DR-ALT-30

Information Required:

In order to facilitate preparation of the SA/DEIS document and allow further analysis of the project site with alternative sites, please provide the precise locations of the four alternative sites (Township/Range/Section and/or parcel numbers) and GIS data if available.

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. All descriptions are relative to the San Bernardino Baseline and Meridian.

East of Lancaster:	T 7 N, R 9 W, Sections 19, 20, 21, 28, 29, 30
	T 7 N, R 10 W, Sections 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30
	T 7 N, R 11 W, Section 25
El Centro:	T 15 S, R 11 E, Sections 26, 27, 28, 33, 34, 35
	T 16 S, R 11 E, Sections 2, 3, 4
Johnson Valley:	T 4 N, R 3 E, Sections 21, 22, 25, 26, 27, 28, 34, 35, 36
	T 4 N, R 4 E, Sections 29, 30, 31, 32
Chuckwalla Valley	T 7 S, R 18, E, Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24

DR-ALT-31

Information Required:

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

Response:

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

- East of Lancaster 7,900 acres
- El Centro 3,500 acres
- Johnson Valley 5,700 acres
- Chuckwalla Valley 9,000 acres

DR-ALT-32

Information Required:

For private property sites, please indicate the number of individual landowners comprising ownership of the alternative site, the assessor's parcel number, and the acreage of each separate parcel and landowner.

Response:

The El Centro alternative site is situated on land owned by two separate landowners. Ten parcels are owned by the U.S. Government and one parcel is owned by Van Derpoel. Table DR-ALT-32-1 identifies the 11 assessor's parcel numbers, acreage, and landowner of each separate parcel.

Table DR-ALT-32-1 El Centro Alternative Site

Assessor's Parcel #	Acreage	Landowner
034280009000	639.6403175	U.S. Government Land
034280010000	640.0728757	U.S. Government Land
034280011000	639.9146183	U.S. Government Land
034280016000	639.8684616	U.S. Government Land
034280017000	640.064745	U.S. Government Land
034280018000	159.9573732	Van Derpoel
034280019000	479.7209017	U.S. Government Land
034360004000	639.9408156	U.S. Government Land
034360005000	640.1737789	U.S. Government Land
034360006000	479.9721278	U.S. Government Land

The Johnson Valley alternative site is situated on land owned by 29 separate landowners. Table DR-ALT-32-2 identifies the 55 assessor's parcel number, acreage, and landowner of each separate parcel.

Table DR-ALT-32-2 Johnson Valley Alternative Site

Assessor's Parcel #	Acreage	Landowner
0447421070000	2.38	Government Land
0447421080000	2.33	Government Land
0448251030000	640	State of California
0448261030000	640	State of California
0448261060000	200	State of California
0448261080000	480	State of California
0448261090000	160	Government Land
0448261100000	400	State of California
0448261110000	240	Government Land
0448271010000	20	Remmers, Eugene T & Carolyn E
0448271020000	60	Jin, Ling
0448271030000	60	Gip, Pao A Etal & Phong N (HW-PAO)
0448271040000	20	Tsou, Alice W
0448271050000	20	Tsou, Alice W
0448271060000	60	Wilcox, Carl R etal; C/O Robert J Wilcox
0448271070000	80	Chen, Nancy Trust
0448281010000	640	Government Land
0448281040000	40	Luu, Tri Thanh
0448281100000	10	Axtater, John T TR & Arlene D TR
0448281110000	10	Axtater, Arlene D TR
0448281120000	20	Dang, Thanh; Ong, Lillian
0448281140000	40	Gip, Pao A Etal & Sy A
0448281150000	30	Cangco, Francisco A & Matilde P
0448281170000	10	Lee, Davy
0448281180000	40	Miller, John W & Carole C
0448281190000	20	Witte, Randall
0448281200000	20	Eckel Family TR; C/O Roberta J Eckel TR
0448281210000	27.71	Charlson, Antoinette M Trust

Table DR-ALT-32-2 Johnson Valley Alternative Site

Assessor's Parcel #	Acreage	Landowner
0448281220000	10	Atkinson, Tommy L & Martha J
0448281230000	10	Larderuccio, Salvatore Rev TR & Jennie
0448281240000	10	Larderuccio, Salvatore Rev TR & Jennie
0448281250000	10	Larderuccio, Salvatore Rev TR & Jennie
0448281260000	10	Larderuccio, Salvatore Rev TR & Jennie
0448301060000	480	State of California
0448301080000	20	Gudgin, Bernadette
0448301110000	20	Bailey, Nathan T III & Carla J
0448301120000	120	State of California
0448301130000	10	Pino, Jerry & Martha
0448301140000	10	Valley Trust Deed Services Inc
0448301170000	270	Government Land
0448301180000	10	O'hara, Dennis G TR & Virginia J TR
0448301190000	10	Lafon, David L & Terry M TR
0448301200000	20	Campbell, Harry J
0448311050000	640	State of California
0454421100000	320	State of California
0454421110000	640	Lehavi, Dov Etal; RCOB Inc
0454421120000	315.74	Government Land
0454421200000	320	State of California
0454421220000	200	State of California
0454421230000	431.7	State of California
0454421240000	480	State of California
0454421250000	160	Government Land
0454421260000	480	State of California
0454421270000	160	Government Land

The Chuckwalla Valley alternative site is situated on land owned by nine separate landowners. Table DR-ALT-32-3 identifies the assessor's parcel number, acreage, and landowner address of each separate parcel. The publicly available data from the Riverside County Assessor does not provide landowner names, only addresses. It is assumed that each separate address represents a separate landowner.

Table DR-ALT-32-3 Parcel Information Chuckwalla Valley Alternative Site

Assessor's Parcel #	Acreage	Landowner Address
860140004	20.0	1101 Shannon Drive, Medford, OR 97504
860140003	20.2	1101 Shannon Drive, Medford, OR 97504
860140011	39.9	1935 University Way, San Jose, CA 95126
860140013	79.8	4426 Braeburn Road, San Diego, CA 92116
860140010	39.9	6169 North Reno Avenue, Temple City, CA 91780
860140014	79.7	698 Lookout Avenue, Prineville, OR 97754
860140005	322.3	8004 Clock Tower Court, Las Vegas, NV 89117
860140012	79.8	9031 Cypress Creek Road, Lantana, TX 76226

The East of Lancaster alternative site is comprised of 1,370 parcels. The parcels are illustrated below. Because of the huge number of parcels, individual ownership information is not provided

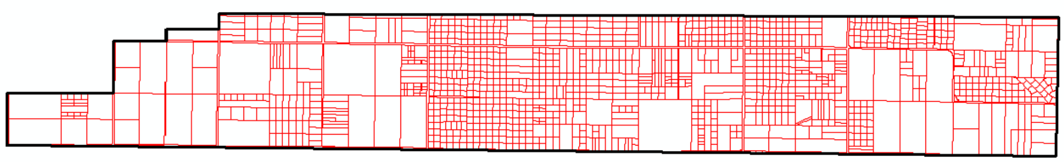

Figure DR-ALT-32-1

DR-ALT-33

Information Required:

For sites located on BLM-administered land, please indicate if the BLM has received a right-of-way application for use of any of the alternative site land and the status of the application, if available.

Response:

On July 3, 2008, Solar Millennium LLC submitted a right- of-way (ROW) application to Bureau of Land Management (BLM) for the Chuckwalla Valley alternative site. In August 2008, BLM indicated that the Chuckwalla Valley site was partly in a Desert Wildlife Management Agency (DWMA) and partly in the Chuckwalla Valley Dune Thicket Areas of Critical Environmental Concern (ACEC) and the site was rejected.

DR-ALT-34

Information Required:

Please fill in Table 1 on the last page of this Data Request to compare the East of Lancaster alternative site with the proposed project. Please also include any information previously gathered on the El Centro, Johnson Valley, Chuckwalla Valley alternative sites.

Response:

Table DR-ALT-34-1 compares the Project as proposed with the East of Lancaster site and the other three alternative sites included in the AFC.

