MITIGATION MONITORING AND REPORTING PROGRAM

CEQA requires a Mitigation Monitoring and Reporting Program (MMRP) for projects where mitigation measures are a condition of project approval and development. The Initial Study / Mitigated Negative Declaration prepared for the Antelope Valley Solar Renewable Energy Project identified mitigation measures, where appropriate, to avoid or substantially reduce the environmental impacts associated with the Project. This MMRP is designed to monitor the implementation of those mitigation measures. Accordingly, this MMRP has been prepared in compliance with the requirements of CEQA Section 21081.6 and CEQA Guidelines Section 15097. This section lists each of the required Mitigation Measures (MMs) and identifies the corresponding action required for proof of compliance, the mitigation timing the party responsible for implementation, and the monitoring agency or party responsible for ensuring each measure is adequately implemented.

NO.	PDF/MM	Mitigation	Action Required	Mitigation Timing	Responsible Party	Monitoring Agency or Party
General						
1		Except as otherwise specified, the Mitigation Measures set forth herein will be accomplished for Phase 1 of the Project in connection with the development and construction of Phase 1 of the Project, and separately for Phase 2 of the Project in connection with the construction of Phase 2 of the Project. No Phase of the Project will be responsible for satisfying the Mitigation Measures of any other Phase of the Project. Conditional Use Permit #201300170 ("CUP") issued in respect of the Project will not be terminated or revoked, and the rights under the CUP shall not be diminished, with respect to any Phase of the Project as a result of a breach or default of the CUP, or Mitigation Measures or other conditions or conditions of approval thereof, by any other Phase of the Project.	N/A	N/A	N/A	N/A
Aesthetics						
2	AES-1	The Project shall incorporate landscaping with drought-tolerant vegetation periodically spaced along the portions of the perimeter fence parallel	Submittal and approval of a Landscape Plan.	Prior to issuance of certificate of occupancy	Applicant	DRP

		to 90th Street East and parallel to the northern and southern 500-foot portions of 87th Street East. The landscaping parallel to the perimeter fencing for Phase 1 of the Project will be accomplished with Phase 1 of the Project, and the landscaping parallel to the perimeter fencing for Phase 2 of the Project will be accomplished with Phase 2 of the Project. A Landscape Plan shall be prepared by Applicant and reviewed and approved by the County. Irrigation via water trucks will be conducted until the landscaping is established.	Installation of landscaping as described in the Landscape Plan.	Prior to energization of the solar panels	Applicant	DRP
			Maintenance of landscaping during operation.	During operation	Operator	DRP
3	AES-2	Any lighting that may be installed in specific locations around the periphery of the Site, as required for nighttime security purposes, shall consist of modern, low intensity, downward-shielded fixtures that are motion-activated, and will be directed onto the Site. Motion-detectors shall be set at a sensitivity level that cannot be triggered by small animal movement.	Submit lighting plan for review and approval	Prior to issuance of building permit	Applicant	DRP
Air Quality						
4	AQ-1	During construction, the Project shall comply with Antelope Valley Air Quality Management District's (AVAQMD's) Rule 403, Fugitive Dust, by preparing a Dust Control Plan for controlling fugitive dust. The Dust Control Plan shall be subject to the review and approval of AVAQMD and include the following strategies: a. <u>Minimal Grading and Ground Disturbance</u>: The Project would perform the minimum amount of grading and disturb the minimum amount of existing vegetation to construct the Project. Generally, graded areas shall be limited to fire access/service roads, substations, water tanks, inverter, equipment, and switchgear pads, and retention basins. Clearing and grubbing and fine grading may occur throughout the Site. The existing vegetation under the proposed solar panels	Submittal and approval of a Dust Control Plan.	Prior to issuance of grading permit	Applicant	DRP / AVAQMD
			Implementation of dust control measures as described in the Dust Control Plan during construction.	During construction and during operations	Applicant	DRP

		will not be removed by may be mowed. b. Construction Scheduling: Grading activities would be temporarily halted and/or Site watering would be increased during wind speeds that exceed 25 miles per hour, or when visible dust plumes have the potential to be transported off of the Site. c. Water Application: During construction, the Project would apply water to control fugitive dust from the Site as necessary and required by the AVAQMD. d. Soil Binders/Wood Mulch: Soil binders or wood mulch would be applied if and as necessary. e. Monitoring: A qualified construction mitigation manager or delegate ("CMM") would be onsite during all grading activities to ensure compliance with the approved Dust Control Plan. The CMM would monitor all construction activities for visible dust plumes, and would promptly implement additional dust plume reduction measures in the event that such visible dust plumes are observed. Additional measures to be implemented, as necessary, would include increased watering, application of dust palliatives, and/or scaled back construction activities up to and including temporary work cessation.				
Biological Resources						
5	BIO-1	Pre-construction surveys: a. A pre-construction burrowing owl survey should be conducted no less than 14 days prior to the initiation of ground disturbance activities and a final survey should also be conducted no earlier than 24 hours prior to	Field survey	Prior to construction	Applicant	DRP / CDFW

