DOCKET	
09-AFC-7	
DATE	AUG 18 2010
RECD.	AUG 18 2010

August 18, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Palen Solar Power Project, Docket No. 09-AFC-7**
Resource Area: Biology

Dear Mr. Solomon:

Per your request, PSI is re-docketing and re-serving this submittal that was originally sent to the CEC Dockets Unit on July 21, 2010, then received by Dockets and served to POS recipients on July 22, 2010.

If you have any questions regarding this submittal, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

Solar Millennium LLC
A Wholly Owned Subsidiary of Solar Trust of America

1111 Broadway, 5th Floor
Oakland, CA 94607

t. (1) 510.524.4517
f. (1) 510. 463.6475

Info@SolarMillennium.com
http://www.SolarMillennium.com

Palen Solar Power Project
Application for Certification

Responses to CEC Information Requests
Reconfigured Alternatives 2 and 3
Biological Resources
09-AFC-7

Submitted by:
Palen Solar I, LLC

Submitted to:
California Energy Commission

Prepared by:
AECOM Environment

July 21, 2010

BIOLOGICAL RESOURCES

Introduction

The following terms will be used throughout the biological resources section of this Data Request response document to refer to the components of the Palen Solar Power Project (PSPP):

- Project Disturbance Area: The Project Disturbance Area encompasses the disturbance resulting from the proposed construction of the Proposed Project including solar fields, transmission facilities, office and maintenance buildings, lay down area, bioremediation area, drainage channels, leach fields, and other components.
- Project BRSA (Biological Resources Survey Area): The Project BRSA includes the Project Disturbance Area and all associated buffers.
- First Solar Survey Area: This includes a 1-mile section of the transmission line corridor leading to the Red Bluff East Substation. This area was surveyed by Tetra Tech as part f the proposed First Solar Desert Sunlight Solar Farm project located northwest of the PSPP. However, this data has not been available to Solar Millennium and its contractor (AECOM); and therefore, the survey results and impacts evaluation for this section of the transmission line are not included herein.
- Reconfigured Alternative 2 Disturbance Area: The Reconfigured Alternative 2 Disturbance Area encompasses the disturbance resulting from the proposed construction of Reconfigured Alternative 2 including solar fields, transmission facilities, office and maintenance buildings, lay down area, bioremediation area, drainage channels, leach fields, and other components.
- Reconfigured Alternative 2 (BRSA): The Reconfigured Alternative 2 BRSA includes the Reconfigured Alternative 2 Disturbance Area and all associated buffers.
- Reconfigured Alternative 3 Disturbance Area: The Reconfigured Alternative 3 Disturbance Area encompasses the disturbance resulting from the proposed construction of Reconfigured Alternative 3 including solar fields, transmission facilities, office and maintenance buildings, lay down area, bioremediation area, drainage channels, leach fields, and other components.
- Reconfigured Alternative 3 BRSA: The Reconfigured Alternative 3 BRSA includes the Reconfigured Alternative 3 Disturbance Area and all associated buffers.

BIO-1-1

Information Required:

For Reconfigured Alternatives 2 and 3 please provide the following:

1. An analysis of impacts to the sand transport corridor and Mojave fringe-toed lizard habitat, including direct and indirect impact acreages (by Zone and also overall MFTL habitat). If sand management activities such as clearing accumulated sand from the base of the wind fencing are proposed (please provide as much detail as possible on those proposed activities, including information about the anticipated frequency and volume of sand removal, the kind of equipment that would be used to excavate and transport sand, measures that would be taken to protect surrounding habitat and wildlife, and a figure depicting the location proposed for depositing the sand).

Response:

The Applicant has endeavored to design Reconfigured Alternatives 2 and 3 in such a manner that would further reduce disturbance within Zone II of the identified sand transport corridor. As described in the previous reports by Dr. Miles Kenney, the vast majority of all sand transport in this corridor is within Zone I, likely greater than 80 percent. Zone II accounts for the majority of the up to 20 percent remainder. Therefore, the Applicant does not believe either of the Reconfigured Alternatives impact the sand transport corridor. Portions of Zone II and Zone III are however, MFTL habitat. Dr. Kenney has updated his analysis to address the two alternatives; the updated analysis is attached to this submittal;

Attachment BIO-A contains all Biology figures. Figure BIO-1 depicts the Reconfigured Alternative 2 Disturbance Area overlain on sand transport zones and MFTL habitat. Figure BIO-2 depicts the Reconfigured Alternative 3 Disturbance Area overlain on sand transport zones and MFTL habitat. Table 1 presents direct and indirect impacts to MFTL habitat. There are no direct impacts to Zone I for either Reconfigured Alternative 2 or 3. We have calculated theoretical indirect impacts resulting in "sand shadows" that could potentially occur as a result of the blockage of sand by the wind fence around the northern boundary of the site. These theoretical sand shadows are shown in the Figure BIO-1 and BIO-2 as areas of purple shadow. Due to the very low quantity of sand movement and the wind direction, the Applicant does not agree that these theoretical sand shadows would result in significant impacts to MFTL habitat. However, the disagreement with Staff is moot because all but an extremely minimal amount of sand shadow falls outside the Disturbance Area boundaries (approximately 4.5 acres for Reconfigured Alternative 2 and 2.3 acres for Reconfigured Alternative 3). areas located within the Disturbance Area boundaries are already counted as permanent direct impacts. Direct impacts to MFTL will be mitigated by purchasing habitat.

Table 1. Direct and Indirect Impacts to MFTL Habitat for Reconfigured Alternatives 2 and 3 Disturbance Areas (acres)

MFTL Habitat	Reconfigured Alternative 2 Disturbance Area		Reconfigured Alternative 3 Disturbance Area	
	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts
High Quality MFTL Habitat	180.67	None	164.94	None
Moderate Quality MFTL Habitat	878.14	None	958.46	None
Low Quality MFTL Habitat	444.59	None	418.67	None
TOTAL	**1,503.40**	**0**	**1,542.06**	**0**

MFTL suitable habitat delineated by AECOM biologists within the disturbance areas for Reconfigured Alternatives 2 and 3 ranges from low to high quality. Suitable MFTL habitat is considered high quality if there is the abundance of fine, windblown sand that is highly suitable for MFTL burrowing. Suitable MFTL habitat is considered moderate quality if there is less windblown sand and the sand is coarser and more compact; the sand may be suitable for MFTL burrowing. However, MFTL in these areas use burrows dug by other animals (e.g. rodents) for cover. Suitable MFTL habitat is considered low quality if there is presence of only isolated sand patches and the absence of windblown sand.

BIO-1-2

Information Required:

For Reconfigured Alternatives 2 and 3 please provide the following:

2. Number of acres within DT Critical Habitat

Response:

Figures 13 and 14 from the PSPP Biological Resources Data Package submitted to the CEC on July 2, 2010 depict the DT suitable habitat and DT Critical Habitat within the Reconfigured Alternatives 2 and 3 Disturbance Areas. As reported in Table 7 of that Data Package, the Reconfigured Alternative 2 Disturbance Area contains approximately 11.47 acres of moderate quality DT Critical Habitat and 216.92 acres of low quality DT Critical Habitat. The Reconfigured Alternative 3 Disturbance Area contains approximately 11.47 acres of moderate quality DT Critical Habitat and 216.92 acres of low quality DT Critical Habitat.

The Chuckwalla DWMA provides a better delineation of the area potentially supporting primary constituent elements that should define DT critical habitat within the Project and Reconfigured Alternative Disturbance Area. Figures BIO-3 and BIO-4 depict the Chuckwalla DWMA and DT Critical Habitat within the Reconfigured Alternative 2 and Reconfigured Alternative 3 Disturbance Areas, respectively. DT CHU boundaries, as stated in the *Determination of Critical Habitat for the Mojave Population of the Desert Tortoise; Final Rule* (USFWS 1994a), are loosely based on DWMA boundaries; however, to facilitate legal definitions, CHU boundaries typically follow adjacent section lines. Therefore, at this coarse scale of mapping, CHU boundaries may contain both suitable and unsuitable habitat for the species (USFWS 1994a). The DWMA boundaries are a more relevant indicator of suitable habitat for this area because they are not merely adjusted to section lines but rather based on biological conditions and principles. The portion of habitat within the Project and Reconfigured Alternative Disturbance Area north of I-10 does not meet five of the principles of conservation biology used to delineate DWMA boundaries and thus was excluded from the DWMA.

A review of the USFWS identification process of DWMAs boundaries clarifies why this is the case. DWMAs boundaries are based on the seven principles of conservation biology used in the Draft Recovery Plan for desert tortoise (USFWS 1994a). These principles state that:

(1) Reserves should be well distributed across a species' native range;
(2) Reserves should contain large blocks of habitat with large populations of the target species;
(3) Blocks of habitat should be close together;
(4) Reserves should contain contiguous rather than fragmented habitat;
(5) Habitat patches should contain minimal edge to area ratios;
(6) Blocks should be interconnected by corridors or linkages containing protected, preferred habitat for the target species; and
(7) Blocks of habitat should be roadless or otherwise inaccessible to humans.

The Chuckwalla DWMA boundary does not match that of the DT CHU because the portion of the CHU north of the I-10 does not meet all seven principles required to be in a DWMA and the adjustment of CHU boundaries to adjacent section lines causes CHU boundaries to extend north of I-10. Of the seven principles of conservation biology used for DWMA boundaries, only two (1 and 3) are associated with the portion of the CHU north of I-10, while the other five elements are lacking.

Principle number "2" is not met due to the low density of DT sign detected in the CHU boundary north of the I-10. The only DT sign observed within this area were bone fragments, which were probably washed down from the adjacent mountains. No DTs were observed anywhere in the CHU in the Project and Reconfigured Alternative Disturbance Area.

Principle numbers "4, 5, 6, and 7" are not met due to the presence of the I-10 to the south, an existing orchard to the west, and a palm farm and an existing single family residence to the northwest. These factors result in fragmentation, high edge to area ratio, limited functional connectivity, and high human disturbance in the CHU boundary north of the I-10. The evidence of human disturbance within this area noted was high and included off-road vehicle use, domestic dog use and trash dumping.

As a result of DT protocol surveys and habitat assessments conducted in 2009 and 2010, project biologists characterized DT critical habitat within the Project and Reconfigured Alternative Disturbance Area based on the presence and prevalence of the six primary constituent elements (i.e., functions and values) of DT critical habitat (USFWS1994a). According to this Final Rule (USFWS1994a), DT critical habitat consists of six primary constituent elements (PCEs). The functions and values of DT critical habitat occurring within the Project and Reconfigured Alternative Disturbance Area are considerably lower north of Interstate-10 (I-10) and higher south of I-10, and generally increase with proximity to the Palen Mountains to the south. All six PCEs are met where the CHU overlaps with the Project and Reconfigured Alternative Disturbance Area south of I-10, whereas only three PCEs are met where overlap occurs north of I-10.

Based on this analysis, the Chuckwalla DWMA boundary (which does not extend north of I-10 into the Reconfigured Alternatives 2 and 3 Disturbance Areas) provides a better delineation of what should be considered DT critical habitat for PSPP than the DT CHU boundary.

BIO-1-3a-d

Information Required:

For Reconfigured Alternatives 2 and 3 please provide the following:

3. The following files, in both GIS (shapefile) and Google earth (kml) formats for:

    a. Project disturbance area boundary

    b. Wind fence (if different from disturbance boundary)

    c. 2009 and 2010 MFTL observations points (from applicant's Figure 19)

    d. For Alternatives 2 and 3, please provide calculations for indirect impacts to the sand transport corridor/MFTL habitat.

Response:

The requested shapefiles and kml files are provided on the attached CD. Please refer to response BIO-1-2, above, for a discussion of the calculations. .

BIO-2-1a-b

Information Required:

For the Proposed Project (and Reconfigured Alternatives 2 & 3 where applicable):

1. The updated Biological Resources Technical report (mentioned in the Spring 2010 survey results memo dated June 15, 2010, on the first page of the AECOM memo dated May 27, 2010). This report should contain:

    a. Temporary and permanent impact acreages by habitat type (or species if appropriate) broken down by power plant footprint, transmission line, etc. Please use the same table response format that was submitted for the June 23, 2010 Blythe filing.

    b. Please include updated buffer and Biological Resources Survey Area numbers, if applicable.

Response:

Palen Solar I is no longer preparing a separate Biological Resources Technical Report (BRTR). The PSPP Biological Resources Data Package submitted on July 2, 2010 was intended to serve the function of the BRTR by providing the results of the biological resources surveys conducted to date relative to the disturbance areas of the two new alternatives. However, we have provided the requested additional information herein. The previously submitted Data Package only included data and figures for Reconfigured Alternatives 2 and 3; therefore, we are providing an addendum to that Data Package for the original proposed Project that presents the same data information and figures. Please see Attachment BIO-B for the PSPP Biological Resources Data Package Addendum.

The following tables provide direct and indirect impacts to vegetation communities, State waters, vegetated swales, and rare plants by Project feature (solar facility site, transmission line alignment, and access road). Table 2 provides the direct impacts to vegetation communities, including State waters and vegetated swales, by Project feature. Table 3 provides indirect impacts to waters of the State by project feature. Please note that the access road, transmission lines and utilities corridor will not result in indirect impacts to waters of State or vegetated swales because downstream flows will be maintained via culverts or overland flow. Table 4 provides direct impacts to rare plants by Project feature. Note that the buffer and Biological Resources Survey Area values have not changed since the PSPP Biological Resources Data Package submitted on July 2, 2010 and are not included in the tables below.

The data provided herein and Attachment BIO-B include buffer and BRSA values

Table 2. Anticipated Permanent Direct Impacts to Vegetation Communities and Waters of the State in the Project Disturbance Area and Reconfigured Alternatives 2 and 3 Disturbance Areas (in acres) by Project Feature

Vegetation Communities and Other Cover Types	Proposed Project Disturbance Area						Reconfigured Alternative 2 Disturbance Area						Reconfigured Alternative 3 Disturbance Area					
	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total
Riparian																		
Desert Dry Wash Woodland	136.18	11.36	-	-	-	147.54	196.45	11.36	-	-	-	207.80	186.32	11.36	-	-	-	197.67
Unvegetated Ephemeral Dry Wash	163.30	0.71	-	-	-	164.00	179.39	0.71	-	-	-	180.10	167.11	0.71	-	-	-	167.81
Subtotal Riparian	*299.48*	*12.06*	-	-	-	*311.54*	*375.84*	*12.06*	-	-	-	*387.90*	*353.42*	*12.06*	-	-	-	*365.48*
Upland																		
Active Desert Dunes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Desert Sink Scrub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dry Lake Bed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sonoran Creosote Scrub Brush	3,288.89	121.80	3.28	3.32	4.65	3,421.94	3,683.92	121.45	3.28	3.30	4.96	3,816.91	3,637.65	121.45	3.28	3.30	4.96	3,770.64
Stabilized and Partially Stabilized Desert Dunes	284.74	-	-	-	-	284.74	155.59	-	-	-	-	155.59	187.83	-	-	-	-	187.83
Subtotal Upland	*3,573.62*	*121.80*	*3.28*	*3.32*	*4.65*	*3,706.67*	*3,839.51*	*121.45*	*3.28*	*3.30*	*4.96*	*3,972.50*	*3,825.48*	*121.45*	*3.28*	*3.30*	*4.96*	*3,958.47*
Other																		
Agricultural Land	0.02	2.94	-	-	-	2.96	0.10	2.94	-	-	0.01	3.05	0.10	2.94	-	-	0.01	3.05
Developed	-	-	0.21	1.69	-	1.90	-	-	0.21	1.63	-	1.84	-	-	0.21	1.63	-	1.84
Subtotal Other	*0.02*	*2.94*	*0.21*	*1.69*	-	*4.86*	*0.10*	*2.94*	*0.21*	*1.63*	*0.01*	*4.88*	*0.10*	*2.94*	*0.21*	*1.63*	*0.01*	*4.88*
Grand Total	**3,873.13**	**136.80**	**3.49**	**5.01**	**4.65**	**4,023.07**	**4,215.45**	**136.45**	**3.49**	**4.93**	**4.97**	**4,365.29**	**4,179.00**	**136.45**	**3.49**	**4.93**	**4.97**	**4,328.84**