Table DR-ALT-34 -1 Blythe Solar Power Project: Alternative Sites Environmental Comparison Table

Environmental Criteria	Proposed Project Site	East of Lancaster	El Centro	Johnson Valley	Chuckwalla Valley
Is site mechanically disturbed?	Some roads and vehicle tracks	Partially. Some agriculture on west side, several residences	Some roads and off road vehicle impacts	Some roads and residences	Some off-road vehicle impacts
Is site adjacent to degraded and impacted private lands?	None listed	Several LUFT sites identified	None listed	None listed	None listed
Is site a Brownfield?	No	No	No	No	No
Is site located adjacent to urbanized areas (indicate distance)?	~ 7 miles northwest of the center of Blythe	Site located within the city limits of both Palmdale and Lancaster	~ 6 miles northwest of unincorporated community of Seely, 13.5 miles northwest of El Centro	~ 31 miles southeast of Apple Valley/Victorville, 14 miles northeast of Big Bear Lake, 20 miles northwest of Yucca Valley	~ 19 miles west of Blythe
Does site require the building of new roads (indicate length)?	Yes, site is approximately 1.5 miles north of U.S. Interstate 10 (I-10)	No, site accessible by surface streets	Yes, site is ~1 mile north of State Highway 80	Yes, site is ~700 feet northeast of State Highway 247	Yes, site is ~0.5 mile south of I-10
Could site be served by existing substations (indicate name and distance)?		~ 14 miles from Southern California Edison (SCE) substation; suitability, availability, etc. unknown	~ 7 miles from San Diego Gas and Electric substation, suitability, availability, etc. unknown	~ 31 miles from SCE substation, 3 miles from proposed Los Angeles Department of Water and Power line; suitability, availability, etc. unknown	~ 7 miles from proposed SCE substation; suitability, availability, etc. unknown
Is site located proximate to sources of municipal wastewater (indicate name and distance)?	~ 8 miles from Blythe Wastewater Treatment Plant (WWTP). However, this wastewater source is not available as it is accounted for as Colorado River Water return flow.	~ 5 miles from Palmdale Water Reclamation Plant (has tertiary treatment but availability unknown)	~ 14.5 miles from El Centro WWTP	~ 40 miles from Victor Valley Wastewater Reclamation Plant (has tertiary treatment but availability unknown)	~ 19.5 miles from Blythe WWTP. However, this wastewater source is not available as it is accounted for as Colorado River Water return flow
Is site located proximate to load centers (indicate name and distance?)	~ 200 miles to Los Angeles, ~ 150 miles to San Diego, and ~ 170 miles to Las Vegas	~ 30 miles from Los Angeles	~ 75 miles from San Diego, ~60 miles from Los Angeles	~ 75 miles from Los Angeles	~ 190 miles to Los Angeles, ~140 miles to San Diego and ~180 miles to Las Vegas
Is site located adjacent to federally designated corridors with existing transmission lines?	Yes	~ 20 miles to nearest transmission corridor	Yes	Yes	Yes
Does site support sensitive biological resources, including federally designated/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?	Yes. contains observed small tortoise population	Yes, Swainson's hawk identified on site by California Natural Diversity Database (CNDDB)	Yes, flat tailed horned lizard identified on site by CNDDB	Yes, desert tortoise identified on site by CNDDB	Yes, site is located within designated Desert Tortoise critical habitat. Other special-status species also documented on the site, see CNDDB map for more details.
Is site within Area of Critical Environmental Concern, Wildlife Habitat Management Area, proposed HCP and NCCP Conservation Reserves?	None identified	Yes, site includes portion of Mojave Fringe-toed Lizard ACEC	None identified	None identified	Yes, most of site is within Chuckwalla DWMA, portion of site within Chuckwalla Valley Dune Thicket ACEC

Table DR-ALT-34 -1 Blythe Solar Power Project: Alternative Sites Environmental Comparison Table

Environmental Criteria	Proposed Project Site	East of Lancaster	El Centro	Johnson Valley	Chuckwalla Valley
Does site contain land purchased for conservation including those conveyed to BLM?	No	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 for impact on wildlife movement corridors, but would not be considered, by itself as required for the continued functioning of biological and ecological processes.	Site is adjacent to the cities of Lancaster and Palmdale and characterized by a patchwork of disturbed lands, including current and former agricultural areas, and some sparse native vegetation. Based on the proximity to urban areas and the historical land uses on the site and in the surrounding areas, the site does not function as a biological linkage and is not required for the continued functioning of biological and ecological processes.	This site lies in an area of relatively undisturbed desert habitat to the west of agricultural lands of the southern Imperial Valley. The southern portion of the site has been disturbed by use as a sanctioned off-highway vehicle recreation area (Plaster City Off-Highway Vehicle Area). Two sizable desert washes, which are known to facilitate animal movement in the desert traverse the site and thus, desert wildlife may move through or inhabit portions of the site. However, because of the abundance of relatively intact habitat surrounding the site, it is unlikely that this site, in and of itself, is required for the continued functioning of biological and ecological processes.	The site lies within a large area of relatively undisturbed habitat. While the site does not appear to function as a critical linkage between different areas of habitat, desert tortoise have been documented in surrounding areas. It is possible that desert wildlife may move through or inhabit portions of the site. However, based on the abundance of quality habitat surrounding the site, it is unlikely that this site, in and of itself, is required for the continued functioning of biological and ecological processes.	The site lies within a large area of relatively undisturbed desert habitat. While the site does not appear the site does not function as a critical linkage between different areas of habitat, the site lies almost entirely within desert tortoise critical habitat and the Chuckwalla DWMA and a portion is within the Chuckwalla Valley Dune Thicket ACEC. There are also a number of desert washes that traverse the site. While it is likely that wildlife may move through or inhabit portions of the site, it is unlikely that this site, in and of itself, is required for the continued functioning of biological and ecological processes. However, the designation of the area as desert tortoise critical habitat, a DWMA, and ACEC would indicate that its preservation is important to the ecology of Mojave desert wildlife.
Is the site within Proposed Wilderness Area, proposed National Monuments, and Citizens' Wilderness Inventory Areas	None identified	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 does contain ephemeral washes which are being considered waters of the State	Site contains no wetlands or riparian areas but does contain ephemeral washes which may be considered waters of the State	Site contains no wetlands or riparian areas but does contain jurisdictional waters of the State (ephemeral washes)	Site contains no wetlands or riparian areas but does contain jurisdictional waters of the State (ephemeral washes)	Site contains no wetlands or riparian areas but does contain jurisdictional waters of the State (ephemeral washes)
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	Class I archival research underway. Results will be available by January 20, 2010.	Class I archival research underway. Results will be available by January 8, 2010.	Class I archival research underway. Results will be available by January 20 2010.	Class I archival research underway. Results will be available on January 8, 2010.
Is the site located directly adjacent to National or State Park units?	None identified	Yes, site adjacent to Antelope Valley Indian State Park and ¼ mile from Saddleback Butte State Park	None identified	None identified	None identified

DR-ALT-35

Information Required:

Given the uncertainty regarding the transmission line route and possible substation location, please detail what additional transmission line routes or substations are being considered. Illustrate all options on a detailed map that includes section numbers and boundaries.

Response:

Figure DR-ALT-35-1 shows the transmission routes and substation alternatives that have been considered. There are two routes being considered. However, either of the two routes would terminate at the same planned SCE Colorado River substation where the BSPP would interconnect with the SCE system. Thus, both transmission routes terminate at the location that has been selected by SCE for the substation facility.

One of the two transmission line routes was the one included in the July 2009 AFC and the other route is included in the October 2009 AFC Volume 3 Data Adequacy Supplement.

DR-ALT-36

Information Required:

One of the site selection criteria for the proposed Blythe SPP site was environmental sensitivity. Please provide the results of a CNDDB search for the East of Lancaster alternative site.