		ground disturbance. If no burrowing owls are detected during the pre-construction survey, ground disturbance activities can proceed without further consideration of this species. If burrowing owls are detected during the take avoidance survey, additional avoidance and minimization measures would then be required, under the guidance of the CDFW, provided that mitigation acreage acquired for Swainson's hawk (if required) that is similar to the relatively low quality of the site will also be sufficient to replace lost burrowing owl habitat. b. Conduct a 30-day desert kit fox and American badger pre-construction survey prior to ground disturbance to identify any burrows on the Site. If any burrows are identified and determined to be inactive, a qualified biologist shall excavate such burrows by hand. If any burrows are actively being used as natal dens, a 250-foot buffer around such burrows shall be established until such burrows are no longer being used as natal dens. If any desert kit fox burrows are actively being used, but not as natal dens, the desert kit fox may be encouraged to depart the site, provided that no "take" may occur, and once such burrows are inactive, they can be excavated to prevent further occupancy. c. To comply with the Migratory Bird Treaty Act (MBTA), if any ground disturbance is anticipated during the nesting bird season (February-August) the project proponent will initiate a breeding/nesting bird survey to ensure no nesting birds are impacted. If a nesting bird is detected, the area will be avoided and a 50-meter buffer will be installed until the nesting birds have fledged and have				

		been observed to be foraging independently. d. A CNDDB form should be submitted for any burrowing owl and any other sensitive species encountered in order to provide the resource agency personnel and biological consultants with a better understanding of sensitive species distribution in this area.				
6	BIO-2	Conduct a 30-day pre-construction survey of the Swainson's hawk nest location identified in CNDDB #2416. If no nest is identified, or if a nest is identified but subsequently determined to be unsuccessful, construction activities can proceed without further consideration of this species. If a Swainson's hawk nest is identified and successfully established, all construction activities shall be postponed until CDFW is consulted. If any mitigation land is required for Swainson's hawk, mitigation land for Phase 1 of the Project shall be obtained prior to ground disturbance for Phase 1 of the Project, and mitigation land for Phase 2 of the Project shall be obtained prior to ground disturbance for Phase 2 of the Project.	Field survey	Prior to construction	Applicant	DRP / CDFW
7	BIO-3	Construction workers should be provided with an information pamphlet on burrowing owl biology and (although unlikely to occur on the site) general desert tortoise biology, how to recognize and avoid burrowing owl and desert tortoises, authorized speed limits while working within the site, trash abatement and checking under parked vehicles and equipment prior to moving. If a burrowing owl or desert tortoise is detected on site, all construction activity would be suspended and the resource agencies notified to determine appropriate measures.	Provide information	During construction	Construction Manager	DRP
8	BIO-4	Provide a trash abatement program with sealed trash containers on site to prevent unwanted tortoise predators such as ravens and coyotes.	Provide sealed trash containers	During construction and operations	Construction Manager	DRP

9	BIO-5	Vehicular speed limits of 15 miles per hour on all project related access roads and work areas.	Enforce speed limits	During construction and operations	Construction Manager	DRP
10	BIO-6	Utilize existing roads, whenever possible, to minimize disturbance to potential habitat. Implementation of these mitigation measures would reduce impacts to biological resources to a less than significant level.	Utilize existing roads	During construction and operations	Construction Manager	DRP
11	BIO-7	Applicant has agreed to pay an in-lieu fee to a non-profit organization in support of a project that assists in the preservation of burrowing owl habitat (the "In-Lieu Project"). The amount of the in-lieu fee shall be acceptable to the County and determined based on an assessment of the benefit of the In-Lieu Project to the preservation of the burrowing owl habitat and the loss of the potential burrowing owl habitat on the Site, which is acknowledged to be low quality habitat for burrowing owl. As an example, an In-Lieu Project that provides fencing around a conservation area that contains high-quality habitat for burrowing owl may be the type of In-Lieu Project acceptable to the County. The in-lieu payment shall be made prior to ground disturbance for Phase 1 of the Project, and such payment shall satisfy this mitigation measure for both Phase 1 and Phase 2 of the Project.	Payment of in-lieu fee	Prior to ground disturbance	Applicant	DRP
Cultural Resources						
12	CUL-1	In the unlikely event that historical, archaeological, or paleontological resources are identified on the Site during ground-disturbing activities, a qualified archaeologist or paleontologist (as appropriate) will be assess the significance of any find and will have the authority to stop or divert the construction excavation as necessary. Work may proceed in other areas of the Site. A plan to mitigate any adverse impacts will be prepared and undertaken, and work may proceed on the Site once evaluation of the find is complete.	Evaluate any cultural resources discovered.	During construction	Applicant / Construction Manager	DRP