Table 3. Anticipated Indirect Impacts to Waters of the State in the Project Disturbance Area (in acres) by Project Feature

Type of Jurisdictional Waters of the State	Project Disturbance Area						Reconfigured Alternative 2 Disturbance Area						Reconfigured Alternative 3 Disturbance Area					
	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total
Xeric Riparian Extent	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ephemeral Channel	31.98	-	-	-	-	31.98	18.50	-	-	-	-	18.50	17.64	-	-	-	-	17.64
Grand Total	**31.98**	-	-	-	-	**31.98**	**18.50**	-	-	-	-	**18.50**	**17.64**	-	-	-	-	**17.64**

Table 4. Direct Impacts to Special Status Plant Species within the Project Disturbance Area by Project Feature (Plant Counts)

Species Common Name	Project Disturbance Area						Reconfigured Alternative 2 Disturbance Area						Reconfigured Alternative 3 Disturbance Area					
	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total	Project Plant Facility Site	Transmission Line Alignment	Access Road	Telecom Route	Construction Water Supply	Total
CNPS List 1B and CNPS List 2 Plant Species																		
Harwood's milkvetch	5	2	-	-	-	**7**	4	2	-	-	-	**6**	5	2	-	-	-	**7**
Harwood's woollystar	-	-	-	-	-	**-**	-	-	-	-	-	**-**	-	-	-	-	-	**-**
CNPS List 3, CNPS List 4, and Taxonomically Unresolved Plant Species																		
ribbed cryptantha[a]	$3.6x10^6$ 406.01 acres	-	-	-	-	**$3.6x10^6$** **406.01 acres**	$4.4x10^5$ 49.60 acres	-	-	-	-	**$4.4x10^5$** **49.60 acres**	$4.7x10^5$ 52.46 acres	-	-	-	-	**$4.7x10^5$** **52.46 acres**
California ditaxis	-	-	-	-	-	**-**	-	-	-	-	-	**-**	-	-	-	-	-	**-**
Additional Plant Species for Consideration at the Request of BLM (La Pre 2009)																		
California barrel cactus	-	-	-	-	-	**-**	-	-	-	-	-	**-**	-	-	-	-	-	**-**
cottontop cactus	1	-	-	-	-	**1**	-	-	-	-	-	**-**	-	-	-	-	-	**-**

[a]Ribbed cryptantha is also expressed in terms of area (acres) due to the quantity of this species in the sandy dune habitats. Plant counts are estimates, based on subsampling data from within the ribbed cryptantha population (calculated density of 2.2 plants per square meter, or 8,903 plants per acre).

BIO-2-2

Information Required:

2. If phasing is proposed for Palen as for Blythe, we would need detailed phasing information including a figure depicting the boundaries of each phase and acreages disturbed for each phase. For each phase area please also include the acreage of habitat types (for example, desert wash woodland and other waters of the state, Mojave fringe-toed lizard habitat, stabilized and partially stabilized sand dunes, critical habitat, etc.).

Response:

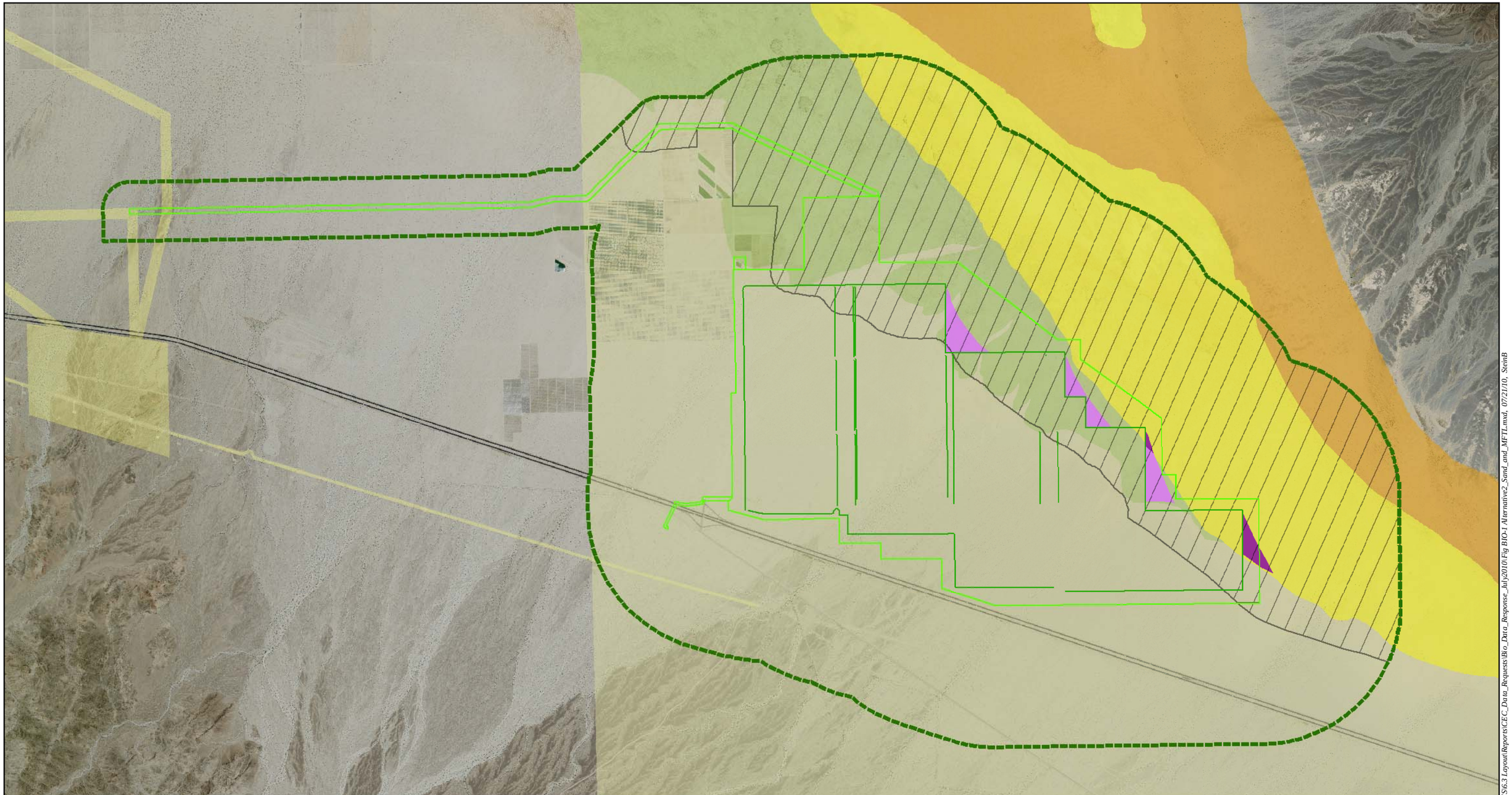
Construction phasing is proposed for Palen. There are two construction phases proposed at this time. Table 5 provides the acreages disturbed for each phase by habitat type. Figures BIO-5 and BIO-6 depict the boundaries of each phase for Reconfigured Alternative 2 and Reconfigured Alternative 3, respectively.

Table 5. Area of Habitat Type Disturbed by Construction Phase (acres)

Habitat Type	Reconfigured Alternative 2 Disturbance Area		Reconfigured Alternative 3 Disturbance Area	
	Phase 1	**Phase 2**	**Phase 1**	**Phase 2**
MFTL Habitat				
High Quality MFTL Habitat	None	180.67	13.39	151.55
Moderate Quality MFTL Habitat	467.00	411.14	347.68	610.78
Low Quality MFTL Habitat	213.89	230.70	207.10	211.55
TOTAL	**680.89**	**822.51**	**568.17**	**973.88**
DT Habitat				
Moderate Quality DT Habitat	39.81	None	39.81	None
Low Quality DT Habitat	2,353.33	1,971.85	2,225,95	2,065.84
TOTAL	**2,393.14**	**1,971.85**	**2,265.76**	**2,065.84**
Jurisdictional Waters (Direct Impact)				
Riparian Interfluve	62.49	2.15	59.18	1.67
Unvegetated Ephemeral Dry Wash	98.96	81.12	94.86	73.02
Vegetated Ephemeral Dry Wash	137.81	3.84	132.02	3.24
Wash Dependent Vegetation	1.43	0.08	1.42	0.08
TOTAL	**300.69**	**87.19**	**287.48**	**78.01**
Jurisdictional Waters (Indirect Impact)				
Riparian Interfluve	None	None	None	None
Unvegetated Ephemeral Dry Wash	16.67	1.83	15.33	2.30
Vegetated Ephemeral Dry Wash	None	None	None	None
Wash Dependent Vegetation	None	None	None	None
TOTAL	**16.67**	**1.83**	**15.33**	**2.30**

ATTACHMENT A

FIGURES



Map Location

Legend

- Reconfigured Alternative 2 Disturbance Area
- Reconfigured Alternative 2 BRSA
- Mojave Fringe-toed Lizard Suitable Habitat
- fig-2-2 fences.dwg Polyline
- First Solar Area

Wind Shadow

- Zone II
- Zone III

Sand Zones (digitized)

- Zone I
- Zone II
- Zone III
- Zone IV

Source: NAIP 2009; AECOM 2010; BLM 2010

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

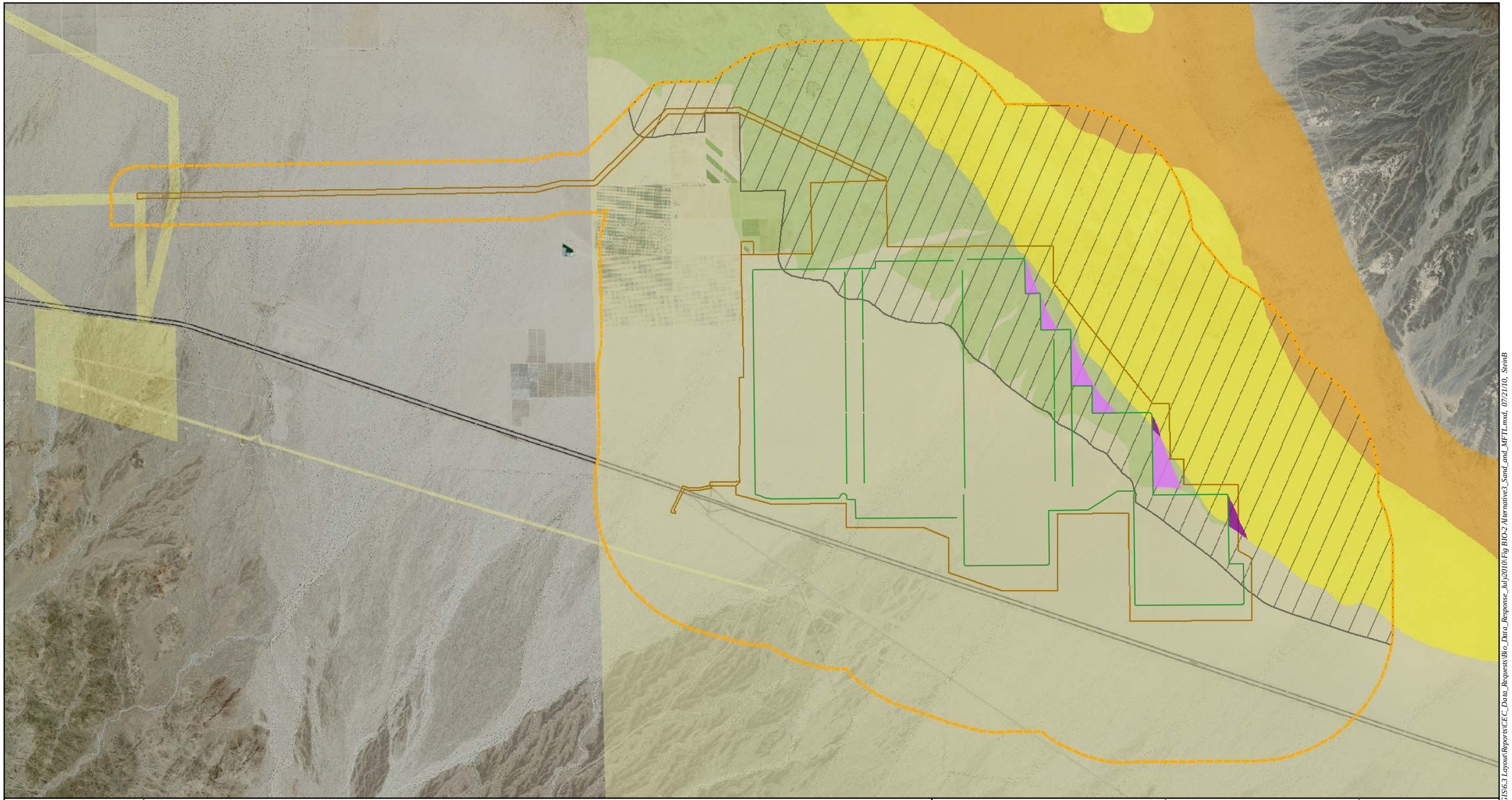
Palen Solar Power Project
Figure BIO-1

Sand Transport Zones and MFTL Habitat within Reconfigured Alternative 2 BRSA

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 LayoutReports\CEC_Data_Requests\Bio_Data_Response_July2010\Fig BIO-1 Alternative2_Sand_and_MFTL.mxd 07/21/10 SteinB



Map Location

Legend

- Reconfigured Alternative 3 Disturbance Area
- Reconfigured Alternative 3 BRSA
- Mojave Fringe-toed Lizard Suitable Habitat
- Fenceline
- First Solar Area

Wind Shadow

- Zone II
- Zone III

Sand Zones (digitized)

- Zone I
- Zone II
- Zone III
- Zone IV

Source: NAIP 2009; AECOM 2010; BLM 2010

N
W
E
S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Palen Solar Power Project
Figure BIO-2

Sand Transport Zones and MFTL Habitat within Reconfigured Alternative 3 BRSA

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol MI Palen\6.0 GIS\6.3 Layout\Reports\CEC_Data_Requests\Bio_Data_Response_July2010\Fig BIO-2 Alternative3_Sand_and_MFTL.mxd, 07/21/10, SteinB

Map Location

Legend

- Reconfigured Alternative 2 Disturbance Area
- Reconfigured Alternative 2 BRSA
- Desert Tortoise Designated Critical Habitat (USFWS)
- Chuckwalla DWMA

Source: NAIP 2009; AECOM 2010; BLM 2010

N
W E
S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Palen Solar Power Project
Figure BIO-3

DT Critical Habitat within Reconfigured Alternative 2 BRSA

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout Reports\CEC_Data_Requests\Bio_Data_Response_July2010\Fig BIO-3 Alternative2_Desert Tortoise_CriticalHabitat.mxd, 07/20/10, SteinB

Map Location

Legend

- Reconfigured Alternative 3 Disturbance Area
- Reconfigured Alternative 3 BRSA
- Desert Tortoise Designated Critical Habitat (USFWS)
- Chuckwalla DWMA