Response:

Figure DR-ALT-36-1 illustrates the results of the CNDDB search conducted for the East of Lancaster site. The species identified at the site and within a 5-mile radius are listed immediately below:

Species	**Status**
Alkali mariposa lily	CNPS 1B.2
Parish's popcorn-flower	CNPS 1B.1
Parry's spineflower	CNPS 3.2
Le Conte's thrasher	State – Species of Special Concern
Mountain plover (nonbreeding/wintering)	State – Species of Special Concern
Swainson's hawk	State – Threatened
Western burrowing owl	State – Species of Special Concern
Desert tortoise	Fed – Threatened; State – Threatened
American badger	State – Species of Special Concern
Mohave ground squirrel	State – Threatened

DR-ALT-37

Information Required:

Please provide an Information Center search (Class I) for recorded sites identified within the East of Lancaster alternative site.

Response:

The South Central Coastal Information Center is the repository for cultural resources data that covers the East of Lancaster alternative site. However, the Information Center closes over the Christmas/New Year holiday and it was not possible to complete the Class I research until after the Information Center reopened on January 4, 2010. We anticipate providing the results of the Class I search for the East of Lancaster site by January 20, 2010.

DR-ALT-38

Information Required:

Please provide the results of a CNDDB search for the Blythe Disturbed Land alternative site.

Response:

Figure DR-ALT-38-1 shows the results of the CNDDB search for the Blythe Disturbed Land alternative site. The data shown is for the site plus a 5-mile radius. The species identified in the search are listed immediately below:

Species	**Status**
Angel trumpets	CNPS 2.3
California satintail	CNPS 2.1
Harwood's milk-vetch	CNPS 2.2
Razorback sucker	Fed – Endangered; State – Endangered
Crissal thrasher	State – Species of Special Concern
Elf owl	State – Threatened
Gila woodpecker	State – Endangered
Sonoran yellow warbler (nesting)	State – Species of Special Concern
Southwestern willow flycatcher	Fed – Endangered; State – Endangered
Summer tanager (nesting)	State – Species of Special Concern
Vermilion flycatcher (nesting)	State – Species of Special Concern
Western burrowing owl	State – Species of Special Concern
Western yellow-billed cuckoo	Fed – Candidate; State Endangered
Yellow-breasted chat (nesting)	State – Species of Special Concern
Yuma clapper rail	Fed – Endangered; State – Threatened
Desert tortoise	Fed – Threatened; State – Threatened
Arizona myotis	State – Species of Special Concern
Cave myotis	State – Species of Special Concern
Colorado River cotton rat	State – Species of Special Concern
Pallid bat	State – Species of Special Concern

Pocketed free-tailed bat	State – Species of Special Concern
Western yellow bat	State – Species of Special Concern

DR-ALT-39

Information Required:

> Please provide an Information Center search (Class I) for recorded sites identified within the Blythe Disturbed Land alternative site.

Response:

The Eastern Information Center is the repository for cultural resources information for the Blythe Disturbed Lands alternative site. However, the Eastern Information Center (like the other cultural resources repositories) closes over the Christmas/New Year holiday.

Thus, we were not able to provide the full results of the Class 1 search on January 6, 2010. Specifically, we did not have the historical maps for the site in time. We expect to be able to obtain the needed historical maps in time to make a full submittal of the requested cultural resources information for this alternative site by January 20, 2010.

DR-ALT-40

Information Required:

> To determine the feasibility of obtaining site control, please explain how many separate owners would result in an unacceptable probability of obtaining site control. Consider the Renewable Energy Transmission Initiative (RETI) Phase 2A Report's 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:

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 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 the size of the proposed BSPP represent enormous investments, whoever the proponent(s) might be. Obviously, these are major, complex business decisions not taken lightly by any applicant. The ease/difficulty and cost of obtaining site control is one of the components of such business decisions. Different applicants legitimately may have different views of how many landowners with whom successful negotiations would be required is "too many". The Applicant has decided that the appropriate maximum number of landowners they would be willing to deal with is three.

DR-ALT-41

Information Required:

Please describe in detail the engineering constraints, if any, to the development of a revised configuration of each 250 MW unit. 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 and to allow troughs to be installed on either side of the wash.

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 is 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 desert washes to reach the power blocks.

Response:

Solar Field Design Criteria

The basic building block of a parabolic trough solar field is the so-called "loop". Each loop is made up of 40 solar collector assemblies with an 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.

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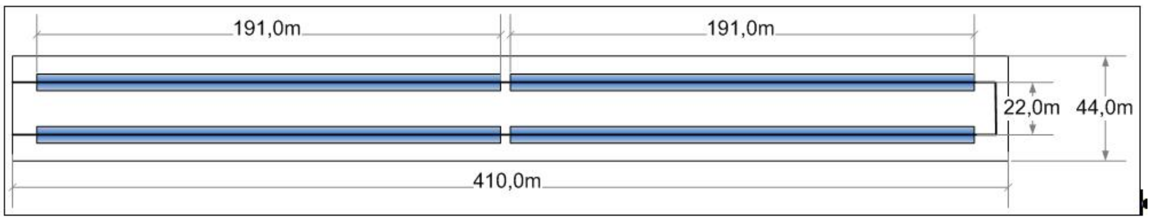
1 Steam cycles have improved efficiency with higher peak operating temperature. So system designers strive to achieve peak operating temperatures up to 550°C (1000 degrees Fahrenheit).

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 "W" shape, this results in large additional pressure drop 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.

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.

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

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.

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, where 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. BSPP Units use a so-called "H" header design, where the number of loops in each subfield is equal and thus each header is of equal length. 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: Flexibility in number of collector loops or number of units to comprise a 500 MW power plant

The number of loop/units in a single 250-MW solar plant is optimized with respect to typical annual solar radiation. The fewer loops there are in the plant with a fixed turbine size, the less annual energy the plant will produce, thus directly impacting the cost of electricity. For the solar radiation profile at the BSPP site, a range of 250 to 300 loops could power a nominal 250-MW power block. In current electricity markets and current collector technology, the minimum number of loops to power a nominal 250-MW plant is approximately 290 loops. As currently configured, Units 1 and 2 at BSPP are designed with 296 loops each. These units will be constructed first and put into commercial service to serve existing contracts. Units 3 and 4 are currently designed with 250 to 260 loops. These plants would operate at a reduced capacity factor compared to Units 1 and 2. The economic viability of plants with lower output is supported by the site infrastructure (roads, transmission and gas lines, assembly hall and administration buildings, and storm water management systems) constructed to support the more robust Units 1 and 2.

e: 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 stepup 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.

f: 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-42

Information Required:

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

Response:

The BSPP was originally proposed as a 1,000-MW (nominal) wet cooled power plant. In 2009, the Applicant decided to drastically reduce water use by utilizing air-cooled condensers, an alternative cooling method commonly referred to as "dry cooling". A dry cooling system is more expensive for the Project as this cooling system is less efficient, most noticeably in the hot summer months when power demand is highest.

In an earlier configuration of the Project, the solar fields were designed to utilize three of the private parcels in and around the Project ROW (see Figure DR-ALT-42-1). Due to difficulties in acquiring the private parcels, the Applicant created a layout used in the BLM ROW application that included only BLM land (see Figure DR-ALT-42-2). In addition, in June 2009, the Applicant decreased the ROW size for BSPP by relinquishing three and a half sections in the northeast portion of the ROW. In earlier site layouts, the northeast area was planned for solar energy generation. This area, partly in the McCoy Wash, was relinquished for environmental stewardship reasons to minimize the Project's impact on biological and cultural resources (see Figure DR-ALT-42-3).

With regard to engineering constraints, the solar fields have minimum size requirements to generate adequate amounts of electrical power, the drainage channels have minimum size requirements to convey expected surface water flows, and the internal roads and fencing have clearance requirements. Each of these factors (solar field and drainage channel size requirements; roads/fencing clearance requirements) pushes the layout of Project components up to the ROW boundary.