13	CUL-2	In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found during ground-disturbing activities, no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). Such descendants shall complete their inspection within 48 hours of being granted access to the Site.	If human remains are discovered, contact County Coroner	During construction	Applicant / Construction Manager	DRP / Coroner
Hazards and Hazardous Materials						
14	HAZ-1	Prior to commencement of onsite ground-disturbing activities, Applicant shall obtain soil samples from the Site and test such samples for the presence of agricultural chemicals (insecticides, pesticides, and/or herbicides). If chemical levels are above regulatory standards, remediation and/or removal of contaminated soils in compliance with applicable local, state, and federal standards and requirements shall be conducted prior to Project construction.	Preconstruction soil testing and compliance with applicable regulations.	Prior to construction.	Applicant / Construction Manager	DRP
Utilities and Service Systems						
15	UTIL-1	Construction activities on the Site shall be conducted in compliance with Chapter 20.87 (Construction and Demolition Debris Recycling and Reuse) of the Los Angeles County Code. A Recycling and Reuse Plan (RRP) must be submitted to the Los Angeles County Department of Public Works, Environmental Programs Division prior to grading permits being issued for each of Phase 1 and Phase 2 of the Project.	Submittal and approval of a RRP.	Prior to issuance of building permit.	Construction Manager	DPW

Antelope Valley Solar

Mojave Desert Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	8.00	User Defined Unit	8.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2015
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - solar facility

Construction Phase - Site Prep/Grading 10 days, PV Install 30 days

Off-road Equipment - Prep/Grading: 1 grader, 1 dozer, 2 loader/backhoes

Off-road Equipment - PV Install: 2 forklifts, 2 generator sets, 1 trencher, 2 loader/backhoes, 2 welders

Trips and VMT - Site Prep/Grading: 10 workers, 20 daily trips
PV Install: 30 workers, 60 daily trips

Construction Off-road Equipment Mitigation - water exposed surfaces 3x per day

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	PhaseEndDate	2/25/2015	3/13/2015
tblConstructionPhase	PhaseStartDate	1/15/2015	2/1/2015
tblLandUse	LotAcreage	0.00	8.00
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	PhaseName		Building Construction
tblOffRoadEquipment	PhaseName		Building Construction
tblProjectCharacteristics	OperationalYear	2014	2015
tblTripsAndVMT	PhaseName		Grading
tblTripsAndVMT	PhaseName		Building Construction
tblTripsAndVMT	WorkerTripNumber	15.00	20.00
tblTripsAndVMT	WorkerTripNumber	0.00	60.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.0854	0.6383	0.5286	7.1000e-004	0.0736	0.0436	0.1172	0.0358	0.0414	0.0772	0.0000	62.8834	62.8834	0.0136	0.0000	63.1687
Total	**0.0854**	**0.6383**	**0.5286**	**7.1000e-004**	**0.0736**	**0.0436**	**0.1172**	**0.0358**	**0.0414**	**0.0772**	**0.0000**	**62.8834**	**62.8834**	**0.0136**	**0.0000**	**63.1687**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.0854	0.4709	0.5286	7.1000e-004	0.0336	0.0436	0.0772	0.0153	0.0414	0.0567	0.0000	62.8833	62.8833	0.0136	0.0000	63.1686
Total	**0.0854**	**0.4709**	**0.5286**	**7.1000e-004**	**0.0336**	**0.0436**	**0.0772**	**0.0153**	**0.0414**	**0.0567**	**0.0000**	**62.8833**	**62.8833**	**0.0136**	**0.0000**	**63.1686**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**26.22**	**0.00**	**0.00**	**54.31**	**0.00**	**34.12**	**57.37**	**0.00**	**26.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.4000e-004	1.4000e-004	0.0000	0.0000	1.5000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.4000e-004**	**1.4000e-004**	**0.0000**	**0.0000**	**1.5000e-004**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.4000e-004	1.4000e-004	0.0000	0.0000	1.5000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.4000e-004**	**1.4000e-004**	**0.0000**	**0.0000**	**1.5000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2015	1/14/2015	5	10	Site Prep/Grading
2	Building Construction	Building Construction	2/1/2015	3/13/2015	5	30	PV Install

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction	Trenchers	1	8.00	80	0.50
Building Construction	Rough Terrain Forklifts	2	8.00	100	0.40
Building Construction	Generator Sets	2	8.00	84	0.74
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Welders	2	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	6	20.00	0.00		10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	60.00	0.00		10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0153	0.1606	0.1040	1.1000e-004		9.1000e-003	9.1000e-003		8.3700e-003	8.3700e-003	0.0000	10.1876	10.1876	3.0400e-003	0.0000	10.2514
Total	**0.0153**	**0.1606**	**0.1040**	**1.1000e-004**	**0.0655**	**9.1000e-003**	**0.0746**	**0.0337**	**8.3700e-003**	**0.0420**	**0.0000**	**10.1876**	**10.1876**	**3.0400e-003**	**0.0000**	**10.2514**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	7.4000e-004	7.0500e-003	1.0000e-005	8.1000e-004	1.0000e-005	8.1000e-004	2.1000e-004	1.0000e-005	2.2000e-004	0.0000	0.7441	0.7441	5.0000e-005	0.0000	0.7452
Total	**4.6000e-004**	**7.4000e-004**	**7.0500e-003**	**1.0000e-005**	**8.1000e-004**	**1.0000e-005**	**8.1000e-004**	**2.1000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.7441**	**0.7441**	**5.0000e-005**	**0.0000**	**0.7452**