Source: NAIP 2009; AECOM 2010; BLM 2010

N
W E
S

1 inch = 3,500 feet

0 3,500 7,000 Feet

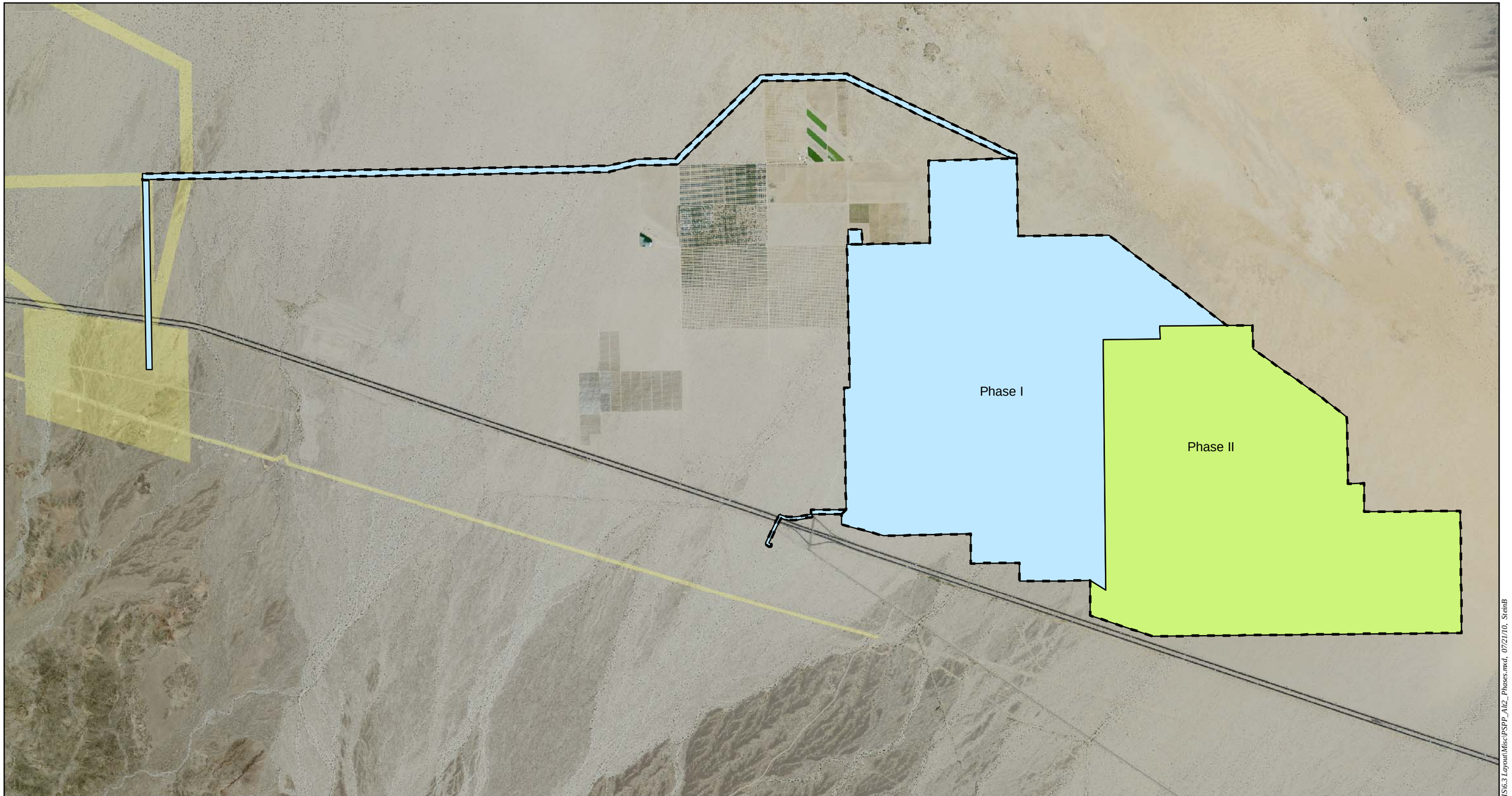
Palen Solar Power Project
Figure BIO-4

DT Critical Habitat within Reconfigured Alternative 3 BRSA

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Data_Requests\Bio_Data_Response_July2010\Fig BIO-4 Alternative3_Desert Tortoise_CriticalHabitat.mxd, 07/20/10, SteinB



Map Location

Legend

Reconfigured Alternative 2 Disturbance Area

First Solar Area

Reconfigured Alternative 2 Construction Phases

Phase I

Phase II

Source: NAIP 2009; AECOM 2010; BLM 2010

N
W E
S

1 inch = 3,000 feet

0 3,000 6,000 Feet

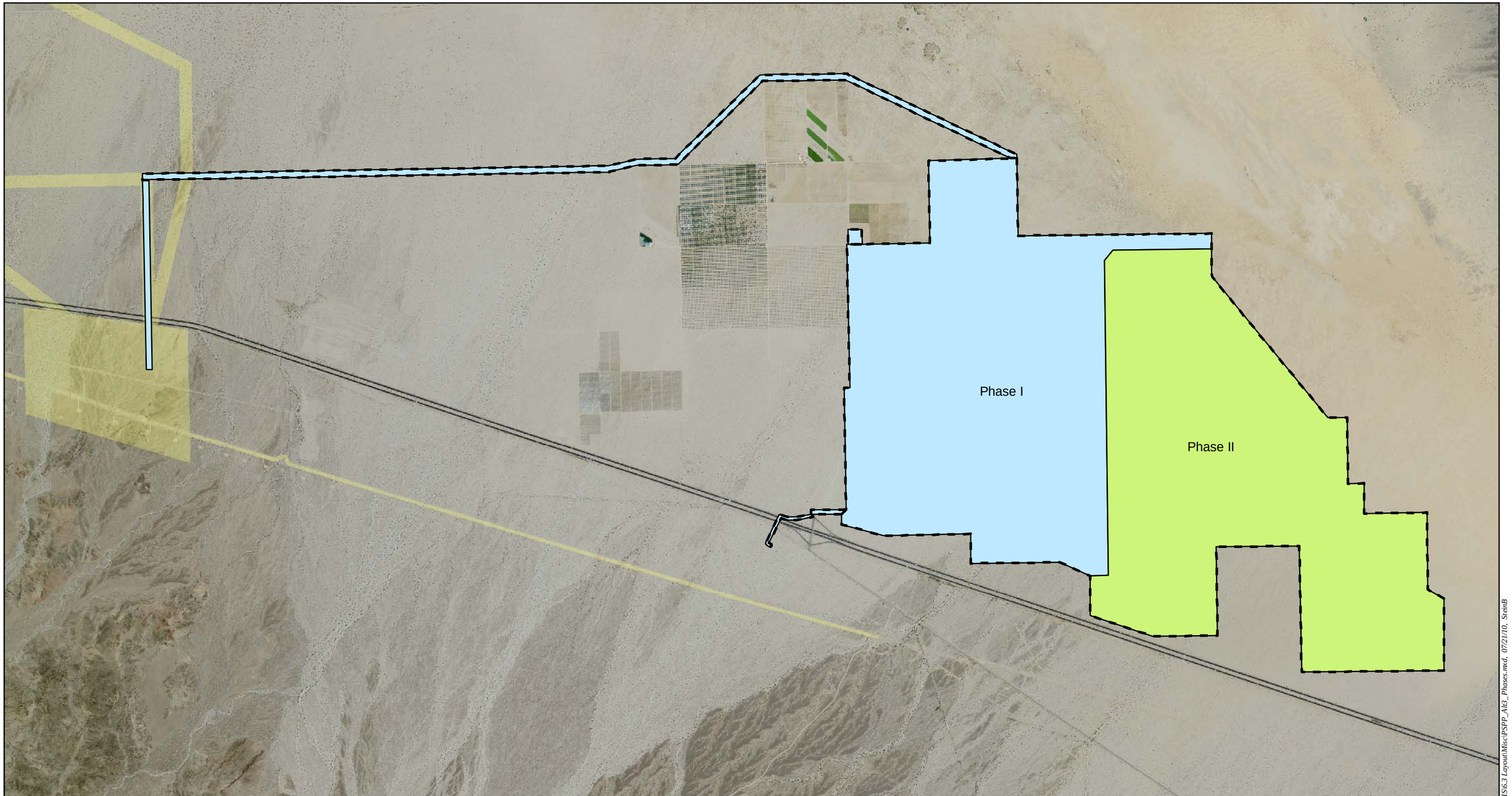
Palen Solar Power Project

Figure BIO-5
Reconfigured Alternative 2
Construction Phases

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Misc\PSPP_Alt2_Phases.mxd, 07/21/10, SteinB



Map Location

Legend

Reconfigured Alternative 3 Disturbance Area

First Solar Area

Reconfigured Alternative 3 Construction Phases

Phase I

Phase II

Source: NAIP 2009; AECOM 2010; BLM 2010

N

W E

S

1 inch = 3,000 feet

0 3,000 6,000 Feet

Palen Solar Power Project

Figure BIO-6
Reconfigured Alternative 3
Construction Phases

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Misc\PSPP_Alt3_Phases.mxd, 07/21/10, SteinB

BIOLOGICAL RESOURCES DATA PACKAGE ADDENDUM

PALEN SOLAR POWER PROJECT
BIOLOGICAL RESOURCES DATA PACKAGE ADDENDUM
RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

Palo Verde Solar I, LLC
1625 Shattuck Avenue
Berkeley, California 94709

Prepared by:

AECOM
1420 Kettner Boulevard, Suite 500
San Diego, California 92101
Phone: (619) 233-1454
Fax: (619) 233-0952

July 2010

TABLE OF CONTENTS

Section **Page**

1.0 INTRODUCTION 1
1.1 Background 1
1.2 Proposed Project Location and site description 2

2.0 DATA TABLES AND FIGURES 4

ATTACHMENT
1 Figures

LIST OF TABLES

Table **Page**

Table 1 Vegetation Communities and Cover Types (in acres) 5
Table 2 Potential Jurisdictional Waters of the United States and Waters of the State of California Occurring within the Proposed Project 6
Table 3 Occurrence Detail for Special Status Plant Species Documented for the Proposed Project 7
Table 4 Desert Tortoise Observations within the Project BRSA 8
Table 5 Desert Tortoise Suitable and Critical Habitat within the Proposed Project 9
Table 6 Summary of Non-listed Special Status Species Observations within Project BRSA 10

1.0 INTRODUCTION

The following terms will be used throughout this report:

- Project Disturbance Area: The Project Disturbance Area encompasses the disturbance resulting from the proposed construction of the Proposed Project including solar fields, transmission facilities, office and maintenance buildings, lay down area, bioremediation area, drainage channels, leach fields, and other components.
- Project BRSA (Biological Resources Survey Area): The Project BRSA includes the Project Disturbance Area and all associated buffers.
- Focused Survey Area: This includes all areas surveyed during 2009 and 2010 pursuant to survey protocols. Some of these areas were surveyed for contingency reasons in the engineering design process and ultimately will not be disturbed by the Palen Solar Power Project (PSPP).
- Focused Survey BRSA: The Focused Survey BRSA includes the Focused Survey Areas and all associated buffers.
- Desert Aquatic Resources Survey Area (DARSA): This includes the Project Disturbance Area and associated 250-foot buffers.
- First Solar Survey Area: This includes a 1-mile section of the transmission line corridor leading to the Red Bluff East Substation. This area was surveyed by Tetra Tech as part f the proposed First Solar Desert Sunlight Solar Farm project located northwest of the PSPP. However, this data has not been available to Solar Millennium and its contractor (AECOM); and therefore, the survey results and impacts evaluation for this section of the transmission line are not included herein.

1.1 BACKGROUND

AECOM performed biological resources studies for Palen Solar I, LLC, the Applicant for the proposed Palen Solar Power Project (Project or PSPP). This report summarizes the results of biological resources surveys conducted in 2009 and 2010 and present acreages of Project disturbance to vegetation cover types and jurisdictional waters for the Proposed Project. This report summarizes the data yielded by the survey work and includes figures to enable the CEC to conduct an analysis of the Proposed Project in its Revised Staff Assessment.

Subsequent to the preparation of the Application for Certification (AFC) in August (AECOM 2009), Palen Solar I, LLC made various minor modifications to the PSPP in areas that had not yet been surveyed. AECOM surveyed these additional areas in spring 2010. In addition, the March 2010 California Energy Commission (CEC) Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) analyzed a Reconfigured Alternative that AECOM surveyed as part of the spring 2010 surveys. The combined results of spring 2009, fall 2009 and spring 2010 biological surveys conducted to date for the desert tortoise (*Gopherus agassizii*; DT), western burrowing owl (*Athene cunicularia hypugaea*; WBO), golden eagle (*Aquila chrysaetos*; GOEA), botanical surveys, and jurisdictional waters of the state are included herein. Incidental wildlife observations noted during protocol surveys for special status species and jurisdictional waters are also included herein.

It should be noted that the Applicant, in consultation with the resource agencies, introduced two further Reconfigured Alternative Disturbance Areas (Reconfigured Alternatives 2 and 3) subsequent to completing spring 2010 surveys; these alternatives were devised primarily to avoid impacts to Mojave fringe-toed lizard habitat. A data package covering the subject matter of this submittal for the Reconfigured Alternatives 2 and 3 was provided to the CEC on July 2, 2010.

1.2 PROPOSED PROJECT LOCATION AND SITE DESCRIPTION

Palen Solar I, LLC (PSI or Applicant), is proposing to construct two commercial solar thermal electric power-generating stations, each producing 250 MW and referred to as the Palen Solar Power Project (PSPP or Project). The proposed Project would include installation of two solar power units within a Bureau of Land Management (BLM) right-of-way (ROW) located in the southern California inland desert, approximately 10 miles east of Desert Center, in eastern Riverside County (Figure 1). The total Project Disturbance Area would be 4,023 acres (Figure 2). The total Project BRSA is 14,771 acres (Figure 2).

The Project Disturbance Area is largely undeveloped. To the north of the Project Disturbance Area is Palen Dry Lake. The Chuckwalla Mountains are located to the south of the site and the Palen Mountains to the northeast. The Chuckwalla Wilderness Area and the Palen-McCoy Wilderness Area are located to the north and south of the proposed Project, respectively, and beyond the BRSA.

Topography in the BRSA is generally flat with elevations ranging from approximately 425 to 650 feet. The existing topographic conditions of the Project Disturbance Area show an average slope of approximately 1 foot every 330 feet (0.30 percent) toward the northeast, with a series of

desert washes traversing the site (e.g., a primary wash and a few secondary washes). Drainage across the undeveloped property is concentrated in these washes, until the drainage features disappear and flows fan out across the landscape as sheet flow. During infrequent large precipitation events, runoff through sheet flow may reach Palen Dry Lake, approximately 1-mile northeast of the site.

2.0 DATA TABLES AND FIGURES

Table 1 through 6 quantify the combined results of spring 2009, fall 2009 and spring 2010 biological surveys conducted to date for the desert tortoise (*Gopherus agassizii*; DT), western burrowing owl (*Athene cunicularia hypugaea*; WBO), botanical surveys, and jurisdictional waters of the state. The tables show the survey results for the Proposed Project. Figures 2 shows the Project Disturbance Area boundaries and Figure 3 shows the proposed facility layout. Figures 4 through 15 display the results of the biological resources surveys. GOEA survey results noted one inactive GOEA nest located just over 10 miles northeast of the site and 4 inactive GOEA nests were located approximately 6 miles southwest of the site.

Tables 1 and 2 present the results of vegetation mapping and jurisdictional waters surveys. Because it is assumed that anything within the Disturbance Area will be permanently directly impacted by the PSPP, the results calculations are the same as the impact calculations. For example, all vegetation communities and cover types within the Disturbance Area will be permanently directly impacted. All jurisdictional waters within the Disturbance Area will be permanently directly impacted. All jurisdictional waters hydrologically connected downstream within the buffer area were assumed to be permanently indirectly impacted.

Table 3 presents special status plant species observations within the Project BRSA, All special status plant species within the Disturbance Area will be permanently directly impacted.

Tables 4 presents DT observations and Table 5 presents DT habitat within the Project BRSA. All DT observations and habitat within the Disturbance Area will be permanently directly impacted.

Table 6 presents non-listed species status wildlife observations within the Project BRSA. All non-listed species status wildlife observations within the Disturbance Area will be permanently directly impacted.