DR-ALT-43

Information Required:

Please see **Alternatives Data Request – Figure 2,** which illustrates areas within project boundaries that are occupied by the most sensitive biological resources – desert washes (shown in green) and special status plant species (shown in pink). The areas outlined in red identify potential revised configurations that would reduce effects on these resources. In order for the Energy Commission and BLM to evaluate a potential alternative that avoids effects on these sensitive areas 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 outlined in red. Alternatively, complete biological and cultural resources surveys for other areas within the project ROW application boundaries (but outside of the current project footprint) that minimize effects on biological resources to the same degree as the areas identified on Figure 2.

Response:

CEC Staff Alternatives Data Request – Figure 2 illustrates areas within the Project site boundaries that are occupied by the most sensitive biological resources. In Figure 2, Staff has identified additional land (outlined in red) outside of the BLM ROW that is proposed as an alternative area for the Project to site solar facilities without reducing generation output. The Applicant (PVSI) analyzed the area within the red outline and has determined that it is not a feasible alternative site configuration because it has significant site control problems. Specifically, the area within the red line is comprised of 42 privately-owned parcels with 22 different owners. PVSI has made repeated attempts to discuss the purchase of some of these parcels with the respective owners, to no avail. For example, PVSI previously and repeatedly contacted the owner of a 200-acre parcel adjacent to the southeast corner of the ROW, but the owner did not respond. PVSI expects that similar problems would be encountered with some or many of the other private landowners. The acquisition of several private parcels could easily take years to complete negotiations. As the Commission is aware, a primary objective of the project is to obtain American Reinvestment & Recovery Act (ARRA) funding and lengthy negotiations with multiple landowners would likely result in failure to achieve that objective. Acquiring all of the 42 parcels in a timely manner therefore is not feasible.

Based on the request in DR-ALT-43 to establish a revised configuration that would reduce effects on the most sensitive biological resources, PVSI has conducted additional siting analysis for this purpose. As explained above, the outlined red area is not a feasible alternative site configuration. In Figure 2, it appears that the CEC Staff uses criteria to establish a revised configuration that would allow Project facilities to be constructed outside of the BLM ROW application area. In the additional siting analysis, PVSI has used this flexibility, as well as economic and engineering criteria as described in the response to DR-ALT-41, and environmental impact criteria based on aerial photos and previous Project surveys (e.g., buffer zones surrounding the Project disturbance area), to produce a revised configuration (see Figure DR-ALT-43-1).

The newly developed revised configuration maintains the economic and engineering viability of the Project, while minimizing the impacts to the most sensitive biological resources. This configuration would move the southwest unit (Unit 3) onto BLM land that is outside of the current ROW application, while maintaining its economic and engineering viability. This alternative is only feasible if the BLM allows this modification to the 299 ROW Grant Application without a delay in permitting that would jeopardize a major Project objective of receiving ARRA funding.

Engineering and economic analyses also were undertaken to evaluate alternative designs for the northwest unit (Unit 2), for the purpose of fitting the unit within the Staff's Figure 2 Reduced Project boundary. Such designs were not feasible. Specifically, PVSI evaluated a design that would relocate the southwest quadrant of the solar field to an area south and east of the original Unit 2 solar field (in space vacated by the movement of Unit 3). The resulting design has an extremely sub-optimal layout. Additional pumping auxiliaries, heat losses, and additional dead HTF mass would reduce the expected yearly efficiency by more than one percent. Please see the response to DR- ALT-41 for a thorough description of the engineering constraints that govern economic solar field design. This layout would also increase the total investment cost of the project and the daily startup time, while the anticipated electricity output and resulting revenue of the plant would be reduced by approximately 5 percent. Based on the criteria stated above, PVSI proposes that Figure DR-ALT 43-1 be used as the new "Reconfiguration Alternative" in lieu of Staff's Figure 2.

From an environmental perspective, a preliminary review suggests that for most environmental resource areas, there likely would be relatively minor differences for the PVSI Reconfiguration Alternative compared to the Applicant's proposed configuration. The Reconfiguration Alternative avoids a main east-west wash on the site as currently proposed. The Applicant will investigate the comparison of environmental impacts between the Reconfiguration Alternative and the Applicant's proposed configuration in future environmental reviews discussed below.

Both the proposed Project layout and the new PVSI Reconfiguration Alternative layout maintain their economic viability only if the current AFC/Environmental Impact Statement schedule allows the Project to be licensed and approved by November 2010. Meeting this deadline is necessary to allow the Project to qualify for ARRA funding, which is crucial to the Project's economic viability.

The Applicant will conduct resource assessments, including a field reconnaissance, to identify sensitivities that might make the area(s) in question environmentally unsuitable. After these assessments, surveys, if warranted, within the alternative would follow appropriate protocols.

Due to the seasonality of biological resources, necessary additional surveys for biological resources within the proposed Reconfiguration Alternative described in Figure DR-ALT 43-1 would be conducted in 2010. Biological resources surveys would follow methods previously described in the AFC and Biological Resources Technical Report for vegetation mapping and special-status plant surveys, delineation of State waters, desert tortoise, burrowing owl, avian point count, and general wildlife use. Vegetation mapping would be conducted concurrently with surveys for special-status plants. Habitat suitability would be determined for special-status plant species within the alternative footprint and any additional surveys for species that suitable habitat is identified for will be conducted at the appropriate time of year.

Necessary additional surveys for special status plants within the alternative would follow the same plan described in DR-BIO-81. Necessary Desert Tortoise surveys would be conducted in the spring of 2010 following the survey protocol guidelines published in the U.S. Fish and Wildlife Services (USFWS) Field Survey Protocol for any Non-Federal Action That May Occur within the Range of the Desert Tortoise (protocol) (USFWS 1992) and CEC Draft Guidelines. Bird surveys (e.g., burrowing owls, avian point counts) would be completed during the spring breeding season when bird activity is at its peak, potentially beginning in March 2010. Burrowing owl surveys would be performed according to the protocol established by California Burrowing Owl Consortium (CBOC 1993) and accepted by California Department of Fish and Game. Avian point count surveys will follow the methodology outlined in the Handbook of Field Methods for Monitoring Landbirds (Ralph et al. 1993) and guidance from the BLM (LaPre 2009). The results of these surveys would be reported in July 2010.

As is the case for biological resources, any additional necessary cultural resources surveys of the proposed alternative configuration would be conducted by qualified professionals following the same professional methodologies, protocols, and procedures as were utilized for the earlier Project cultural resources work. We anticipate that the cultural resources survey work will begin in late January 2010 with results to be provided in June 2010.

DR-ALT-44

Information Required:

> Please provide detailed information regarding the feasibility, economic and engineering, of a reduced acreage alternative that would avoid the most sensitive biological resources. See Data Request -Figure 3 as example of a reduced acreage alternative

based on avoiding impacts to desert dry wash woodland, waters (shown in light green) and special status plants (shown in pink), as well as wildlife movement corridors. The area outlined in **Alternatives Data Request Figure 3** retains 75 to 80 percent of the original footprint.

Response:

The area outlined in Staff's Figure 3 of the Data Request would reduce the size of two of the four planned 250-MW units of the 1,000-MW BSPP. In the reduced/redesigned ROW, the solar field for the southwest unit (Unit 3) would be reduced by 50 percent, to approximately 140 loops. The reduced acreage would result in a population of solar collector loops far below the minimum number (280 loops) necessary to support a 250-MW power block, consequently rendering the plant economically infeasible. Please see the response to DR ALT-41 for a description of the engineering constraints associated with design of an economically feasible solar field. The 250-MW size is a required condition to fulfill an investment cost-to-performance ratio that brings the cost of electricity to a competitive level. This ratio, in turn, is what makes the Project economically feasible, as outlined in the response to DR ALT-41.

The reduced/redesigned ROW would reduce the size of the northwest solar field (Unit 2) by 25 percent. As with Unit 3, this reduction would reduce area where collectors could be placed to level below the critical 280 loops for first-stage development, rendering it economically infeasible for same reasons discussed above and in Response to DR ALT-41.