3.2 Grading - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0256	0.0000	0.0256	0.0131	0.0000	0.0131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0153	0.1606	0.1040	1.1000e-004		9.1000e-003	9.1000e-003		8.3700e-003	8.3700e-003	0.0000	10.1876	10.1876	3.0400e-003	0.0000	10.2514
Total	**0.0153**	**0.1606**	**0.1040**	**1.1000e-004**	**0.0256**	**9.1000e-003**	**0.0347**	**0.0131**	**8.3700e-003**	**0.0215**	**0.0000**	**10.1876**	**10.1876**	**3.0400e-003**	**0.0000**	**10.2514**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	7.4000e-004	7.0500e-003	1.0000e-005	8.1000e-004	1.0000e-005	8.1000e-004	2.1000e-004	1.0000e-005	2.2000e-004	0.0000	0.7441	0.7441	5.0000e-005	0.0000	0.7452
Total	**4.6000e-004**	**7.4000e-004**	**7.0500e-003**	**1.0000e-005**	**8.1000e-004**	**1.0000e-005**	**8.1000e-004**	**2.1000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.7441**	**0.7441**	**5.0000e-005**	**0.0000**	**0.7452**

3.3 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0655	0.4703	0.3540	5.1000e-004		0.0344	0.0344		0.0330	0.0330	0.0000	45.2553	45.2553	0.0100	0.0000	45.4658
Total	**0.0655**	**0.4703**	**0.3540**	**5.1000e-004**		**0.0344**	**0.0344**		**0.0330**	**0.0330**	**0.0000**	**45.2553**	**45.2553**	**0.0100**	**0.0000**	**45.4658**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.1300e-003	6.6600e-003	0.0635	9.0000e-005	7.2600e-003	6.0000e-005	7.3200e-003	1.9300e-003	5.0000e-005	1.9800e-003	0.0000	6.6965	6.6965	4.7000e-004	0.0000	6.7064
Total	**4.1300e-003**	**6.6600e-003**	**0.0635**	**9.0000e-005**	**7.2600e-003**	**6.0000e-005**	**7.3200e-003**	**1.9300e-003**	**5.0000e-005**	**1.9800e-003**	**0.0000**	**6.6965**	**6.6965**	**4.7000e-004**	**0.0000**	**6.7064**

3.3 Building Construction - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0655	0.3029	0.3540	5.1000e-004		0.0344	0.0344		0.0330	0.0330	0.0000	45.2552	45.2552	0.0100	0.0000	45.4657
Total	**0.0655**	**0.3029**	**0.3540**	**5.1000e-004**		**0.0344**	**0.0344**		**0.0330**	**0.0330**	**0.0000**	**45.2552**	**45.2552**	**0.0100**	**0.0000**	**45.4657**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.1300e-003	6.6600e-003	0.0635	9.0000e-005	7.2600e-003	6.0000e-005	7.3200e-003	1.9300e-003	5.0000e-005	1.9800e-003	0.0000	6.6965	6.6965	4.7000e-004	0.0000	6.7064
Total	**4.1300e-003**	**6.6600e-003**	**0.0635**	**9.0000e-005**	**7.2600e-003**	**6.0000e-005**	**7.3200e-003**	**1.9300e-003**	**5.0000e-005**	**1.9800e-003**	**0.0000**	**6.6965**	**6.6965**	**4.7000e-004**	**0.0000**	**6.7064**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.438259	0.068659	0.177752	0.157314	0.054401	0.008756	0.006679	0.071289	0.001152	0.000993	0.009678	0.000675	0.004393

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.4000e-004	1.4000e-004	0.0000	0.0000	1.5000e-004
Unmitigated	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.4000e-004	1.4000e-004	0.0000	0.0000	1.5000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.4000e-004	1.4000e-004	0.0000	0.0000	1.5000e-004
Total	**1.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.4000e-004**	**1.4000e-004**	**0.0000**	**0.0000**	**1.5000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.4000e-004	1.4000e-004	0.0000	0.0000	1.5000e-004
Total	**1.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.4000e-004**	**1.4000e-004**	**0.0000**	**0.0000**	**1.5000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Antelope Valley Solar

Mojave Desert Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	8.00	User Defined Unit	8.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2015
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - solar facility