Table 1
Vegetation Communities and Cover Types (in acres)

Vegetation Communities and Other Cover Types	Project BRSA		
	Disturbance Area	Buffer Area	Total
Riparian			
Desert Dry Wash Woodland	147.54	698.64	846.18
Unvegetated Ephemeral Dry Wash[a]	164.00	60.78	224.79
Subtotal Riparian	*311.54*	*759.42*	*1,070.96*
Upland			
Active Desert Dunes	-	683.87	683.87
Desert Sink Scrub	-	9.40	9.40
Dry Lake Bed	-	270.00	270.00
Sonoran Creosote Bush Scrub	3,421.94	7,422.68	10,844.62
Stabilized and Partially Stabilized Desert Dunes	284.74	625.17	909.91
Subtotal Upland	*3,706.67*	*9,011.13*	*12,717.80*
Other			
Agricultural Fields	2.96	829.99	832.95
Developed	1.90	147.44	149.34
Subtotal Other Cover Types	*4.86*	*977.43*	*982.29*
Total Acres[b]	**4,023.07**	**10,747.98**	**14,771.05**

[a] Unvegetated channels are considered by some to be potentially jurisdictional aquatic features and were not mapped within the buffer because these surveys were conducted at a minimum mapping unit of 1.0 acre, as opposed to 0.01 of an acre for riparian vegetation communities within the Disturbance Area. This approach is consistent with the Jurisdictional Delineation methodology and is pursuant to Appendix B, Section (g), Subsection (13), Paragraph (B), Clause (iii) of the the CEC Siting Regulations, which does not require detailed mapping of aquatic features beyond 250 feet of the disturbance limits (CEC 2007).

[b] All values were rounded to the nearest hundredth-acre after summation.

Table 2
Potential Jurisdictional Waters of the United States and Waters of the State of California Occurring within the Proposed Project

Type of Jurisdictional Waters	Type of Habitat (Holland 1986)	Type of Habitat (Cowardin et al. 1979)	Aquatic Resource (acres)[a]			
			Within Disturbance Area	Within 250-feet of the Disturbance Area		Total Survey Area
				Hydrologically Connected Upstream	Hydrologically Connected Downstream	
Jurisdictional Waters of the United States						
None	N/A	N/A	-	-	-	-
		Total USACE Waters =	-	-	-	-
		Subtotal Jurisdictional Waters of the United States	-	-	-	-
Jurisdictional Waters of the State						
Xeric Riparian Extent	Desert Dry Wash Woodland (Holland Code 62200)	Palustrine; Forested, Broad-Leaved, Evergreen, Intermittently Flooded/Temporary, Well Drained/Fresh, Alkaline	147.54	42.21	-	189.75
Ephemeral Channel	Nonvegetated Channel (Holland Code 64200)	Riverine; Unconsolidated Bottom, Sand, Intermittently Flooded, Temporary, Well Drained/Fresh, Alkaline	164.00	11.46	31.98	207.44
		Total CDFG Waters =	*311.54*	*53.67*	*31.98*	*397.19*
		Subtotal Jurisdictional Waters of the State	***311.54***	***53.67***	***31.98***	***397.19***
Grand Total Jurisdictional Waters			**311.54**	**53.67**	**31.98**	**397.19**

[a] Acreage of all jurisdictional waters was determined by using the GIS program ArcGIS. All acreages are rounded to the nearest hundredth after summation.

Table 3
Occurrence Detail for Special Status Plant Species Documented for the Proposed Project

Species Common Name	Project BRSA Number of GPS Points (Plant Count)		
	Disturbance Area	**Buffer Area**	**Total**
CNPS List 1B and CNPS List 2 Plant Species			
Harwood's milkvetch	5 (7)	35 (139)	**40** **(146)**
Harwood's woollystar	-	2 (2)	**2** **(2)**
CNPS List 3, CNPS List 4, and Taxonomically Unresolved Plant Species			
ribbed cryptantha[a]	24 ($2.5x10^6$) 284.74 ac	84 ($1.2x10^7$) 1,308.99 ac	**108** **($1.4x10^7$)** **1,593.73 ac**
California ditaxis	1 (11)	2 (11)	**3** **(22)**
Additional Plant Species for Consideration at the Request of BLM (La Pre 2009)			
California barrel cactus	-	1 (5)	**1** **(5)**
cottontop cactus	-	0 (0)	**0** **(0)**
hedgehog cactus	-	0 (0)	**0** **(0)**

[a] Ribbed cryptantha is also expressed in terms of area (acres) due to the quantity of this species in the substation area. Plant counts are estimates, based on subsampling data from within the ribbed cyrpantha population (calculated density of 2.2 plants per square meter, or 8,903 plants per acre).

Table 4
Desert Tortoise Observations within the Project BRSA

Sign	Class	Description	Number of Observations		
			Disturbance Area	Buffer	BRSA
Tortoises		adult	0	5	5
Tortoise Burrows	1	active (recent tortoise sign)	0	3	3
	2	definitely tortoise, good condition, no recent sign	0	1	1
	3	definitely tortoise, deteriorated	1	2	3
	4	possibly tortoise, deteriorated	9	2	11
	5	possibly tortoise, good condition	5	4	9
	Total		**15**	**12**	**27**
Tortoise Pallets	1	active (recent tortoise sign)	0	2	2
	2	definitely tortoise, good condition, no recent sign	0	2	2
	3	definitely tortoise, deteriorated	0	0	0
	4	possibly tortoise, deteriorated	7	5	12
	5	possibly tortoise, good condition	3	3	6
	Total		**10**	**12**	**22**
Tortoise Scat	1	wet or recently dried, obvious odor	1	0	1
	2	dried with glaze, some odor, dark brown	1	9	10
	3	dried, no glaze or odor, light brown, tightly packed	1	1	2
	4	dried, light brown to pale yellow, loose material	0	0	0
	5	bleached or consisting only of plant fiber	0	1	1
	Total		**3**	**11**	**14**
Tortoise Shell Remains	1	fresh or putrid	-	-	-
	2	carcass, normal color, scutes adhere to bone	-	-	-
	3	carcass, scutes peeling off bone	-	-	-
	4	carcass, shell bone falling apart, growth rings on	-	1	1

Sign	Class	Description	Number of Observations		
			Disturbance Area	Buffer	BRSA
		scutes peeling			
	5	bone fragments, not mineralized	11	28	39
		bone fragments, mineralized	7	7	14
	Total		18	36	54
Tortoise Fossilized Bones			1	0	1
Sets of Tortoise Tracks			0	2	2

Table 5
Desert Tortoise Suitable and Critical Habitat within the Proposed Project

Desert Tortoise Habitat[a]	Project Disturbance Area (acres)
Moderate Quality Habitat	28.33
Low Quality Habitat	3,508.52
Critical Habitat – Moderate Quality	10.91
Critical Habitat – Low Quality	190.19
TOTAL DT Suitable Habitat	3,737.95

[a] DT Suitable habitat encompasses the Project Disturbance Area excluding the following vegetation cover types: developed, agriculture, and stabilized and partially stabilized desert dunes.

Table 6
Summary of Non-listed Special Status Species Observations within Project BRSA

Species	Project		
	Disturbance Area	Buffer	BRSA
Birds			
Western Burrowing Owl with Active Burrow	4	0	4
Burrow with Western Burrowing Owl Sign	4	2[a]	6[b]
Ferruginous Hawk	0	1	1
Le Conte's Thrasher	2	2	4
Loggerhead Shrike	11	6	17
Loggerhead shrike nest	0	1	1
Northern Harrier	3	2	5
Purple Martin	1	0	1
Swainson's Hawk	1	2	3
Vaux's Swift	5	0	5
Mammals			
American Badger Den	4	4	8
American Badger Predation Burrow	6	29	35
Kit Fox Burrow	47	11	58
Kit Fox Burrow Complex	36	11	47
Reptiles			
Mojave fringe-toed lizard - Observations	117	307	424
Mojave fringe-toed lizard – Suitable Habitat (acres)	1,781.07	4,286.40	6,067.48

[a] Within the 492-foot WBO buffer

[b] Outside the 492-foot WBO buffer, but within BRSA

ATTACHMENT 1

FIGURES

Palen Solar Power Project
Data Package Addendum

Figure 1
Regional Map

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResourcesDataPackage_Addendum_July2010\Fig_1_PSPP_RegionalLocation.mxd, 07/16/10, NdemoM

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA
- First Solar Study Area

Source: NAIP 2009; AECOM 2010

N
W E
S

1 in = 6,000 feet

0 6,000 12,000 Feet

Palen Solar Power Project
Data Package Addendum

Figure 2
Focused Survey Area and Biological Resources Survey Area

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol MI Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_2_PSPP_FacilityFootprint_Disturbance_BRSA.mxd, 07/19/10, NdemoM

Unit #2

Unit #1

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Solar Unit
- First Solar Study Area

Proposed Project Facility Layout

- Disturbance Area
- Channels
- Roads
- Ditch
- Solar Loops
- Power Block
- Gas
- Header Pipes
- Spare Loops
- T-Lines

Source: NAIP 2009; ESRI; AECOM 2010

N
W E
S

1 in = 3,500 feet

0 3,500 7,000 Feet

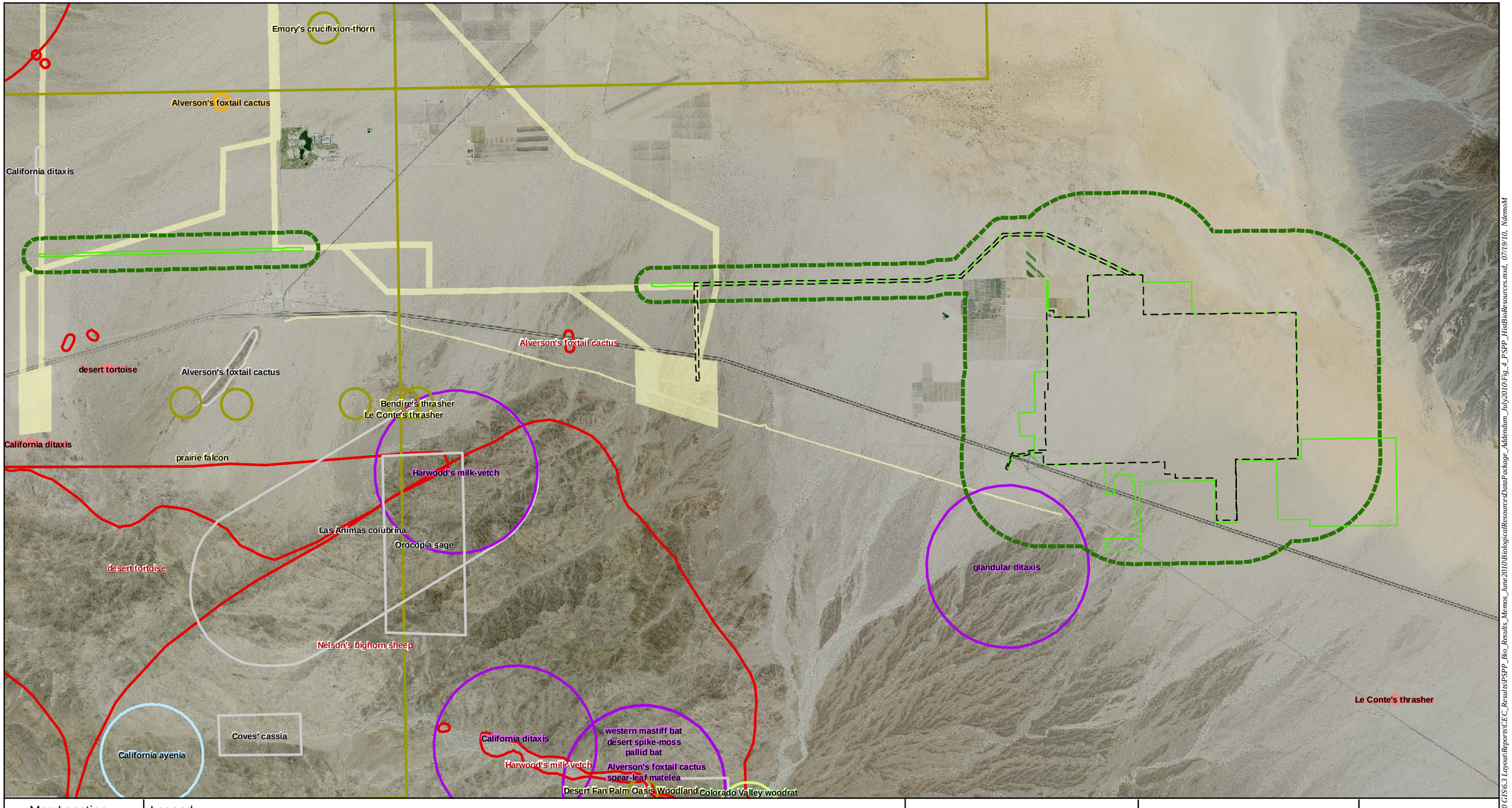
Palen Solar Power Project
Data Package Addendum

Figure 3
Proposed Project Facility Layout

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 LayoutReports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_3_PSPP_FacilityLayout.mxd, 07/19/10, NdemoM



Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA
- First Solar Study Area

CNDDB Species Inventory Accuracy

- Specific Bounded Area
- Specific Bounded Area with 1/20-mile radius
- Feature with 1/10-mile radius
- Feature with 1/5-mile radius
- Feature with 2/5-mile radius
- Feature with 3/5-mile radius
- Feature with 4/5-mile radius
- Feature with 1-mile radius
- Feature with 5-mile radius
- Non-specific Area

Source: NAIP 2009; AECOM 2010; DFG 2009

N W E S

1 in = 6,000 feet

0 6,000 12,000 Feet

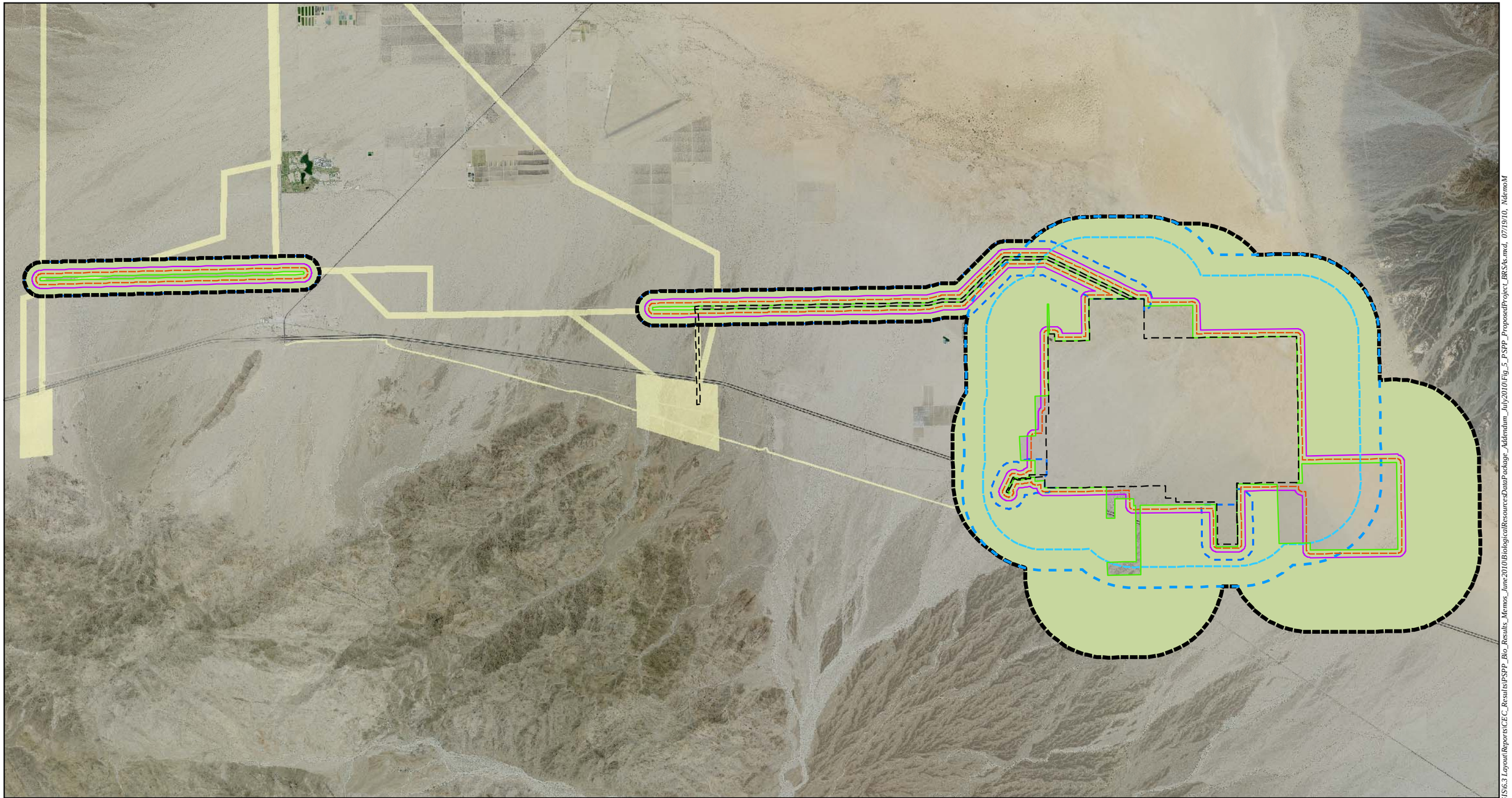
Palen Solar Power Project
Data Package Addendum