In short, two 250-MW units of the BSPP would be effectively eliminated as a result of the alternate boundaries suggested in Staff's Figure 3. Multiple units at a site allow for shared infrastructure (e.g., access roads, pipelines) and other common facilities (e.g., warehouse, maintenance, waste handling/treatment). This shared infrastructure reduces the amount of land needed for overall Project energy output compared to projects with fewer units. Common facilities and infrastructure reduce capital costs as well as operating and maintenance costs. Using less land to produce the same amount of electrical energy reduces environmental impact potential as well.

This same perspective of concentrating electrical energy production at fewer larger sites rather than a larger number of smaller sites has a similar environmental benefit from a broader State-wide policy perspective. The Applicant received feedback from a number of State agencies indicating a preference for a single large project rather than multiple smaller ones. Perhaps even more importantly, there also would be less need for additional transmission line development (i.e., more individual project gen-tie lines), as well as other infrastructure upgrades (access roads, natural gas and/or water pipelines, etc.).

Alternatives Attachments

Figure DR-ALT-35-1
Transmission Line Alternatives with Parcel Map

Figure DR-ALT-36-1
CNDDB for Alternative Sites East of Lancaster

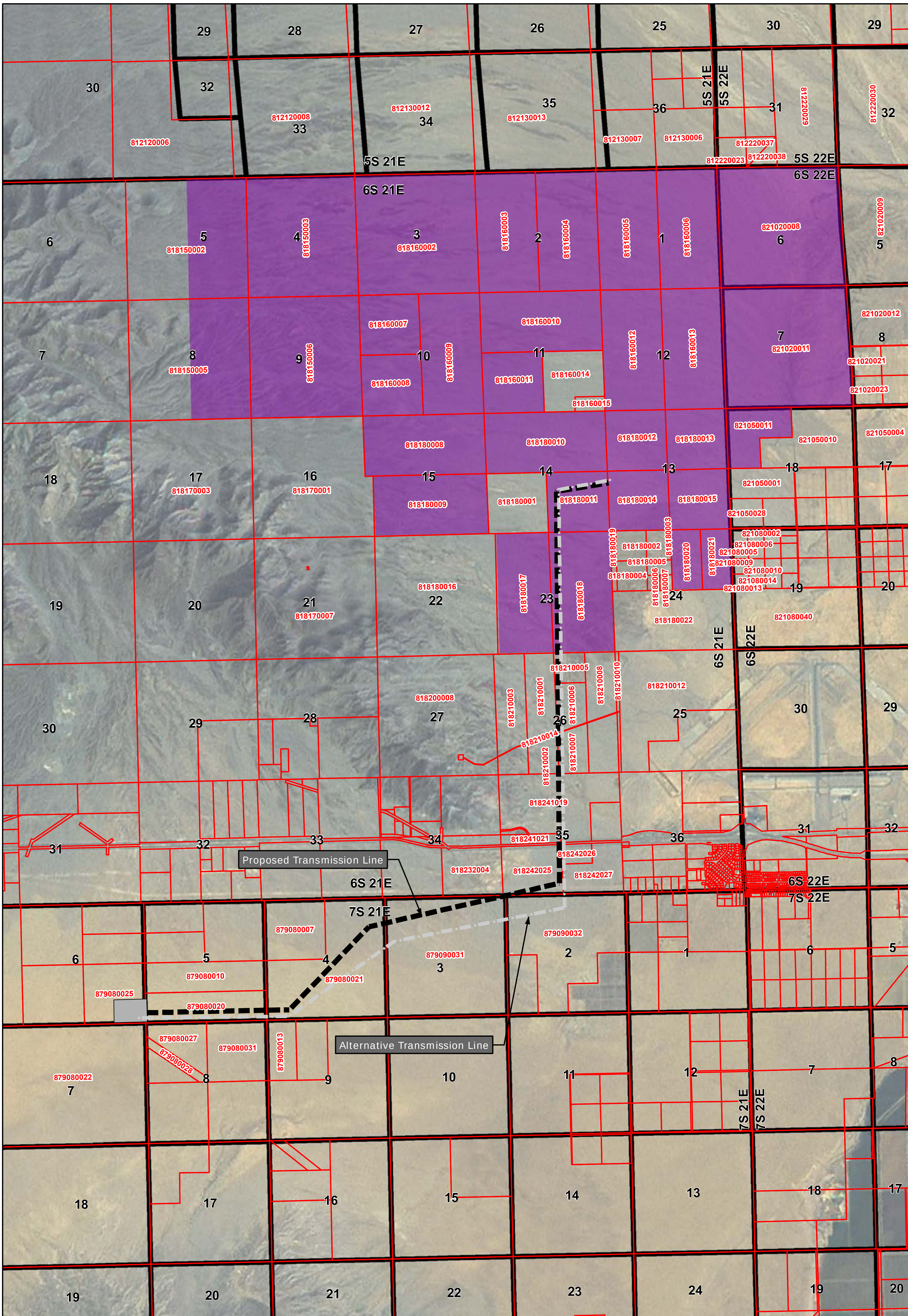
Figure DR-ALT-38-1
CNDDB for Alternative Sites Blythe Disturbed Land

Figure DR-ALT-42-1
Earlier Project Configuration Including Private Land

Figure DR-ALT-42-2
Earlier Project Configuration Using Only BLM Land

Figure DR-ALT-42-3
2009 Project Configuration with Reduced Right-of-Way

Figure DR-ALT-43-1
BSPP Alternative Reconfigured by Applicant



Map Location

Legend

- Project Right-of-Way
- Project Transmission Line
- Alternative Transmission Line Route
- Parcel Boundary
- Section/Township/Range
- Substation

1 inch = 4,000 feet

0 2,000 4,000 8,000 Feet

Blythe Solar Power Project
DR-ALT-35 -1
Transmission Line Alternatives with Parcel Map

Solar Millennium

AECOM

Date: January 2010

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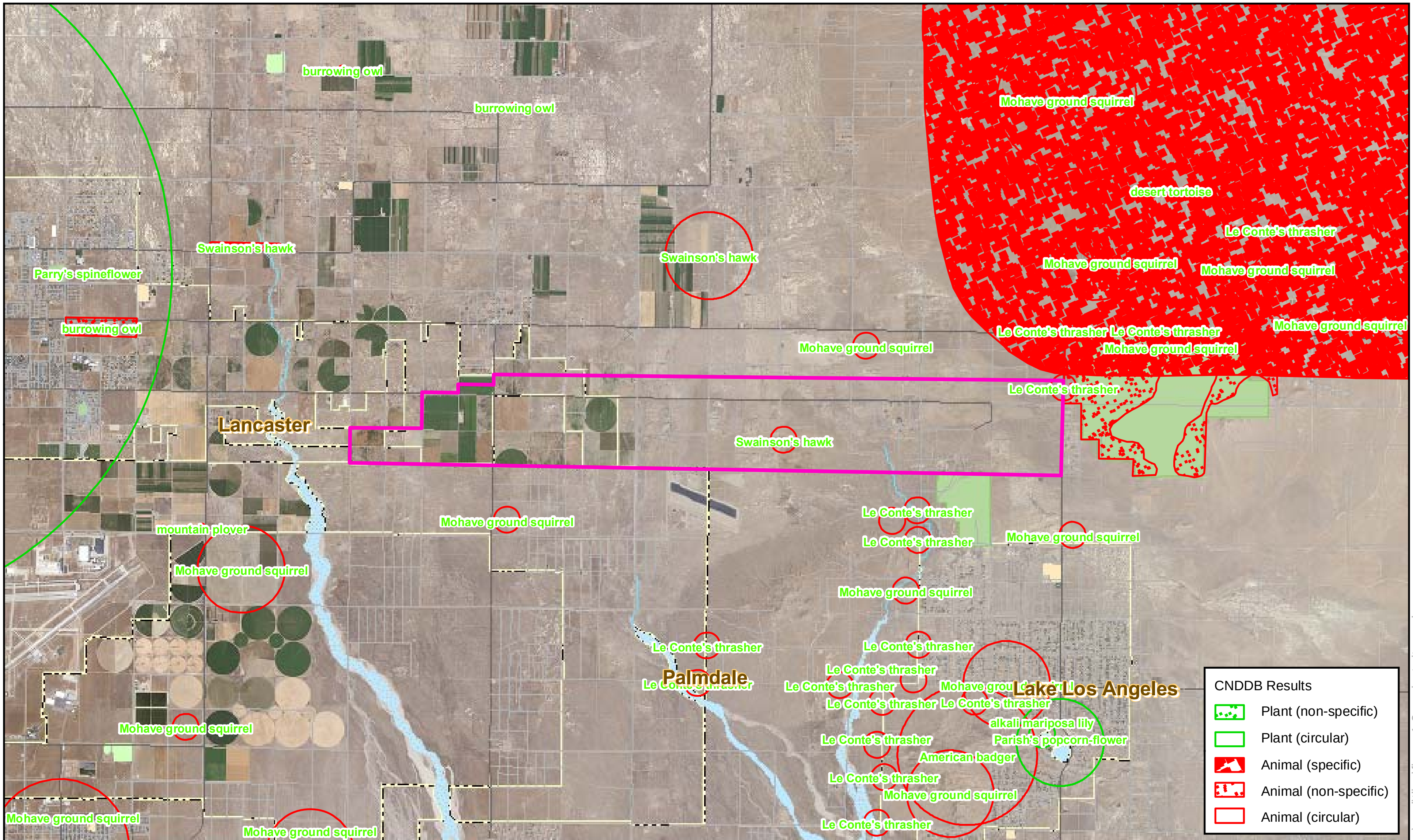