Construction Phase - Site Prep/Grading 10 days, PV Install 30 days

Off-road Equipment - Prep/Grading: 1 grader, 1 dozer, 2 loader/backhoes

Off-road Equipment - PV Install: 2 forklifts, 2 generator sets, 1 trencher, 2 loader/backhoes, 2 welders

Trips and VMT - Site Prep/Grading: 10 workers, 20 daily trips
PV Install: 30 workers, 60 daily trips

Construction Off-road Equipment Mitigation - water exposed surfaces 3x per day

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	PhaseEndDate	2/25/2015	3/13/2015
tblConstructionPhase	PhaseStartDate	1/15/2015	2/1/2015
tblLandUse	LotAcreage	0.00	8.00
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	PhaseName		Building Construction
tblOffRoadEquipment	PhaseName		Building Construction
tblProjectCharacteristics	OperationalYear	2014	2015
tblTripsAndVMT	PhaseName		Grading
tblTripsAndVMT	PhaseName		Building Construction
tblTripsAndVMT	WorkerTripNumber	15.00	20.00
tblTripsAndVMT	WorkerTripNumber	0.00	60.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	4.6856	32.2516	28.3879	0.0404	13.2690	2.2979	15.0899	6.7785	2.2000	8.4538	0.0000	3,866.0433	3,866.0433	0.7712	0.0000	3,882.2380
Total	**4.6856**	**32.2516**	**28.3879**	**0.0404**	**13.2690**	**2.2979**	**15.0899**	**6.7785**	**2.2000**	**8.4538**	**0.0000**	**3,866.0433**	**3,866.0433**	**0.7712**	**0.0000**	**3,882.2380**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	4.6856	32.2516	28.3879	0.0404	5.2751	2.2979	7.0960	2.6702	2.2000	4.3455	0.0000	3,866.0433	3,866.0433	0.7712	0.0000	3,882.2380
Total	**4.6856**	**32.2516**	**28.3879**	**0.0404**	**5.2751**	**2.2979**	**7.0960**	**2.6702**	**2.2000**	**4.3455**	**0.0000**	**3,866.0433**	**3,866.0433**	**0.7712**	**0.0000**	**3,882.2380**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**60.24**	**0.00**	**52.97**	**60.61**	**0.00**	**48.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	8.0000e-005	1.0000e-005	8.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.7500e-003	1.7500e-003	1.0000e-005		1.8600e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**8.0000e-005**	**1.0000e-005**	**8.4000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**1.7500e-003**	**1.7500e-003**	**1.0000e-005**	**0.0000**	**1.8600e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	8.0000e-005	1.0000e-005	8.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.7500e-003	1.7500e-003	1.0000e-005		1.8600e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**8.0000e-005**	**1.0000e-005**	**8.4000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**1.7500e-003**	**1.7500e-003**	**1.0000e-005**	**0.0000**	**1.8600e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2015	1/14/2015	5	10	Site Prep/Grading
2	Building Construction	Building Construction	2/1/2015	3/13/2015	5	30	PV Install

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction	Trenchers	1	8.00	80	0.50
Building Construction	Rough Terrain Forklifts	2	8.00	100	0.40
Building Construction	Generator Sets	2	8.00	84	0.74
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Welders	2	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	6	20.00	0.00		10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	60.00	0.00		10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					13.1047	0.0000	13.1047	6.7350	0.0000	6.7350			0.0000			0.0000
Off-Road	3.0557	32.1191	20.8083	0.0214		1.8196	1.8196		1.6740	1.6740		2,245.9731	2,245.9731	0.6705		2,260.0539
Total	**3.0557**	**32.1191**	**20.8083**	**0.0214**	**13.1047**	**1.8196**	**14.9243**	**6.7350**	**1.6740**	**8.4090**		**2,245.9731**	**2,245.9731**	**0.6705**		**2,260.0539**

3.2 Grading - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1057	0.1325	1.5968	2.1100e-003	0.1643	1.3300e-003	0.1656	0.0436	1.2100e-003	0.0448		180.1170	180.1170	0.0115		180.3591
Total	**0.1057**	**0.1325**	**1.5968**	**2.1100e-003**	**0.1643**	**1.3300e-003**	**0.1656**	**0.0436**	**1.2100e-003**	**0.0448**		**180.1170**	**180.1170**	**0.0115**		**180.3591**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.1108	0.0000	5.1108	2.6266	0.0000	2.6266			0.0000			0.0000
Off-Road	3.0557	32.1191	20.8083	0.0214		1.8196	1.8196		1.6740	1.6740	0.0000	2,245.9731	2,245.9731	0.6705		2,260.0539
Total	**3.0557**	**32.1191**	**20.8083**	**0.0214**	**5.1108**	**1.8196**	**6.9304**	**2.6266**	**1.6740**	**4.3007**	**0.0000**	**2,245.9731**	**2,245.9731**	**0.6705**		**2,260.0539**