Figure 4
Biological Resources
Regional Database

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_4_PSPP_HistBioResources.mxd, 07/19/10, NdemoM



Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Focused Survey BRSA
- First Solar Study Area

Botanical Surveys
- Biological Resources Survey Area (BRSA)

State Waters Survey Buffer
- Desert Aquatic Resources Survey Area (DARSA)

Western Burrowing Owl Survey Buffer
- CBOC 492-foot Buffer

Desert Tortoise Buffer Transects (2010)
- 1-mile Transect
- 3/4-mile Transect
- 1000-foot Transect

Source: NAIP 2009; AECOM 2010

N
W E
S

1 in = 6,000 feet

0 6,000 12,000 Feet

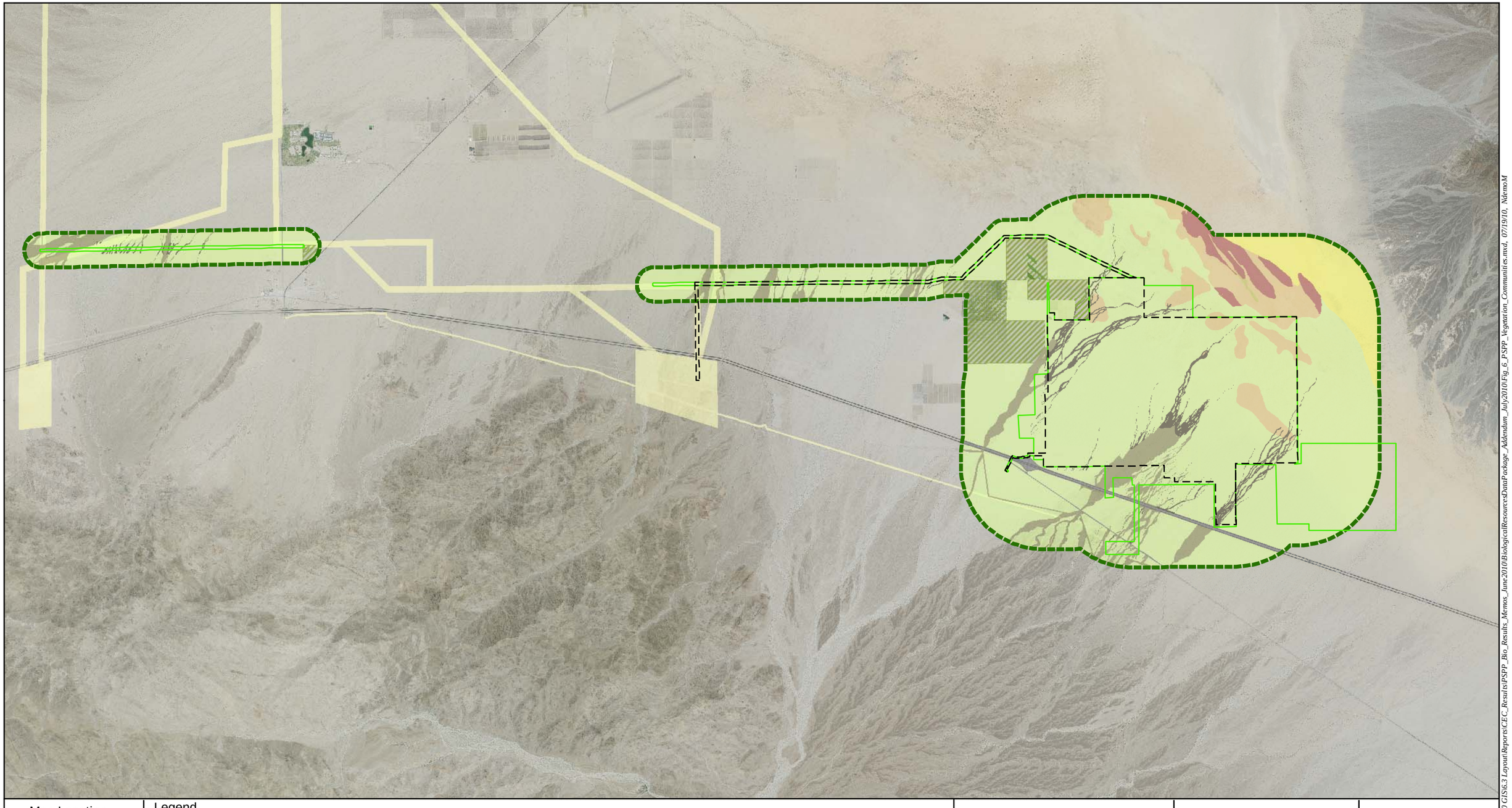
Palen Solar Power Project
Data Package Addendum

Figure 5
Focused Survey Area
Biological Resources Survey Area

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResourcesDataPackage_Addendum_July2010\Fig_5_PSPP_ProposedProject_BRSAs.mxd, 07/19/10, NdemoM


Map Location
OR
ID
NV
UT
CA
AZ
Legend
Focused Survey Area
Project Disturbance Area
Project BRSA
First Solar Study Area
Source: NAIP 2009; AECOM 2010
Vegetation Communities
Riparian
Desert Dry Wash Woodland
Unvegetated Ephemeral Dry Wash
Upland
Sonoran Creosote Bush Scrub
Active Desert Dunes
Stabilized and Partially Stabilized Desert Dunes
Desert Sink Scrub
Dry Lake Bed
Other
Agriculture (Active and Fallow)
Developed
N
W
E
S
1 in = 6,000 feet
0
6,000
12,000
Feet
Palen Solar Power Project
Data Package Addendum
Figure 6
Vegetation Communities
AECOM
Date: July 2010
Path: P:\2009\09080081 Sol MI Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_6_PSPP_Vegetation_Communities.mxd, 07/19/10, NdemoM

Rare Plant Observations (2010)

CNPS 1B and 2

- Harwood's milkvetch
- Harwood's woollystar

CNPS List 4

- Utah milkvine
- Ribbed cryptantha
- Four wing saltbush

BLM-requested Cactus Species

- Cottontop cactus
- California barrel cactus

Rare Plant Observations (2009)

CNPS 1B and 2

- Harwood's milkvetch

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA
- First Solar Study Area

Source: NAIP 2009; AECOM 2010

N
W
E
S

1 in = 3,500 feet

0 3,500 7,000 Feet

Palen Solar Power Project
Data Package Addendum

Figure 7
Proposed Project Special Status Plant Species

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResourcesDataPackage_Addendum_July2010\Fig_7_PSPP_Project_Plants.mxd 07/19/10 NdemoM

Special Staus Wildlife Species Observations (2009-2010)

- American Badger Den
- American Badger Predation Burrow
- California Horned Lark Nest
- Ferruginous Hawk
- Kit Fox Burrow
- Kit Fox Burrow Complex
- Le Conte's Thrasher
- Loggerhead Shrike
- Loggerhead Shrike Nest
- Nest Cavity - Unidentified Woodpecker Species
- Northern Harrier
- Purple Martin
- Swainson's Hawk (represents multiple individuals)
- Vaux's Swift

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA

Source: NAIP 2009; AECOM 2009-2010

N
W E
S

1 inch = 4,000 feet

0 4,000 8,000 Feet

Palen Solar Power Project
Data Package Addendum

Figure 8
Proposed Project
Special Status Wildlife

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResourcesData Package_Addendum_July2010\Fig_8_PSPP_Project_Wildlife.mxd, 07/19/10, NdemoM

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA
- First Solar Study Area

Suitable Habitat Quality

- Low Quality Desert Tortoise Habitat
- Moderate Quality Desert Tortoise Habitat
- Desert Tortoise Suitable Habitat
- Desert Tortoise Critical Habitat

Source: NAIP 2009; USGS; AECOM 2010

N
W
E
S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Palen Solar Power Project
Data Package Addendum

Figure 9
Desert Tortoise Suitable Habitat Within the Proposed Project Biological Resources Survey Area

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_9_PSPP_Project_DT_HabitatQuality.mxd, 07/19/10, NdemoM

Desert Tortoise Observations (2009-2010)

- Adult Tortoise
- Tortoise Burrow (Active) - Class 1
- Tortoise Burrow - Class 2
- Tortoise Burrow - Class 3
- Tortoise Burrow - Class 4
- Tortoise Burrow - Class 5
- Tortoise Pallet (Active) - Class 1
- Tortoise Pallet - Class 2
- Tortoise Pallet - Class 4
- Tortoise Pallet - Class 5
- Tortoise Scat - Class 1
- Tortoise Scat - Class 2
- Tortoise Scat - Class 3
- Tortoise Scat - Class 4
- Tortoise Scat - Class 5
- Tortoise Carcass - Class 3
- Tortoise Carcass - Class 4
- Tortoise Bone Fragment (Class 5) - Not Mineralized
- Tortoise Bone Fragment (Class 5) - Mineralized
- Tortoise Tracks
- Tortoise Fossilized Bones

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA
- First Solar Study Area

Source: NAIP 2009; USGS; AECOM 2009-2010

N
W
E
S

1 inch = 6,000 feet

0 6,000 12,000 Feet

Blythe Solar Power Project
Data Package Addendum

Figure 10
Proposed Project Desert Tortoise Observations

AECOM

Date: July 2010

Path: P:\20090908081 Sol MI Palen\6.0 GIS\6.3 Layout Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_10_PSPP_Project_DT_Observations.mxd, 07/19/10, NdemoM

WBO Pair 2
(2 burrows)

WBO Pair 1
(2 burrows)

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- CBOC 492-foot Buffer
- Project BRSA
- First Solar Study Area

Burrowing Owl Observations (2009-2010)

- Active Burrows
- Burrow with Sign

Source: NAIP 2009; AECOM 2010

N
W E
S

1 inch = 3,500 feet

0 3,500 7,000 Feet

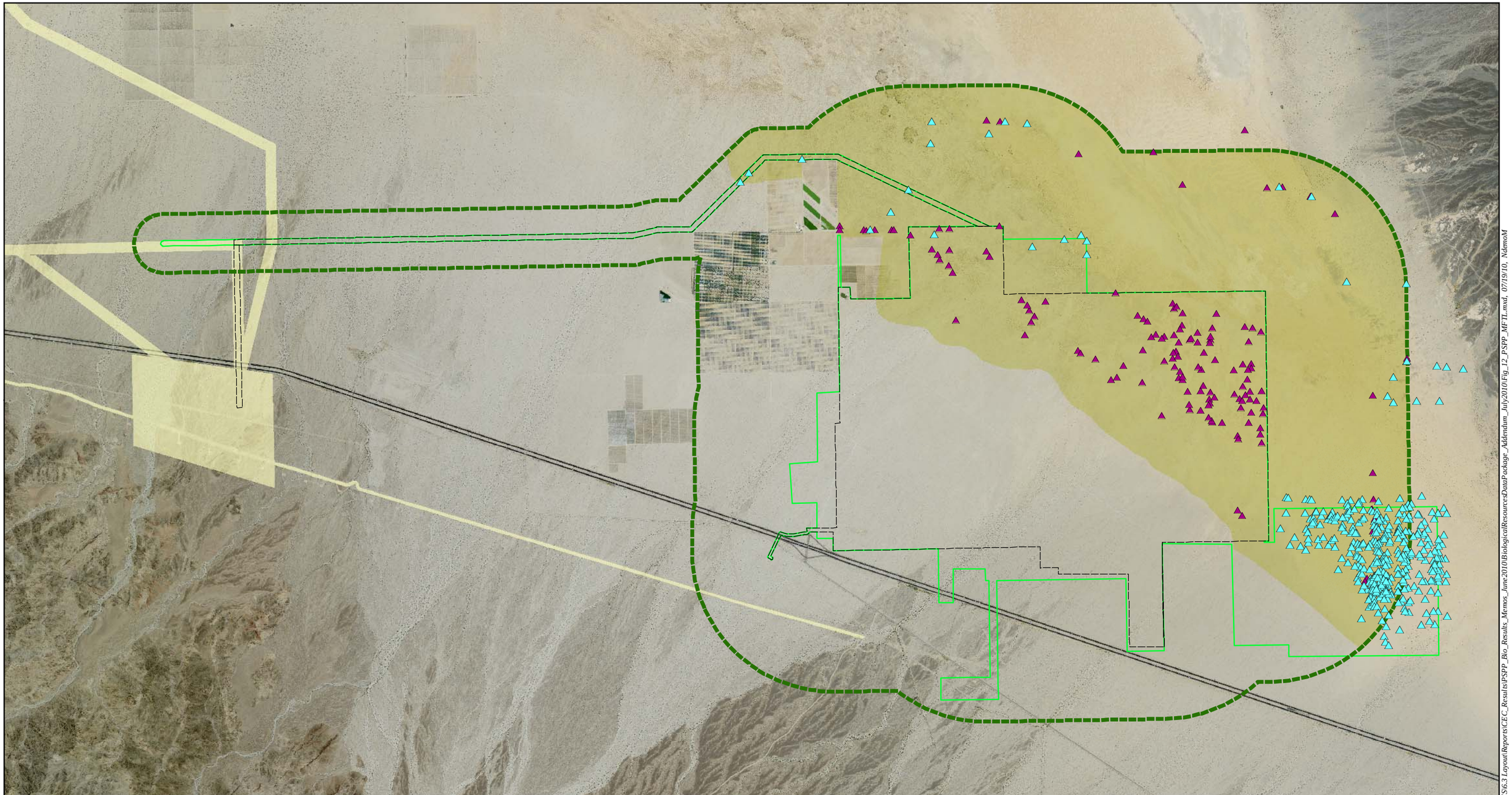
Palen Solar Power Project
Data Package Addendum