Map Location

Legend

East of Lancaster Alternative Site

1 in = 2 miles

0 2 4 Miles

Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2009 Los Angeles County

CNDDB: California Natural Diversity Database, California Department of Fish and Game

Blythe Solar Power Project

Figure DR-ALT-36 -1
CNDDB Search Results for Alternative Site: East of Lancaster

Solar Millennium

AECOM

Project: 60139695-5230
Date: January 2010

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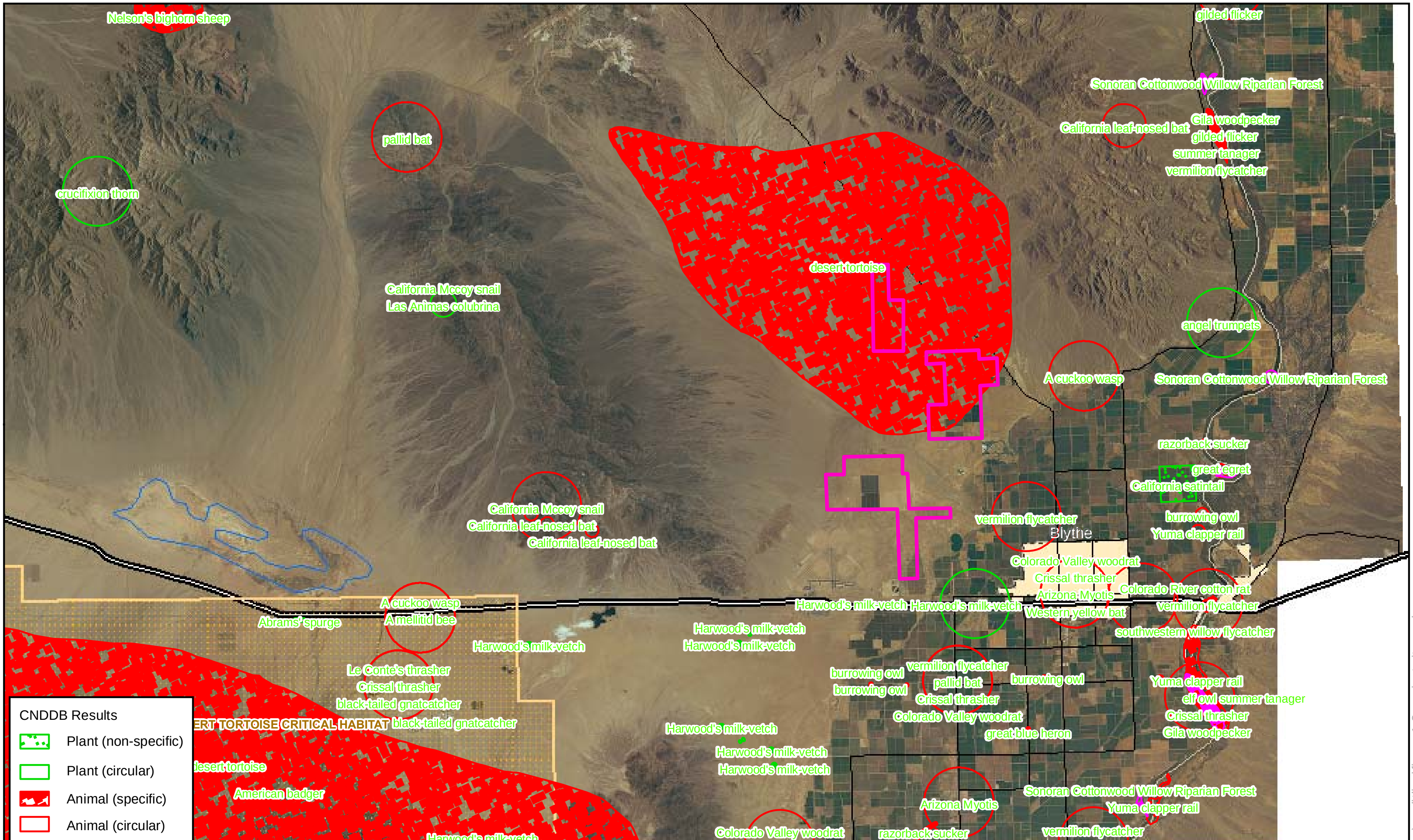

Map Location

Legend

Location of Blythe Disturbed Land Alternative Site

Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2005 Riverside County

CNDDB: California Natural Diversity Database, California Department of Fish and Game

1 in = 4 miles

0 4 8 Miles

Blythe Solar Power Project

Figure DR-ALT-38 -1
CNDDB Search Results
for Alternative Site:
Blythe Disturbed Land

