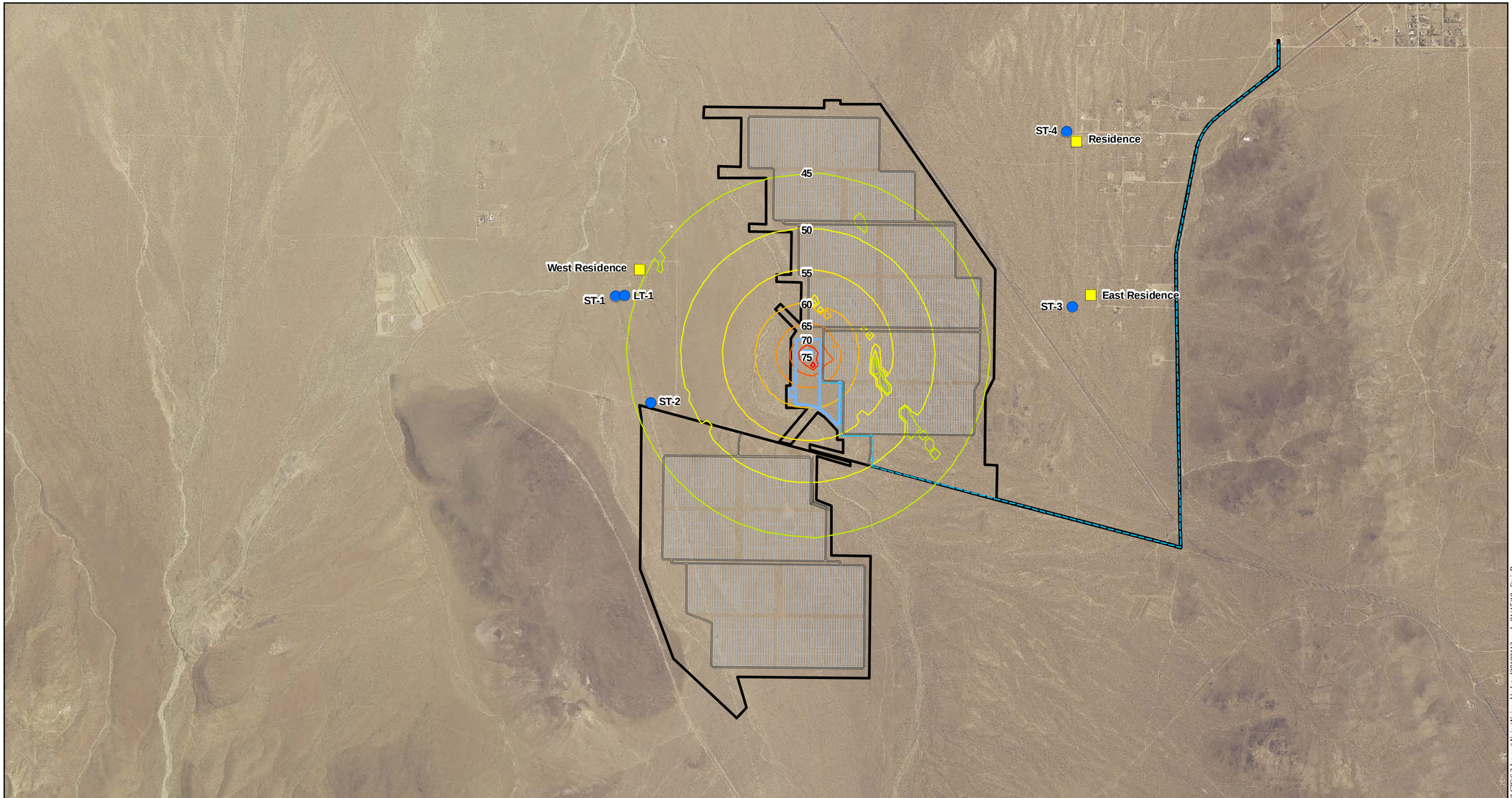
- The 65 dBA Ldn limit at the nearest residence, as identified by the Noise Element of the County General Plan, would not be exceeded during construction or operation.

- The five dBA threshold above the lowest measured L90 at any noise sensitive receptor, the key measure of whether or not a significant adverse impact would occur, would not be exceeded during plant operation; and

- The Ldn increase of one dBA with the Project would not be a substantial increase above levels existing without the Project.

Since there are no significant noise impacts, no mitigation measures are required. However, the noise reduction measures recommended in the AFC to minimize off-site noise levels would still be applicable to the reconfigured Project.

Figure DR-NOISE-249



Map Location

Legend

- Disturbance Area
- Facilities Layout
- Solar Loops
- Power Block
- Water Line Route
- Residence
- Noise Measurement Location

Noise Contours

- 45 dBA Leq
- 50 dBA Leq
- 55 dBA Leq
- 60 dBA Leq
- 65 dBA Leq
- 70 dBA Leq
- 75 dBA Leq
- 80 dBA Leq

Source: NAIP 2005; CNDDB 2009; AECOM 2009; EDAW 2009

N W E S

1 inch = 2,500 feet

0 2,500 5,000 Feet

Ridgecrest Solar Power Project
Responses to 12/22/09
Data Request

DR-NOISE-249
Noise Measurement Locations and Noise Contours

Solar Millennium

AECOM

Date: January 2010

Path: P:\2009\09080080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Noise\Noise_Updated20100113.mxd, 01/15/10, SteinB

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
For the *RIDGECREST SOLAR POWER PROJECT*

Docket No. 09-AFC-9

PROOF OF SERVICE
(Revised 12/23/09)

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*indicates change

DECLARATION OF SERVICE

I, ELIZABETH COPLEY declare that on, 1/25/2010, I served and filed copies of the attached DATA RESPONSES (SET 1+2). The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[http://www.energy.ca.gov/sitingcases/solar_millennium_ridgecrest]**.

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

For service to all other parties:

X sent electronically to all email addresses on the Proof of Service list;

X by personal delivery or by depositing in the United States mail at Sacramento,California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

X sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);

OR

____depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-9
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

*indicates change