3.2 Grading - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1057	0.1325	1.5968	2.1100e-003	0.1643	1.3300e-003	0.1656	0.0436	1.2100e-003	0.0448		180.1170	180.1170	0.0115		180.3591
Total	**0.1057**	**0.1325**	**1.5968**	**2.1100e-003**	**0.1643**	**1.3300e-003**	**0.1656**	**0.0436**	**1.2100e-003**	**0.0448**		**180.1170**	**180.1170**	**0.0115**		**180.3591**

3.3 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.3685	31.3551	23.5976	0.0341		2.2939	2.2939		2.1964	2.1964		3,325.6922	3,325.6922	0.7366		3,341.1606
Total	**4.3685**	**31.3551**	**23.5976**	**0.0341**		**2.2939**	**2.2939**		**2.1964**	**2.1964**		**3,325.6922**	**3,325.6922**	**0.7366**		**3,341.1606**

3.3 Building Construction - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3172	0.3976	4.7904	6.3300e-003	0.4929	3.9900e-003	0.4969	0.1307	3.6300e-003	0.1344		540.3511	540.3511	0.0346		541.0774
Total	**0.3172**	**0.3976**	**4.7904**	**6.3300e-003**	**0.4929**	**3.9900e-003**	**0.4969**	**0.1307**	**3.6300e-003**	**0.1344**		**540.3511**	**540.3511**	**0.0346**		**541.0774**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.3685	20.1963	23.5976	0.0341		2.2939	2.2939		2.1964	2.1964	0.0000	3,325.6922	3,325.6922	0.7366		3,341.1606
Total	**4.3685**	**20.1963**	**23.5976**	**0.0341**		**2.2939**	**2.2939**		**2.1964**	**2.1964**	**0.0000**	**3,325.6922**	**3,325.6922**	**0.7366**		**3,341.1606**

3.3 Building Construction - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3172	0.3976	4.7904	6.3300e-003	0.4929	3.9900e-003	0.4969	0.1307	3.6300e-003	0.1344		540.3511	540.3511	0.0346		541.0774
Total	**0.3172**	**0.3976**	**4.7904**	**6.3300e-003**	**0.4929**	**3.9900e-003**	**0.4969**	**0.1307**	**3.6300e-003**	**0.1344**		**540.3511**	**540.3511**	**0.0346**		**541.0774**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.438259	0.068659	0.177752	0.157314	0.054401	0.008756	0.006679	0.071289	0.001152	0.000993	0.009678	0.000675	0.004393

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	8.0000e-005	1.0000e-005	8.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.7500e-003	1.7500e-003	1.0000e-005		1.8600e-003
Unmitigated	8.0000e-005	1.0000e-005	8.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.7500e-003	1.7500e-003	1.0000e-005		1.8600e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.0000e-005	1.0000e-005	8.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.7500e-003	1.7500e-003	1.0000e-005		1.8600e-003
Total	**8.0000e-005**	**1.0000e-005**	**8.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.7500e-003**	**1.7500e-003**	**1.0000e-005**		**1.8600e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.0000e-005	1.0000e-005	8.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.7500e-003	1.7500e-003	1.0000e-005		1.8600e-003
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**8.0000e-005**	**1.0000e-005**	**8.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.7500e-003**	**1.7500e-003**	**1.0000e-005**		**1.8600e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Biological Habitat Assessment
&
Focused Burrowing Owl Survey and Rare Plant Survey
For
Proposed Up To 7.45MW AC Photovoltaic Solar Array
Antelope Valley Solar Project

(80 Acres; APN #3307-016-012, -013)
Alpine Butte 7.5 Minute Quadrangle,
Section 31, Township 8 N, Range 10 W
Los Angeles County, California

Prepared for

Antelope Valley Solar, LLC
837 9th Street, Suite D
Santa Monica, CA 90403
(310) 806-3296

Prepared by

Report Prepared by Ryan Young & Tina Brazil
Field Work Performed by Ryan Young
Phoenix Biological Consulting
PO Box 720949
Pinon Hills, CA 92372-0949
(949) 887 0859 cell
(760) 249 5463 fax