Solar Millennium

AECOM

Project: 60139695-5230
Date: January 2010

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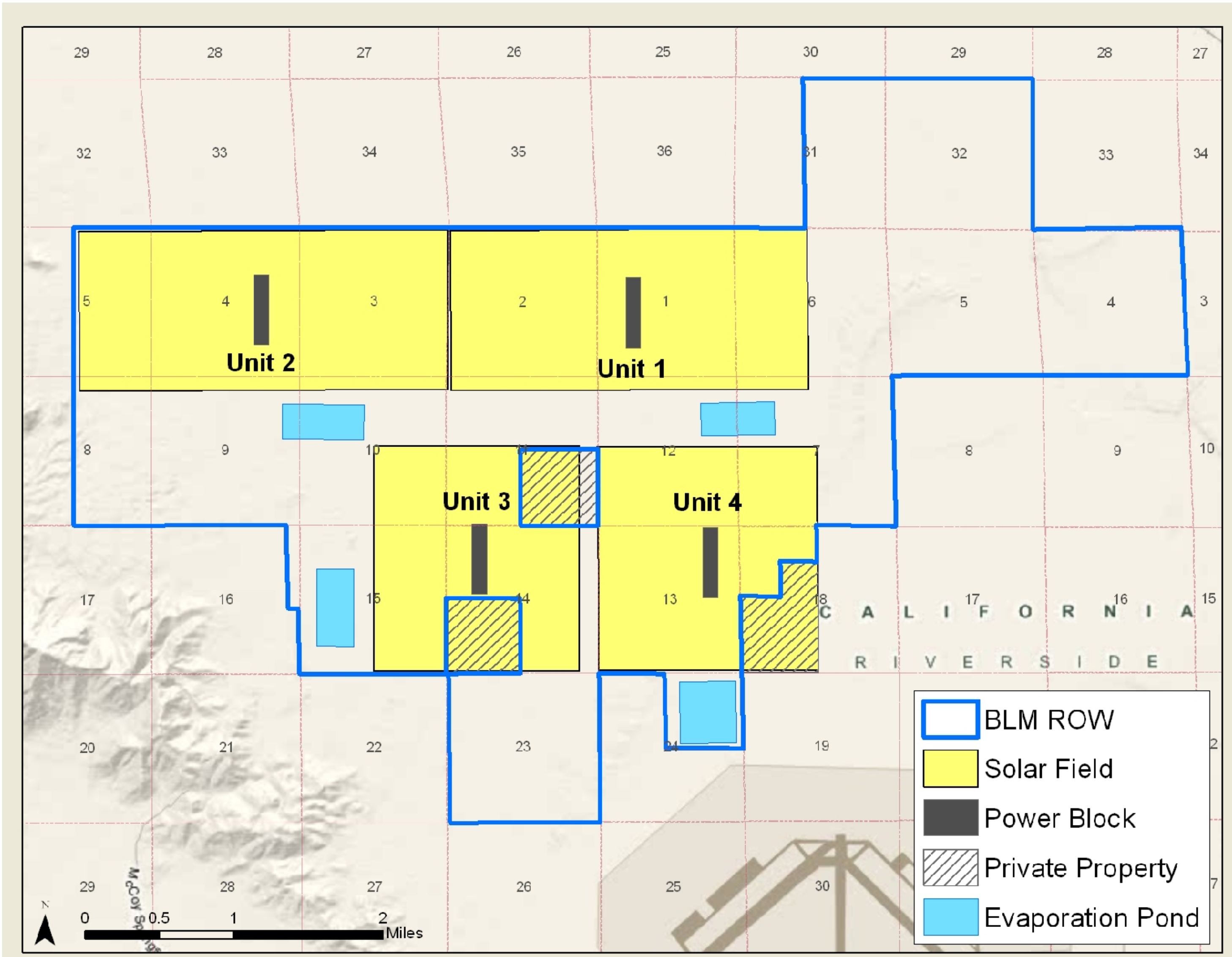

Map Location

Blythe Solar Power Project

Figure DR-ALT-42-1
Earlier Project Configuration
Including Private Land

Solar Millennium

AECOM

Project: 60139694
Date: January 2010

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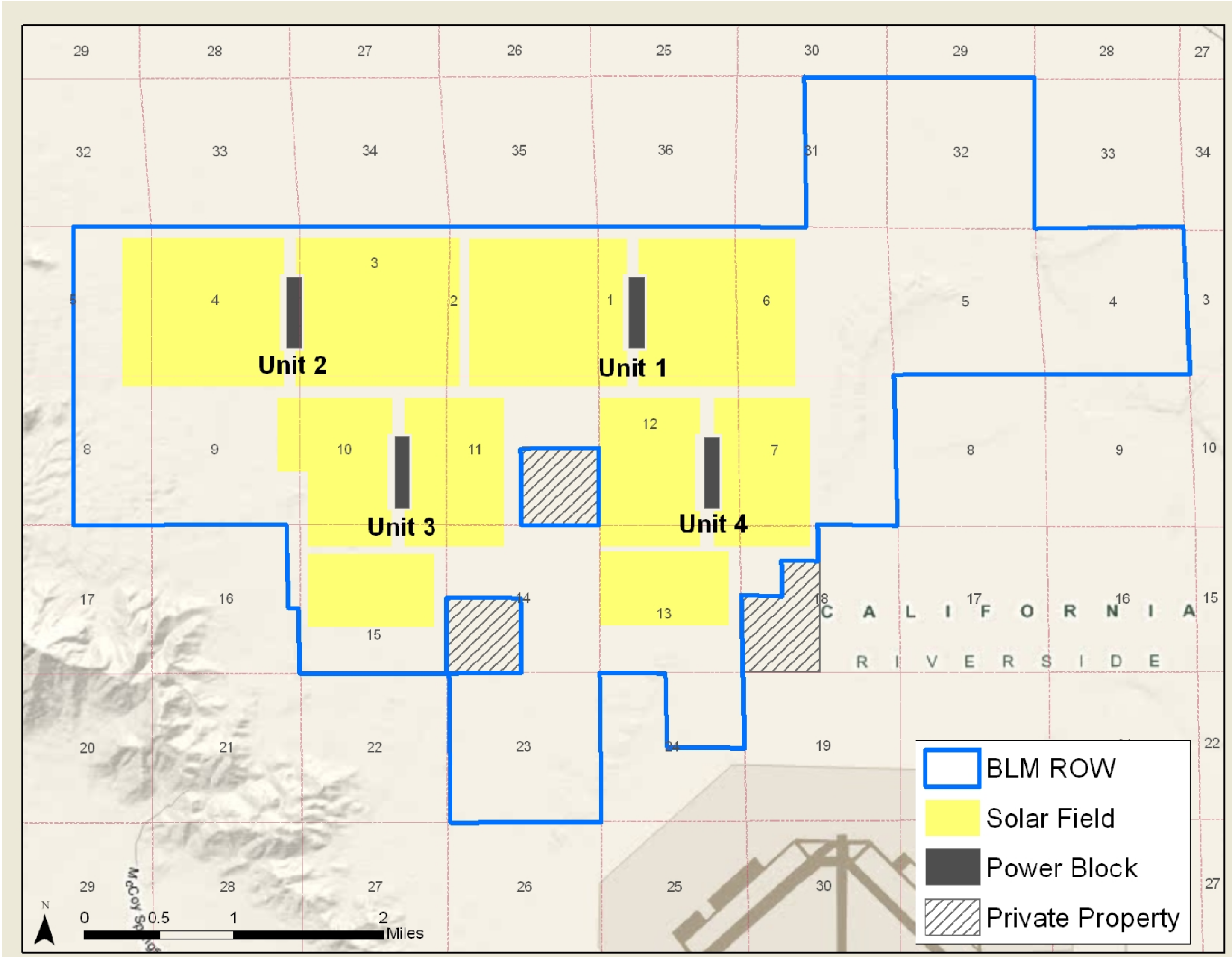