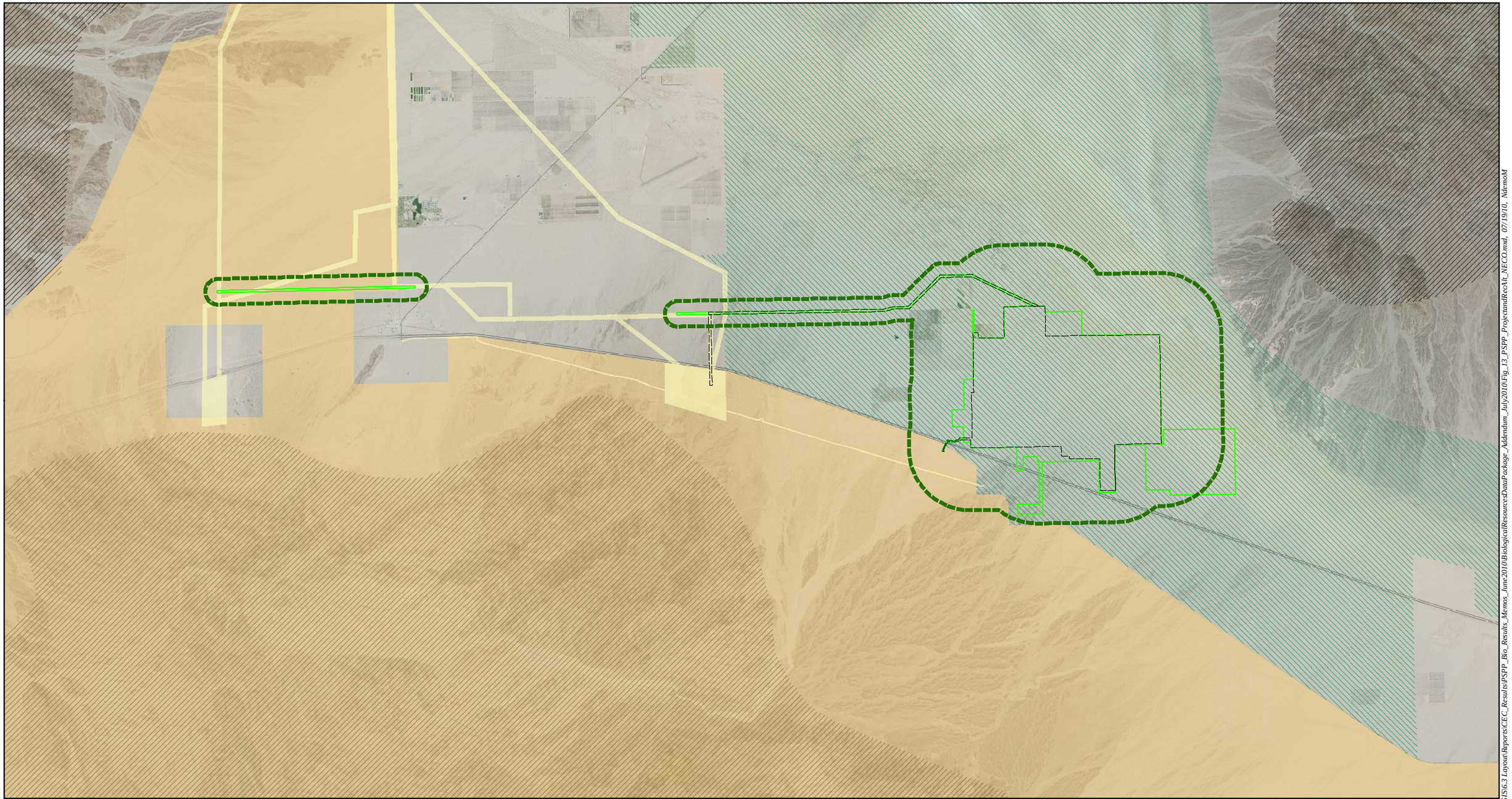
Figure 11
Burrowing Owl Observations within Project Area and and Biological Resources Survey Area

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol MI Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\fig_11_PSPP_Project_WBO.mxd, 07/19/10, NdemoM


Map Location
OR
ID
NV
UT
CA
AZ
Legend
Focused Survey Area
Project Disturbance Area
Project BRSA
First Solar Study Area
Mojave Fringe-toed Lizard Individual Observations (2009)
Mojave Fringe-toed Lizard Individual Observations (2010)
Suitable Habitat for Mojave Fringe-toed Lizard
Source: NAIP 2009; AECOM 2009-2010
N
W
E
S
1 inch = 3,500 feet
0
3,500
7,000
Feet
Palen Solar Power Project
Data Package Addendum
Figure 12
Mojave Fringe-toed Lizard
Suitable Habitat Observations
AECOM
Date: July 2010
Path: P:\2009\09080081 Sol MI Palen\6.0 GIS\6.3 Layout Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_12_PSPP_MFTL.mxd, 07/19/10, NdemoM



Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA
- First Solar Study Area

Desert Wildlife Management Area (NECO)

- Chuckwalla

Wildlife Habitat Management Area (NECO)

- Nelson's Bighorn Sheep
- Multiple Species

Source: NAIP 2009; AECOM 2010

N
W E
S

1 inch = 8,000 feet

0 8,000 16,000 Feet

Palen Solar Power Project
Data Package Addendum

Figure 13
Proposed Project Relative to the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO)

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResourcesDataPackage_Addendum_July2010\Fig_13_PSPP_ProjectandRecAlt_NECO.mxd, 07/19/10, NdemoM

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- Project BRSA
- First Solar Study Area
- Existing Flow Paths

Source: NAIP 2009; NECO; AECOM 2010

N
W E
S

1 inch = 3,750 feet

0 3,750 7,500 Feet

Palen Solar Power Project
Data Package Addendum

Figure 14
Existing Flow Paths

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol M1 Palen\6.0 GIS\6.3 Layout Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResources\DataPackage_Addendum_July2010\Fig_14_PSPP_Existing_FlowPath.mxd, 07/19/10, NdemoM

CACA 048649
CACA 048649
CACA 048649
CACA 049494
CACA 049492
CACA 048808
CACA 048810
CACA 048880
CACA 048880
CACA 049702
CACA 049490
CACA 049488
CACA 049097
CACA 049397
177
177
177
10
78

Map Location

Legend

- Focused Survey Area
- Project Disturbance Area
- First Solar Study Area
- Future Solar Projects
- Desert Tortoise Designated Critical Habitat (USFWS)

Source: ESRI 2010; USFWS 2009; AECOM 2010

N
W E
S

1 in = 4 miles

0 4 8 Miles

Palen Solar Power Project
Data Package Addendum

Figure 15
Location of Cumulative Projects Relative to Desert Tortoise Critical Habitat

AECOM

Date: July 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Reports\CEC_Results\PSPP_Bio_Results_Memos_June2010\BiologicalResourcesDataPackage_Addendum_July2010\Fig_15_PSPP_CumulativeProjects_Relative_to_DETO_CH.mxd, 07/19/10, NdemoM

GEOMORPHIC EVALUATION OF AEOLIAN SAND MITIGATION FOR RECONFIGURED ALTERNATIVES 2 AND 3

Miles Kenney PhD, PG

Consulting Geologist

Date: July 20, 2010

To: Arrie Bachrach
Senior Program Manager
AECOM Environment
1220 Avenida Acaso, Camarillo, CA 93012

From Miles D. Kenney PhD, PG
Consulting Geologist
215 Calle de Madera
Encinitas, CA 92024

Re: Geomorphic Evaluation of Potentially Affected Aeolian Sand Migration Regions for Reconfigured Alternatives 2 and 3 Associated with the Wind Fence, Palen Solar Power Project (PSPP), Chuckwalla Valley, Riverside County, CA

Dear Mr. Bachrach:

Palen Solar I, LLC is proposing to develop a 500-megawatt (MW) solar thermal power generating facility on public lands managed by the Bureau of Land Management (BLM) located in Riverside County, California (PSPP or Project). This letter report provides preliminary findings regarding potential affected regions associated with aeolian sand migration and deposition within identified sand migration corridors for two alternative Project configurations or layouts. A detailed evaluation of the sand migration corridors of the Project area, local geology and geomorphology is provided in Supplemental Responses to the California Energy Commission (CEC) Workshop Data Requests DR-BIO-60 and DR-BIO-62 for Biological Resources dated February 12, 2010 (Docket No. 09-AFC-7). The findings of this report are to satisfy requests from the CEC as described in a letter dated July 9th, 2010 for Docket 09-AFC-7 pertaining to Biological Resources. Specifically, the following pages address the Technical Area: Biological Resources Information Request No.1, which states,

> *"An analysis of impacts to the sand transport corridor and Mojave fringe-toad lizard habitat, including direct and indirect impact acreages (by Zone and also overall MFTL habitat). If sand management activities such as clearing accumulated sand from the base of the wind fencing are proposed (please provide as much detail as possible on those proposed activities, including information about the anticipated frequency and volume of sand removal, the kind of equipment that would be used to excavate and transport the sand, measures that would be taken to protect surrounding habitat and wildlife, and a figure depicting the location proposed for depositing sand."*

INTRODUCTION

The focus of this letter report is to provide findings in the form of Plates (maps) regarding wind shadow areas within aeolian (wind) sand migration corridors for two alternative configurations for the PSPP. Specifically, to evaluate the aerial extent of the wind shadow regions defined as areas downwind from the prevailing winds within designated aeolian sand migration corridors. The two alternative

configurations overlap partly but not entirely with the proposed Project site as described in the August 2009 Project AFC. The aeolian system in the region of the site is described in the Preliminary Geomorphic Aeolian Report dated February 11th (Kenney, 2010) submitted to the CEC on February 12th 2010 (Docket No. 09-AFC-7). The Kenney, 2010 preliminary aeolian report provides information regarding identified active aeolian sand migration corridors and their associated aeolian deposits, as well as relict (old and inactive) dune fields. Aeolian migration and depositional zones were designated in the site vicinity to assist in discussion of different relative magnitudes of active sand transport in different areas. Generalized geologic units were also designated to provide an additional framework for discussion of relative aeolian activity levels.

This report provides the preliminary results of the analysis of potentially affected regions associated with obstruction within active aeolian sand migration corridors for the proposed Reconfigured Alternatives 2 and 3, which are shown on Plates 1 and 2 of this report (attached).

METHODOLOGY AND SCOPE OF WORK

The results provided in this report are primarily based on review of existing literature, site field mapping, soil profile analysis, site photographs, the experience of the author (Dr. Miles Kenney) in the region, and utilization of Google Earth (Kenney, 2010). The scope of this report is to provide a preliminary evaluation of potentially affected aeolian sand migration offsite in the downwind direction from the prevailing winds within identified sand migration corridors. The analysis provided should be considered “qualitative” in the sense that it simply provides an aerial extent of affected regions based on the available data to be potentially impacted by the proposed Reconfigured Alternatives 2 and 3. The analysis is based on the approximate location of the wind fence that bounds the property as shown on Figures 2-2 and 2-3 dated July 15. 2010 from the AECOM Preliminary Site Plan Reconfiguration Alternative Report. The approximate locations of the wind fence on Figures 2-2 and 2-3 (AECOM) were transferred (scaled) to Google Earth images manually by eye for Plates 1 and 2 of this report (attached) and are thus only approximate.

The estimated affected regions provided in this report are primarily based on geomorphic field mapping with an emphasis utilizing wind vector data. The geomorphic wind vector data was collected primarily from existing dune forms (i.e. barchans and coppice dune tails).

PREVAILING WINDS IN THE AREA OF THE SITE

Key to the understanding of aeolian sand migration is an understanding of the regional and local wind directions that are sufficient to entrain, erode and transport sand. Winds capable of such strength and duration are considered prevailing winds. Although wind data for areas of the region indicate that strong summer monsoonal winds from the south occur, they apparently do not play a large role in terms of large sand transport in the region of the Project. This is also the case for other dune systems throughout the southern California including the Mojave Desert (Muhs, et al., 2003; Lancaster and Tchakerian, 2003). Geomorphic evidence for this is provided by the form of the dunes. For example, well developed transverse dunes (i.e. barchan) within Palen Dry Lake clearly indicate that the dominant winds transporting directions responsible for the majority of aeolian sand transport ranges

from the north-northwest to northwest within the Chuckwalla Valley. In addition, a discussion with Caltrans workers responsible for removing sand from the Wiley Well rest area near the east end of Ford Dry lake approximately seven miles east of the Palen site indicated that without question the vast majority of sand moved from the north down the Palen Pass associated with winter and early spring wind events and not from the south. One of the two Caltrans employees had been performing the sand clean up at Wiley Well rest area for over ten years. Thus, the prevailing winds in the eastern Ford Dry Lake region are complex (compound) in that the region is located at the confluence of an approximately north to south valley between the Palen and McCoy Mountains, and within the generally eastern trending Chuckwalla Valley (WorleyParsons, 2010).

Prevailing wind regime near the PSPP site is very similar to those identified at the eastern end of Ford Dry Lake due to its proximity at the confluence of two aeolian sand migration corridors. These include from the northwest-west down the axis of the Chuckwalla Valley (PDL-Chuckwalla migration corridor, Plate 1) and from the north-northwest down Palen Valley (Palen Valley migration corridor, Plate 1). These various prevailing winds are associated with topographic controls provided by the trend of the local valleys and mountain ranges that focus local winds along mountain fronts and valley axis (Laity, 1987). Based on the geomorphic evidence obtained in the field, the prevailing winds along the northeastern boundary of the Project site come from the northwest down the axis of the Chuckwalla Valley along the south end of the Coxcomb Mountains and from the north-northwest down the Palen Valley. This is discussed in more detail below.

Possible Off-Site Affected Regions due to Competing Prevailing Winds

Based on geomorphic wind vector data obtained from active coppice dune tails, the prevailing winds in the northeastern region of the PSPP site varies from northwest to north-northwest (see vectors on Plates 1 through 4). It is clear, based on the evidence that sand migrates both toward the southeast and the south-southeast in this region and is due to fluctuations in relative wind strength emanating down the PDL-Chuckwalla verses Palen Valley sand corridors. As discussed earlier, similar complexities to prevailing wind regimes were identified at the eastern end of Ford Dry Lake where two aeolian sand migration corridors collided (WorleyParsons, 2010).

Based on field mapping and Google Earth imagery, migrating aeolian sand from the Palen Valley sand corridor likely does not reach the south side of the Chuckwalla Valley in large quantities. However, the strong northerly winds from Palen Valley have the ability to move sand in the PDL-Chuckwalla corridor toward the south during some wind storm events. This important observation indicates that more aeolian sand will likely enter southeast offsite regions of the Project site than was indicated by the PWA (2010) report prepared for the CEC (see red areas labeled a and b on Plate 1). In other words, the estimated affected areas proposed by the PWA report likely overestimate impacted regions east of the site because they underestimate the effects of the strong more-northerly prevailing winds from Palen Valley and essentially assume a single prevailing wind down the axis of the Chuckwalla Valley within the PDL-Chuckwalla Valley aeolian sand migration corridor.

Revised Project Designated Aeolian Migration and Depositional Zones

For purposes of discussion, the local PDL-Chuckwalla Valley and Palen Valley sand migration corridors are subdivided into four primary sand migration and depositional zones (I, through IV on Plates 1 through 4). These zones were originally designated by the author in Kenney, 2010 and

adopted with minor changes in the PWA, 2010 report. Each zone is characterized by distinct aeolian geomorphology, or the lack thereof. The various zones provide a foundation to discuss relative magnitudes of aeolian sand transport within the entire Chuckwalla Valley aeolian system based on the idea that various types of aeolian deposits exist as a result of relative aeolian sand transport values. Additional field work conducted since the Kenney 2010 aeolian report has led the author to provide some revisions to the Zone contacts (i.e. Zone II/III contact), descriptions and the designation of subzones within Zone II (Zones IIA and IIB). For this reason, the revised Zone descriptions are provided below.

ZONE I

Zone I represents a region associated with abundant active transverse dunes that range from 8 to over 20 feet high. Some of the transverse dunes represent classic barchans. Many of the transverse dunes exhibit active avalanche faces on their leeward side (eastern sides), well defined form (crests), and are non-vegetated to moderately vegetated. Thus, many dunes in Zone I are not stabilized, but represent actively moving dunes where the dune erodes on the stoss side (windward or upwind side) and deposits on the leeward side (downwind side). Zone I dunes require a relatively robust and continuous supply of aeolian sand to maintain their form. The Palen Dry Lake dune field located within Zone I northwest of the site is considered one of the only "active" dune systems in southern California (Dohrenwend, et. al., 1991). Interdune regions in Zone I are extensive and typically exhibit playa lake deposits and minor older alluvium.

Zone I as shown on Plate 1 represents two major aeolian sand migration corridors that merge in the region of the northeastern portion of the site and the southern Palen Mountains. These represent the Palen Valley sand migration corridor located along the western flanks of the Palen Mountains, and the Dale Lake-Palen Dry Lake sand corridor emanating from the southern CoxComb Mountains at the western end of Palen Dry Lake. It is clear that strong prevailing winds capable of transporting aeolian sand come both from the northwest and the north via these two topographic valleys.