Prepared: February 25, 2014
Updated: October 6, 2014

Table of Contents

	Page
Executive Summary	4
Introduction and Purpose	5
Project Description	6
Location	6
Habitat and Land Use	6
Target Sensitive Species Natural History Description	7
Results:	
CNDDB Rarefind Database and Literature Review Results	14
Proximity to Conservation Areas	18
Jurisdictional Drainages	18
Habitat Assessment Results	23
Burrowing Owl Survey Results	23
Rare Plaint Survey Results	24
Mitigation Measure (MM) and Avoidance Recommendations	25
Literature Cited	28
Certification	30
List of Exhibits and Figures:	
Exhibit 1: Regional Map	31
Exhibit 2: Topographic View	32
Exhibit 3: Vegetation Classification	33
Exhibit 4: Soil Classification	34
Exhibit 5: CNDDB Nine Quadrangle Search Results	35
Exhibit 6: Mohave Ground Squirrel CNDDB Records and Range	36
Exhibit 7: Proximity to Conservation Areas	37
Exhibit 8: Desert Tortoise Density Layer, Range, and CNDDB Records	38
Exhibit 9: Swainson's Hawk CNDDB Five Mile Radius Search Results	39
Exhibit 10: Aerial of Survey Results	40
Exhibit 11: Antelope Valley Solar Site Plan	41
Figure A-G: Site Photos	42-46
List of Tables:	
Table 1: CNDDB Search Results	18
Table 2: Burrowing Owl Survey Weather Summary	24
Table 3: Vertebrates Detected During the Site Visit	48

Table 4: Vascular Plants Detected During the Site Visit…….. 49

Executive Summary:

At the request of Antelope Valley Solar, LLC (AVS), Phoenix Biological Consulting (Phoenix) initiated a biological habitat assessment on a 80 acre, multiple- assessor property (APNs: #3307-016-012, -013) on which AVS is developing an up to 7.45 megawatt (MWac) photovoltaic (PV) solar energy generation facility (the Project) in multiple phases. The site is located on vacant land in unincorporated Los Angeles County, California, near the southwest corner of the intersection of Avenue F and 90th Street East. Representative photographs and maps of the site are included in this report.

This report was completed following a site visit by Mr. Ryan Young on January 15, 2014, and five (5) subsequent site visits from April 14, 2014 through July 15, 2014. The entire site was initially evaluated for potential impacts from the proposed project, including sensitive plant and animal species as well as potential jurisdictional drainages that could be affected by the project. Following the initial habitat assessment, focused surveys were conducted for burrowing owl and rare plants. As part of the burrowing owl surveys, the site was reviewed for signs of desert kit fox (DKF) and American badger (AB).

The conclusions of this report are summarized as follows:

- One inactive burrowing owl burrow was identified on the site;
- DKF sign were identified on the site along with two, active DKF burrows. No DKF pups were observed on the site nor other signs that these burrows are natal dens. DKF is not listed as a threatened or endangered species. However, the desert kit fox is listed as a Planning species in the draft Desert Renewable Energy Conservation Plan (DRECP) and is protected as a fur-bearing mammal under California Code of Regulations, Title 14. Natal dens require a 250 foot buffer during the active pupping season (February to August).
- Although CNDDB records indicate the presence of Swainson's hawk nests within a five mile radius of the site within the last five years, no Swainson's hawk nests are present on the site. The site itself is heavily-disturbed, void of any trees or other nesting locations, and contains low quality foraging habitat for raptors;
- No signs of American badger were identified on the site;
- No sensitive plaint species (including Alkali mariposa lily) were identified on the site;
- The site does not contain potential or suitable habitat for desert tortoise or Mohave ground squirrel; and
- The site does not contain a streambeds, drainages or other aquatic resources that would require a jurisdictional delineation.

Recommended mitigation measures based on the results of the site surveys are provided at the end of this report.

Introduction and Purpose:

At the request of Antelope Valley Solar, LLC (AVS), Phoenix Biological Consulting (Phoenix) initiated a biological habitat assessment on the approximately 80 acre, multiple-assessor property (APNs: #3307-016-012, -013) on which AVS is developing an up to 7.45 megawatt (MW AC) photovoltaic (PV) solar energy generation facility (the Project). The Project will be developed and constructed in multiple phases with the first phase occupying the approximately north half of the site and subsequent phases being constructed in the southern portion of the site.

The site is located on vacant land in unincorporated Los Angeles County, California, near the southwest corner of the intersection of Avenue F and 90th Street East. Representative photographs and maps of the site are included in this report. The site is surrounded by fallow agricultural fields to the immediate south, west, and east which have been inactive for over twenty years (Google Earth, 2014). Irrigated agricultural fields lie adjacent to the northern edge of the site. Paved roads border the northern and eastern boundaries of the site, and a dirt road borders southern edge of the site. Multiple power lines border the site to the east, including cable/telephone lines, and three, separate power distribution and transmission power lines owned by Southern California Edison.

Per the California Environmental Quality Act (CEQA), the lead agency requires a project proponent to initiate a habitat assessment to identify sensitive biological resources that may have the potential to occur within a site. This report was completed following a site visit by Mr. Ryan Young on January 15, 2014, and five (5) subsequent site visits from April 14, 2014 through July 15, 2014. The entire site was initially evaluated for potential impacts from the proposed project, including sensitive plant and animal species as well as potential jurisdictional drainages that could be affected by the project. Following the initial habitat assessment, focused surveys were conducted for burrowing owl and rare plants. The focused burrowing owl survey adhered to the California Burrowing Owl Consortium burrowing owl survey guidelines (CBOC, 1993; CDFW, 2012). The focused rare plant survey methodology adhered to the United States Fish and Wildlife Service and California Native Plant Society Methodologies (USFWS, 2000; CNPS, 2001). As part of the burrowing owl surveys, the site was reviewed for signs of desert kit fox and American badger.