Map Location

Blythe Solar Power Project

Figure DR-ALT-42-2
Earlier Project Configuration
Using Only BLM Land

Solar Millennium

AECOM

Project: 60139694
Date: January 2010

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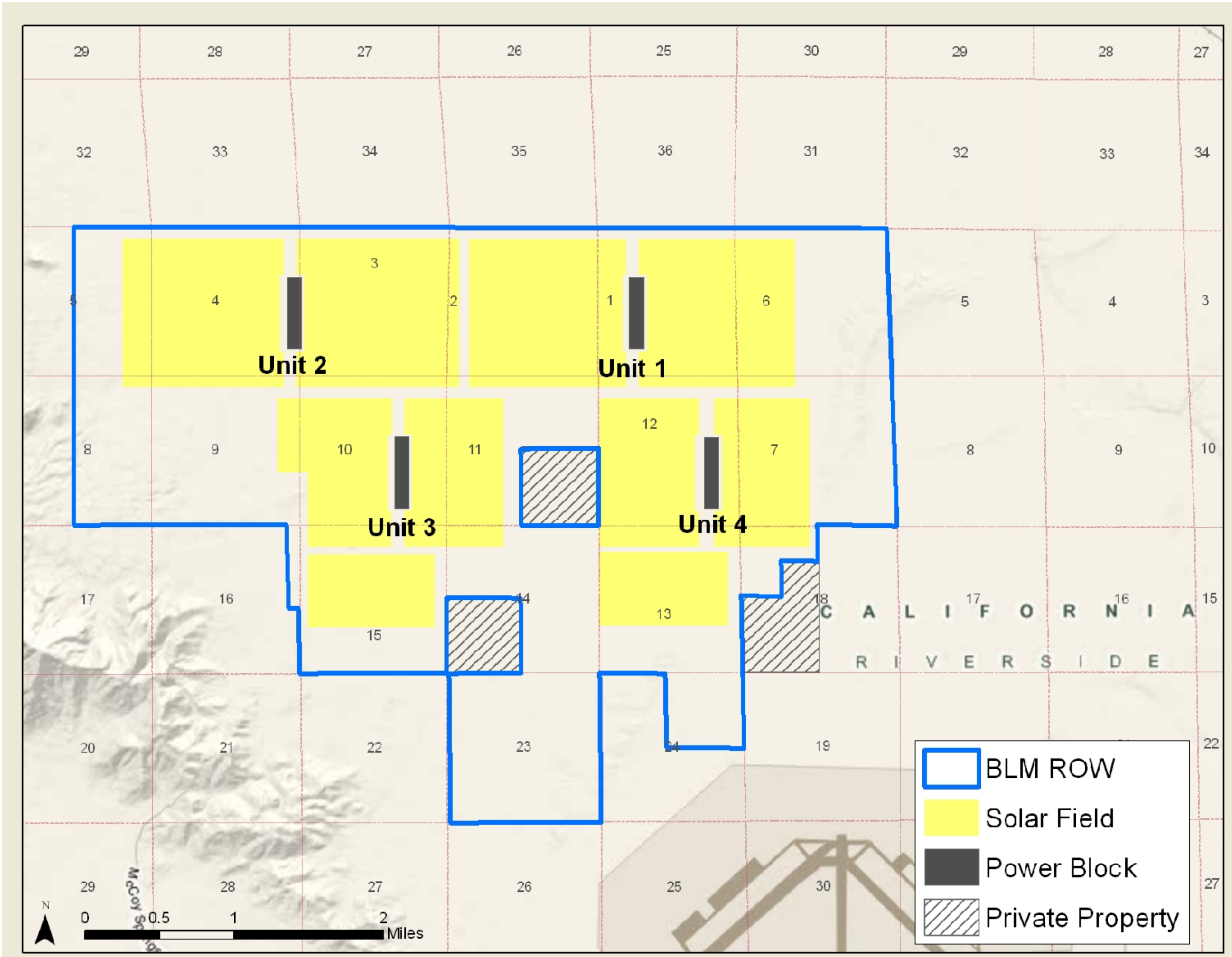

Map Location

Blythe Solar Power Project

Figure DR-ALT-42-3
2009 Project Configuration with Reduced Right-of-Way

Solar Millennium

AECOM

Project: 60139694
Date: January 2010

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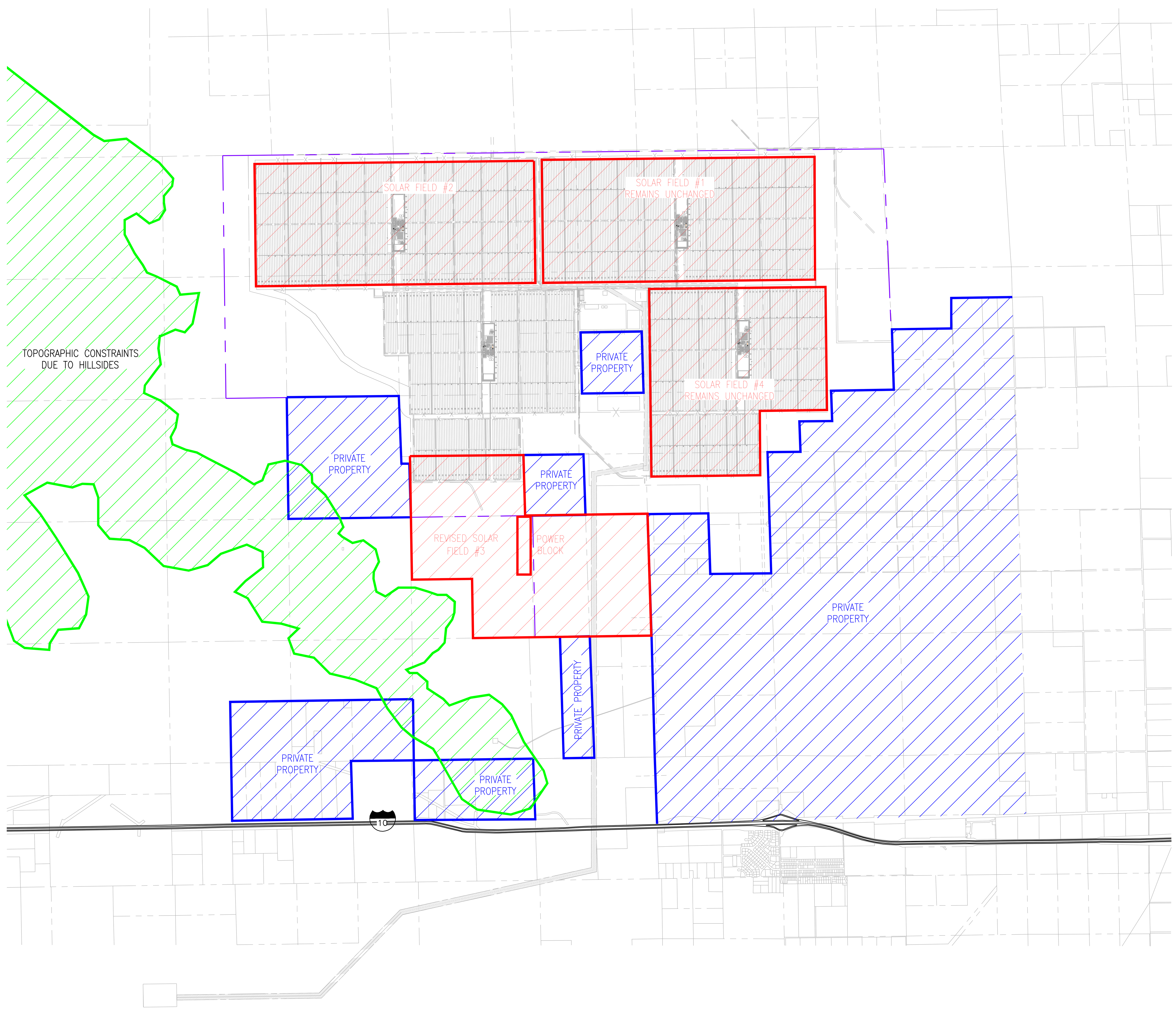

NOTE:
HORIZONTAL COORDINATES ARE REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83).

Figure DR-ALT-43-1 BSPP Alternative Reconfigured by Applicant

AECOM

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REGISTERED PROFESSIONAL ENGINEER
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No. 44325
Exp. 6-30-09
CIVIL
STATE OF CALIFORNIA

Designed: TNM
Checked: -
Drawn: TNM
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Chevron
345 California Street
San Francisco, California 94104

Solar Millennium LLC

LEGEND:

- SOLAR BLOCK LOCATION
- BALANCE OF PLANT FACILITIES
- PROPOSED ACCESS ROAD (PAVED)
- PROPOSED ACCESS ROAD (GRAVEL)
- PROPOSED SILT FENCE
- FR PROPOSED FIBER ROLLS
- EB PROPOSED EARTH BERM
- PROPOSED GAS PIPELINE
- PROPOSED 500kV GEN TIE LINE
- PROPOSED TELEPHONE LINE
- PROPOSED FENCE
- PROPOSED WIND FENCE
- PROPOSED CONTOURS
- PROPOSED STREAM LINE
- PROPOSED FLOOD CONTROL
- EXISTING PAVED ROAD
- EXISTING GRAVEL ROAD
- EXISTING CONTOURS
- EXISTING STREAM LINE
- SITE BOUNDARY
- PUB. R. PUBLIC ROAD
- P.R. PRIVATE ROAD
- DC DRANAGE CULVERT

Blythe Solar Power Project

Riverside County, California

Site Boundary & Legend

30% Conceptual Engineering Plans
NOT FOR CONSTRUCTION

Date: 8/07/09
Sheet: 2 OF 18