ZONES IIA and IIB

Zone II is primarily characterized as an area of aeolian sand source via the wind erosion of Palen Dry lake sediments and older dunes, and as an area of active sand migration. No active transverse dunes were identified in Zone II near or within the site. Active transverse dunes are considered to exhibit well defined dune crests and avalanche faces and are not strongly stabilized with vegetation. Zone II is partitioned into subzones Zone IIA and Zone IIB based primarily on geomorphology. The northeastern and southwestern portions of Zone II are designated Zones IIA and IIB respectively as shown on Plates 2 and 3 and are discussed separately below.

Zone IIA

Zone IIA is characterized by islands of relatively thin sand sheet deposits stabilized with vegetation and active coppice dunes. The area is dominated by interdune areas exposing playa lake, older alluvium and relict dune sediments. These aeolian sand islands are generally no more than a few feet tall. Along the southwestern edges of the playa lake area, (within Zone IIA), the interdune areas expose Quaternary Older Alluvium (Unit Qoaf) of latest Pleistocene age. Project biological surveys observed only a small number of Mojave Fringe-toed Lizard (MFTL) in Zone IIA (Plates 2 and 3). The region also exhibits abundant older degrading coppice dunes, and areas of

moderate to very strong wind erosion into interdune aeolian and playa deposits. This indicates that region Zone IIA is also an aeolian sand source for the sand migration corridors.

Zone IIB

Zone IIB exhibits a series of degrading older transverse dunes that were likely deposited sometime since the latest Pleistocene during a regional dune aggradational event. In addition, one foot thick middle Holocene relict sand sheet deposits were identified within interdune regions of Zone IIB providing additional evidence that Zone IIB currently receives much less aeolian sand migration than it did in the past. The relict dunes are likely younger than latest Pleistocene, based on the observation that the relict dune sands are deposited on top of latest Pleistocene Older Alluvial deposits (unit Qoaf) and exhibit soils themselves that are younger than latest Pleistocene. This relationship is observed near the Zone IIA-IIB contact (Plate 2).

Active aeolian sand deposits within Zone IIB are in the form of sand sheets (migrating ripples) and active coppice dunes within moderately to strongly vegetated zones. Zone IIB exhibits sufficient loose aeolian sand and vegetation to provide habitat for the MFTL; most of the MFTL observed in Project biological surveys were in Zone IIB (see Plates 2 and 3). However, areas of wind abrasion (erosion) of older dune deposits was commonly observed within Zone IIB indicating that the region allows for active sand transport within the sand corridor system and represents a local source for aeolian sand.

The relict transverse dunes in Zone IIB that are now overlain by active sand sheets exist along the northern most exposed older alluvium deposits and thus south of the axis of the Chuckwalla Valley that exhibits underlying playa lake deposits. It appears that aeolian sand deposition occurs southward from the Chuckwalla Valley axis as the eastward moving prevailing wind in the PDL-Chuckwalla valley sand corridor collide with prevailing north-northwest prevailing winds emanating down the Palen Valley sand corridor system. A similar condition occurs at the eastern end of Ford Dry Lake where the Palen Pass and PDL-Chuckwalla Valley sand corridors collide (WorleyParsons, 2010).

ZONE III

Zone III is dominated by active and inactive Holocene alluvial deposits (Qal), preserved relict sand sheets (Qsr), and coppice dune and mound deposits that are currently degrading, strongly vegetated and bioturbated. Quaternary older alluvium of latest Pleistocene age (Qoaf) is exposed in limited areas within Zone III but is relatively close to the surface across much of the area. Much of Zone III is characterized by a series of northeast flowing drainages that have eroded into the relict dune and relatively older and abandoned alluvial deposits. The relict aeolian deposits were clearly laid down during an older dune aggredational event that involved a more robust and wider sand migration corridor than exists today. Most of these relict dune deposits are less than a foot thick based on numerous test pits dug across the site. Minor isolated areas of loose migrating sand sheets occur within Zone III, particularly close to the Zone II/III contact. The sand feeding these local regions is derived from both the primary aeolian sand corridors and to a lesser extent from washes within the site after they flow.

Relative aeolian sand flux within Zone III within the entire sand migration system including the Palen Valley and PDL-Chuckwalla Valley migration zones is estimated to be less than 5% of the entire sand flux for the system as a whole. Most of the region exposes relatively stable surfaces consisting of vegetation and wind abrasion and alluvial gravel lags. Very limited and relatively small areas within Zone III are characterized by well sorted, surficial loose aeolian sands.

ZONE IV

Zone IV is characterized by surficial alluvial deposits and very minor areas of thin relict aeolian sediments. Zone IV does not show much evidence as having been a major part of an older more robust aeolian sand corridor system, but instead, shows evidence that it has been dominated by alluvial (flowing water) derived deposits since the latest Pleistocene. There is evidence of a very minor source of aeolian sand emanating from the local washes soon after they flow. Based on a lack of identified loose aeolian sand deposits in Zone IV, the wash aeolian sand source is very minor and insufficient to maintain loose sand deposits. Biological surveys identified only one MFTL within portions of the Project disturbance area in Zone 4 (Plates 2 and 3).

WIND SHADOW IMPACT AREA ANALYSIS

For this analysis, wind shadow areas refer to regions downwind from the proposed wind fence and evaporation ponds associated with the prevailing winds. These are areas that are expected to experience a decrease in aeolian sand flux moving toward the south-south east and southeast within the designated aeolian sand migration corridors. Plates 1 and 2 (attached) show the approximate limits of the wind fence and evaporation ponds for Reconfigured Alternatives 2 and 3 respectively. In addition, Plates 1 and 2 show the aeolian sand migration zones relative to the proposed wind fences bounding the solar facilities.

The aerial extent of the wind shadow regions were evaluated based on aeolian geomorphic indicators that provided wind vector data associated with the local prevailing wind directions. In the area of the analysis (boundary of the wind fence in the northeastern region of the site), the orientation of identified coppice dune tails were the primary geomorphic wind vector data utilized. Vectors shown on Plates 1 through 4 are thus primarily based on coppice dune tail orientations. No vectors shown on these plates are based on ripples because these structures only provide wind direction data associated with a single wind event and thus might not represent long term sand migration directions. However, it was observed in the field that active sand ripples and wind directions were very consistent with identified coppice dune tails the provide wind migration data on the scale of a number of years at a minimum based on there size.

Wind shadows occur within a number of stepping jogs along the northeastern wind fence boundary for both Reconfigured Alternatives (Plates 3 and 4). The wind shadow areas were estimated utilizing available proximate wind vector data provided on Plates 1 through 4. The orientation of the local average of these vectors was utilized for the evaluation of the northeastern limits of the wind shadow area. It was assumed that the wind shadow area started just south of an east-west to north-south jog of the wind or evaporation pond fence lines. From there, a southeast trending line with an orientation of the average of the local wind vectors extended toward the southeast from the fence line corner to intersect with either an east-west trending fence line or the southwestern contact between Zones III

and IV. The triangular shaped purple regions on Plates 3 and 4 represent the wind shadow region for each jog based on the fence boundaries to the west and south, and the average wind vector direction along the northeast.

The wind shadow regions are shaded as light purple and dark purple to represent areas where blocked aeolian migrating sand is either minor within Zone III to moderate within Zone II (and IIB) respectively.

REFERENCES

California Energy Commission (CEC), 2010; Technical Area Information Request Letter for Palen Solar I (Millennium) dated July 9, 2010.

Dohrenwend, J.C., Bull, W. B., McFadden, L. D., Smith, G. I., Smith, R. S. U., Wells, S. G.; 1991; Quaternary geology of the Basin and Range Province in California; *in* The Geology of North America Vol. K-2, Quaternary Nonglacial Geology: Conterminous U.S.; The Geological Society of America, Chapter 11, p. 321-352.

Kenney, M.D., 2010; Preliminary Geomorphic Aeolian and Ancient Lake Shoreline Report, Palen Solar I Project, Riverside County, CA; submitted within Supplemental Responses to CEC Workshop Data Requests, DR-BIO-60 and DR-BIO-62, Biological Resources Docket No. 09-AFC-7 dated February 12, 2010b.

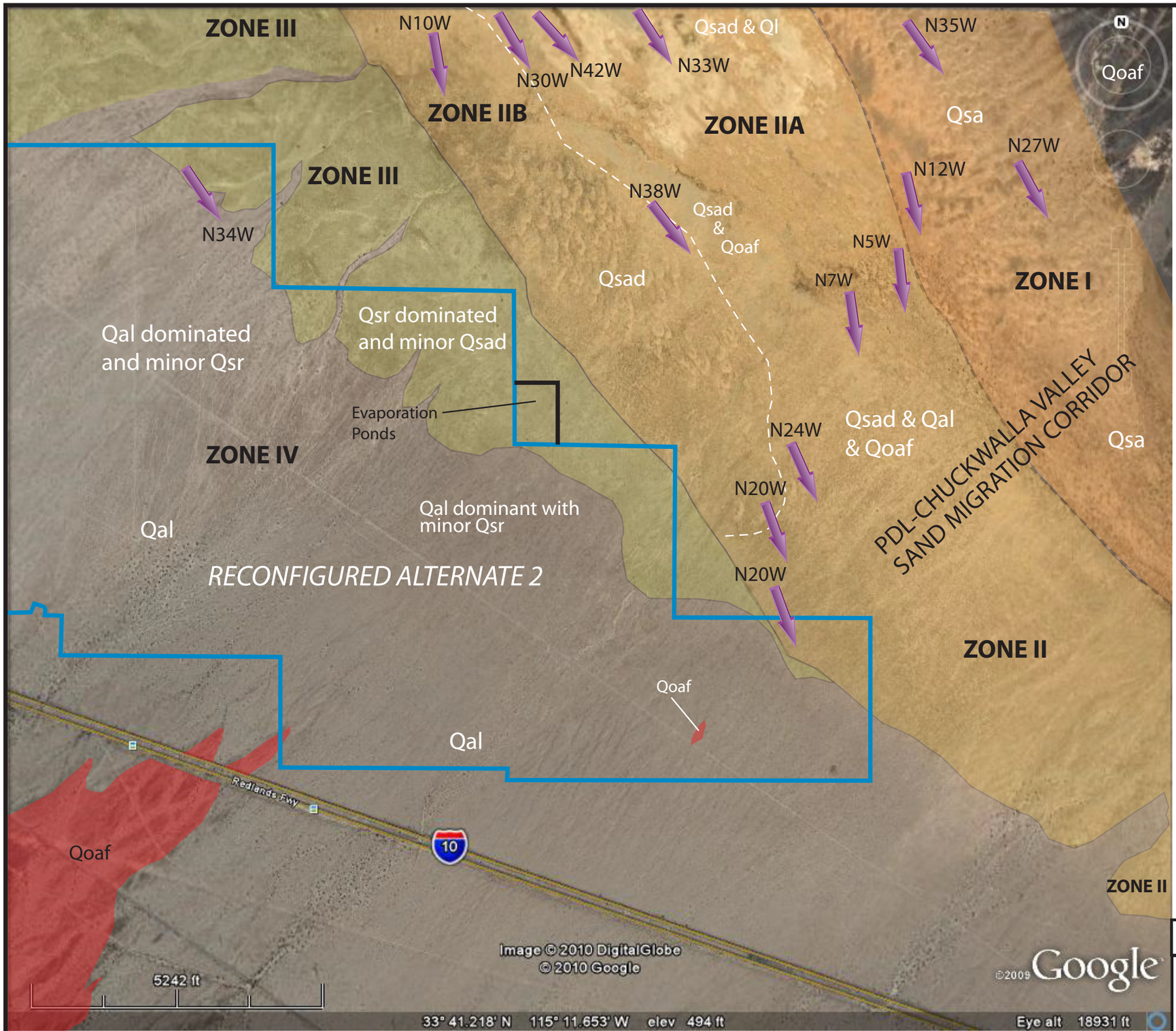
Laity, J. E., 1987; Topographic effects on ventifact development, Mojave Desert, California; Physical Geography, v. 8, p. 113-132.

Lancaster, N., Tchakerian V. P.; 2003; Late Quaternary eolian dynamics, Mojave Desert, California; *in* Enzel, Y., Wells, S.G., and Lancaster, N., eds., Paleoenvironments and paleohydrology of the Mojave and Southern Great Basin Deserts: Boulder Colorado, Geological Society of America, Special Paper 368, p. 231-249.

Muhs, D. R., Reynolds, R. L., Been, J., Skipp, G.; 2003; Eolian sand transport pathways in the southwestern United States: importance of the Colorado River and local sources; Quaternary International 104, 3-18.

Philip Williams and Associates, LTD, 2010; Geomorphic assessment of Palen Solar Project site; report dated February 18, 2010; report prepared for CEC Workgroup for Palen.

WorleyParson, 2010; Aeolian Transport Evaluation and Ancient Shoreline Delineation Report, Genesis Solar Energy Project, Riverside County, CA; report dated February 5, 2010, WP Project Number 52011206.



SYMBOL DESCRIPTIONS

N42W

Wind direction vectors measured in the field or determined via aerial photogrpha (Gooogle Earth). Wind vectors with an orientaion (i.e. N32W - wind is coming from N32W), were obtained from either coppice dune tails or the orientation of barchan dunes. Wind vectors without a wind orientation direction were determined by evaluation of transverse dune orientation (including barchan dunes) via aerial imagery (Google Earth). Note: no wind orientation vectors are shown that are based on ripples, however, active ripples were commonly in general aggreement with the older wind direction indicators (coppice dune tails and transverse dunes).

ZONE IV

Zones I through IV represent aeolian sand migration and depositional regions exhibiting variations in realative aeolian sand flux magnitudues within the PDL-Chuckwalla and Palen Valley aeolian sand migration corridors. The majority of the aeolian sand migrating within the PDL-Chuckwalla and Palen Valley sand corridors occurs within Zone I (region of active transverse dunes) and is likely on the order of greater than 80 to 90% of the total migrating sand in the system. Thus, Zones II through IV and bounding areas (southern flanks of Palen Mountains) likely accomodate the remaining 10 to 20%. The northeastern one half of Zone II (subzone Zone IIB) likely accomodates the majority of the 10 to 20% migrating sand. Thus, there is likely, based on geomorphic evidence, an exponential decrease in aeolian sand flux from Zone I toward Zone IV.

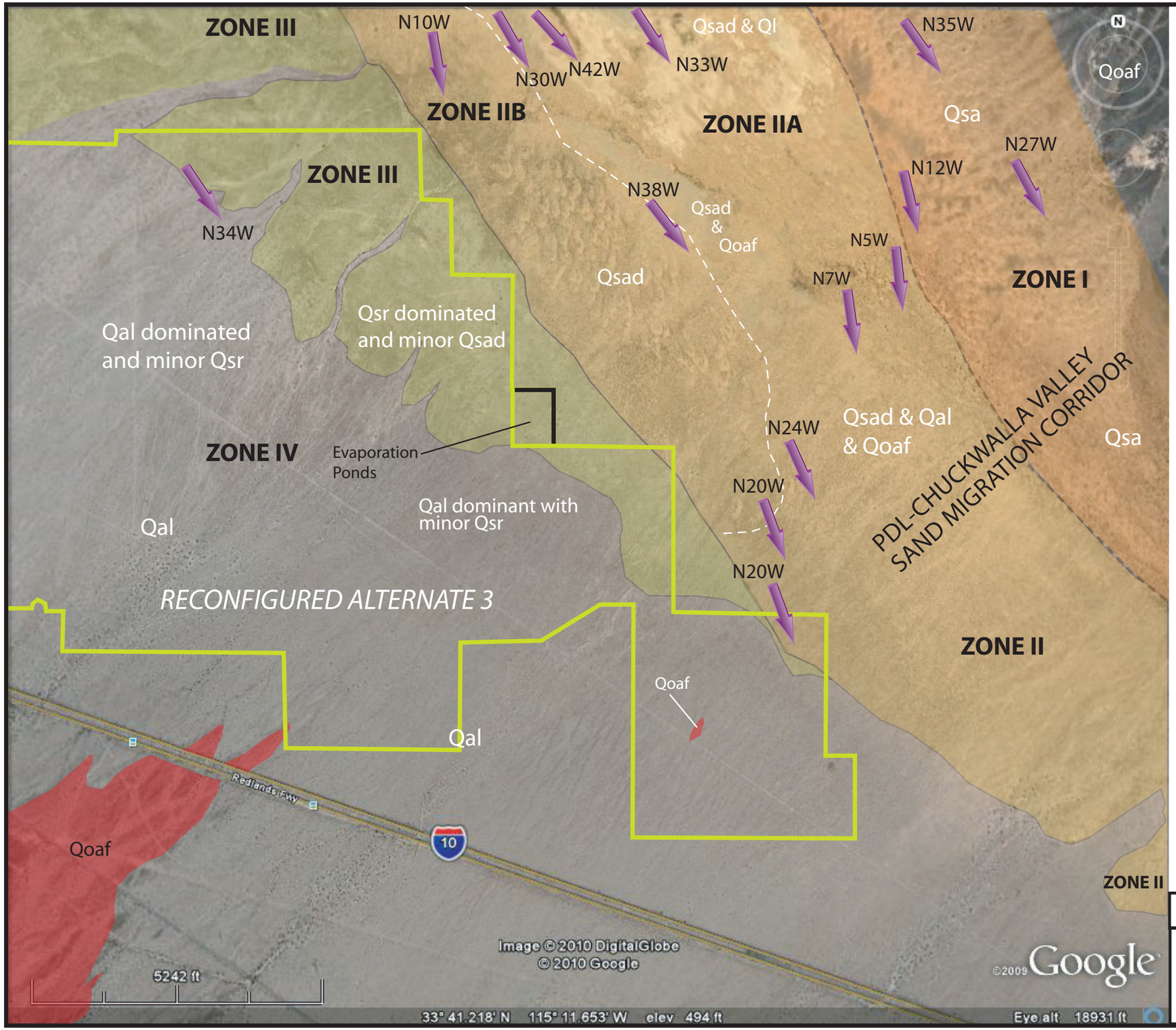
Approximate location of wind fence bounding the proposed Reconfigured Alternate 2.

Note: Geologic units are described in detail in Kenney, 2010. Qal - Quaternary Alluvium (Holocene), Qoaf - Quaternary Older Alluvium (latest Pleistocene), Ql - playa lake, Qsa - area of active dunes and moderate to strong sand transport, Qsad - area of active sand sheets, coppice dunes and moderate sand transport, Qsr - relict aeilian deposits (no longer active).

0 2400'

Scale - Feet

PALEN SOLAR I, LLC	Mapping by Miles D. Kenney, PhD, PG
AEOLIAN SAND MIGRAGION ZONES, AND WIND VECTOR MAP FOR RECONFIGURED ALTERNATIVE 2	M. Kenney 7/20/2010
	Plate 1



SYMBOL DESCRIPTIONS

N42W — Same as shown and described on Plate 1

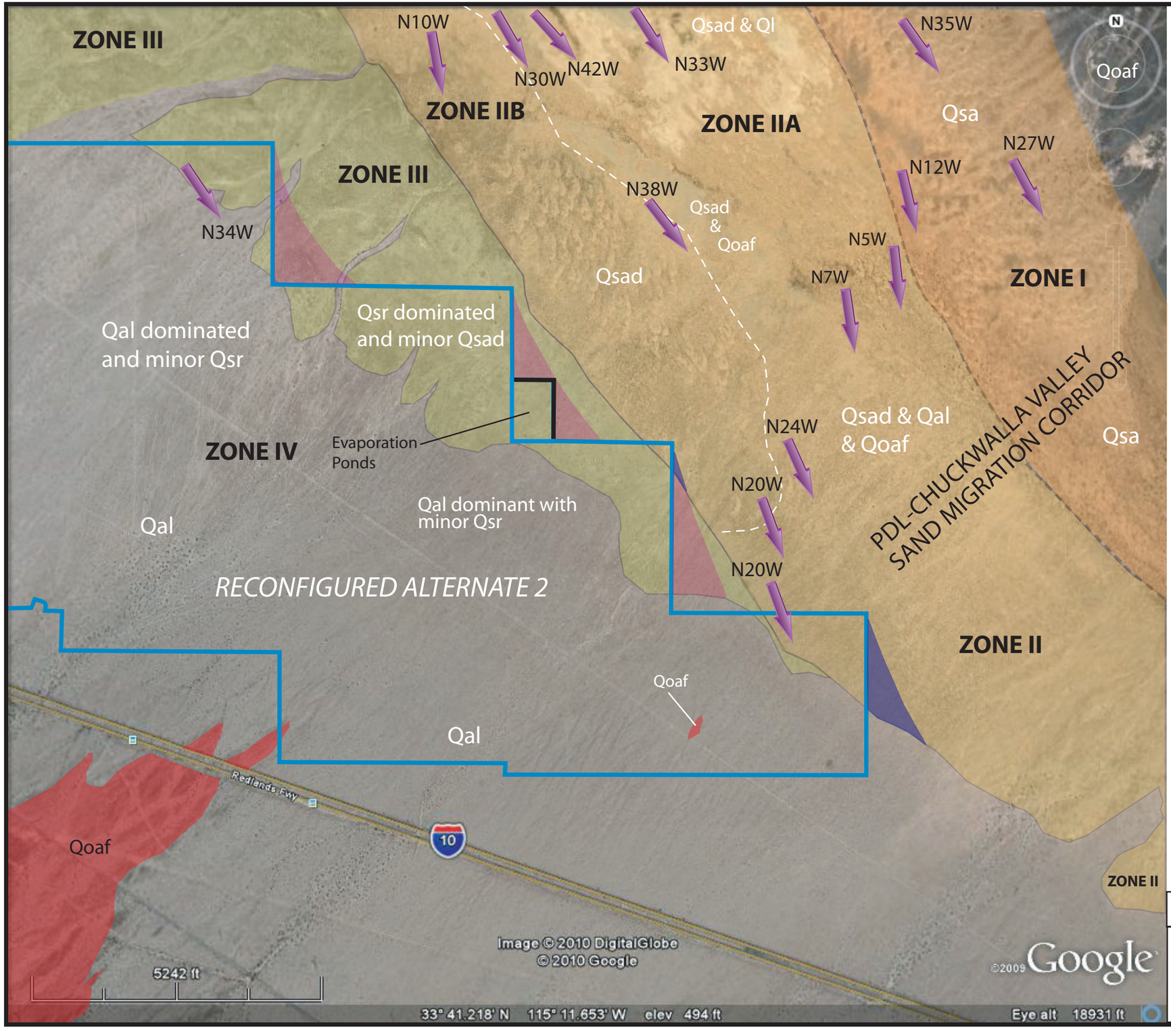
ZONE IV — Zones I through IV are described on Plate 1

Approximate location of wind fence bounding the proposed Reconfigured Alternate 3

0 2400′

Scale - Feet

PALEN SOLAR I, LLC	Mapping by Miles D. Kenney, PhD, PG
AEOLIAN SAND MIGRATION ZONE AND WIND VECTOR MAP FOR RECONFIGURED ALTERNATIVE 3	M. Kenney 7/20/2010
	Plate 2



SYMBOL DESCRIPTIONS

N42W — Same as shown and described on Plate 1

ZONE IV — Zones I through IV are described on Plate 1. Subzones IIA and IIB are described in the text of the report.

Approximate location of wind fence bounding the proposed Reconfigured Alternate 2

Estimated Sand Migration Wind Shadow Affected Areas

Estimated affected area of aeolian sand depletion within aeolian sand migration Zone II including subzones IIA and IIB that are downwind of the local prevailing wind of the proposed wind fence boundary associated with Reconfigured Alternate 2.

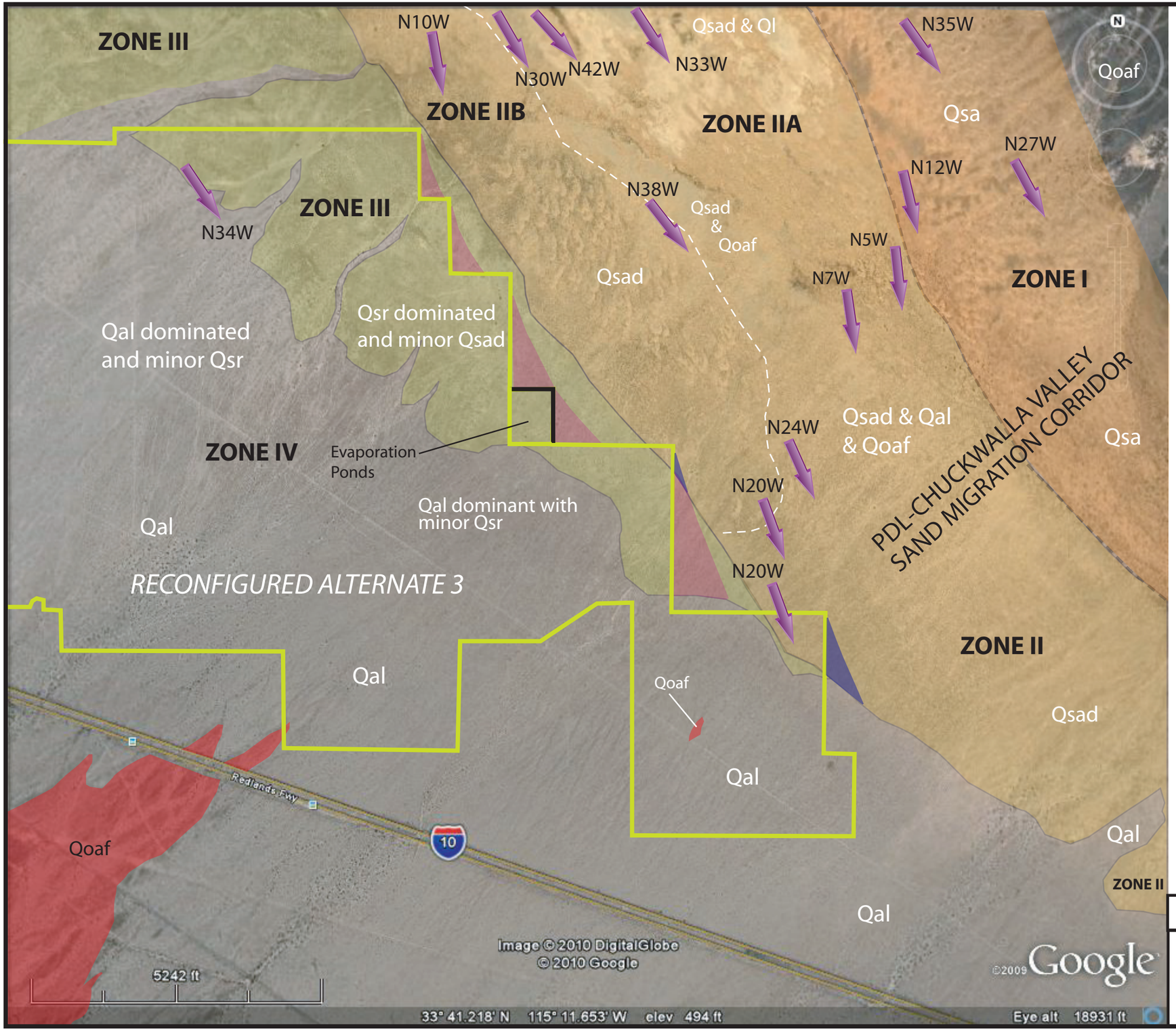
Estimated affected area of aeolian sand depletion within aeolian sand migration Zone III that are downwind of the prevailing wind of the proposed wind fence and evaporation ponds boundary associated with Reconfigured Alternate 2.

0 2400’

Scale - Feet

N

PALEN SOLAR I, LLC	Mapping by Miles D. Kenney, PhD, PG	
AEOLIAN AFFECTED AREAS AND WIND VECTOR MAP FOR RECONFIGURED ALTERNATIVE 2	M. Kenney	7/20/2010
	Plate 3	



SYMBOL DESCRIPTIONS

N42W — Same as shown and described on Plate 1

ZONE IV — Zones I through IV are described on Plate 1. Subzones IIA and IIB are described in the text of the report.

Approximate location of wind fence bounding the proposed Reconfigured Alternate 3

Estimated Areas of Indirect Aeolian Sand Migration Impacts

Estimated affected area of aeolian sand depletion within aeolian sand migration Zone II including subzones IIA and IIB that are downwind of the local prevailing wind of the proposed wind fence boundary associated with Reconfigured Alternate 3.

Estimated affected area of aeolian sand depletion within aeolian sand migration Zone III that are downwind of the prevailing wind of the proposed wind fence and evaporation ponds boundary associated with Reconfigured Alternate 3.

0 2400′

Scale - Feet

PALEN SOLAR I, LLC	Mapping by Miles D. Kenney, PhD, PG
AEOLIAN AFFECTED AREAS AND WIND VECTOR MAP FOR RECONFIGURED ALTERNATIVE 3	M. Kenney 7/20/2010
	Plate 4

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of:
APPLICATION FOR CERTIFICATION for the *PALEN SOLAR POWER PROJECT*

Docket No. 09-AFC-7
PROOF OF SERVICE
(Revised 7/2/10)

APPLICANT

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillenium.com

Elizabeth Ingram, Associate
Associate Developer
Solar Millennium LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709
ingram@solarmillennium.com

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste. 360
Pasadena. CA 91105
rambatipudi@chevron.com

Arrie Bachrach
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
arrie.bachrach@aecom.com

Co-COUNSEL
Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Co-COUNSEL
Peter Weiner
Matthew Sanders
Paul, Hastings, Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

INTERVENORS

California Unions for Reliable Energy (CURE)
c/o Tanya A. Gulesserian,
Marc D. Joseph
*Jason W. Holder
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com
jholder@adamsbroadwell.com*

Michael E. Boyd, President
Californians for Renewable Energy, Inc.
5439 Soquel Drive
Soquel, CA 95073-2659
michaelboyd@sbcglobal.net

Alfredo Figueroa
Californians for Renewable Energy, Inc.
424 North Carlton
Blythe, CA 92225
lacunadeaztlan@aol.com

Basin and Range Watch
Kevin Emmerich/Laura Cunningham
P.O. Box 153
Baker, CA 92309
atomictoadranch@netzero.net

*Lisa T. Belenky, Senior Attorney
Center for Biological Diversity
351 California St., Suite 600
San Francisco, CA 94104
ibelenky@biologicaldiversity.org

*Ileene Anderson
Public Lands Desert Director
Center for Biological Diversity
PMB 447, 8033 Sunset Boulevard
Los Angeles, CA 90046
ianderson@biologicaldiversity.org

INTERESTED AGENCIES

Holly L. Roberts, Project Manager Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive Palm Springs, CA 92262
CAPSSolarPalen@blm.gov

California ISO
e-recipient@caiso.com

ENERGY COMMISSION

Robert Weisenmiller
Commissioner and Presiding Member
rweisenm@energy.state.ca.us

Karen Douglas
Chair and Associate Member
kldougla@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Alan Solomon
Project Manager
asolomon@energy.state.ca.us

Lisa DeCarlo
Staff Counsel
ldecarlo@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, Carl Lindner, declare that on, August 18, 2010, I served and filed copies of the Data Responses to Reconfigured Alternatives 2 and 3 – Biological Resources. 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_palen].

The document has been sent to 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;

_____ by personal delivery

_____ by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on the date 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 respectively, to the address below (**preferred method**);

OR

_____ depositing in the mail an original and 12 paper copies, along with 13 CDs, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-7
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, that I am employed in the country where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Carl E. Lindner