Several sensitive species that are known to occur within the nine quadrangle perimeter of the area were identified through the California Natural Diversity Database (CNDDB) literature/database search. The results of the habitat assessment indicate that portions of the site may have potential habitat for the burrowing owl and several sensitive plant species.

Based on the low quality of the habitat and location, the site does not contain potential or suitable habitat for desert tortoise or Mohave ground squirrel. Due to the historical agriculture use of the site, the soils are hard-packed loamy soils lacking in desert scrub vegetation abundance and diversity and potential forage material for the desert tortoise or Mohave ground squirrel. The site is also located along the range limitations of both species with limited/known detections within recent years.

Small mammal burrows were noticeably absent that could provide foraging habitat for raptors. Although the CNDDB search indicated presence of Swainson's hawk (*Buteo swainsoni*) nesting sites within a five mile radius within the last five years, the site is heavily disturbed, void of any trees, and does not provide suitable nesting or foraging habitat for raptors.

Project Description:

AVS is developing an up to 7.45-Megawatt MW AC photovoltaic (PV) solar energy generation facility (the Project) on approximately 80 acre, multiple-assessor property (APNs: #3307-016-012, -013) located in unincorporated Los Angeles County. The project will generate renewable energy utilizing photovoltaic panels, which will distributed to the Southern California Edison distribution circuits located along the eastern border of the site. The project will be developed and constructed in multiple phases with the first phase occupying the approximately north half of the site and subsequent phases being constructed in the southern portion of the site.

Location:

The site is located on the southwest corner of Avenue F and 90th Street East. The site is located on the Alpine Butte 7.5 minute quadrangle topographic map (Exhibits 1 and 2). The legal description of the parcel is E ½, NE ¼, of Section 31, Township 8N, Range 10W, Los Angeles County.

Habitat and Land Use:

The parcel is situated at approximately 2,346 feet in elevation within the Antelope Valley. Previously disturbed vacant agricultural fields border the site to the west, south, and east. The fallow agriculture fields have been out of production for over twenty years (Google, 2014). Irrigated agricultural fields are situated immediately to the north. There is low density

residential use surrounding the site with one residence adjacent to the northwest corner and one residence near the southwest corner of the site.

Paved roads border the northern and eastern boundaries of the site, and a dirt road borders southern edge of the site. Multiple power lines border the site to the east, including cable/telephone lines, and three, separate distribution and transmission power lines owned by Southern California Edison.

The site consists of heavily-modified, fallow, agricultural fields that has resulted in soil compaction, low shrub diversity/abundance and low species diversity. Metal, irrigation stand pipes (2 feet tall) from previous agricultural practices remain intact along the middle half of the site (see Figure A). In addition, an approximately 100 ft. x 100 ft. abandoned catchment basin exists at the southern border of the site and is depicted on the topographic map (see Exhibit 2-3).

Soils consist of silty-clay loam that are hard-packed with very sparse vegetation. The soil types consist of Rosamond loam (95%) and Rosamond loam, saline-alkali (5%). Rosamond loam is described as non-saline to very slightly saline, well-drained alluvium derived from granite (see Exhibit 4). Rosamond loam, saline-alkali soil is described as very slightly saline to moderately saline, well-drained alluvium derived from granite. Both types of soils are considered good farmland (NRCS, 2014). Existing vegetation is desiccated and low growing (Figures B-C). Approximately 40-50% of the site is denuded of vegetation. Due to the lack of desert scrub, available forage and hard-packed soils, the habitat on site is low quality habitat for most fossorial reptiles and mammals. This is evidenced in the lack of species abundance and diversity on site. It is also evidenced by the fact that there were no recorded nesting or breeding species observed on site and the number of burrows observed was low. Additionally there are no trees on the site or other suitable nesting locations. The vegetation community includes tumbleweed (*Salsola sp.),* less than twelve bushes of saltbush (*Atriplex spinifera*), and Mediterranean grass (*Schismus sp.).* For a complete list of vegetation see Table 4.

<u>Target Sensitive Species Natural History Description:</u>

Desert Tortoise

The desert tortoise (*Gopherus agassizii*) is a desert dwelling reptise with large elephantine appendages and a dome-shaped shell. Desert tortoise inhabit portions of Nevada, Arizona and Mexico in most of the Mojave and Colorado deserts in California. Desert tortoise was listed, by emergency rule, as an endangered species by the USFWS on August 4, 1989 and later downgraded to threatened status on April 2, 1990. It is also listed as threatened species

by the California Department of Fish and Wildlife (CDFW). Several human induced factors have led to their demise, including urban development in the desert, OHV use, livestock, collecting and poaching and increased common raven (*Corvus corax*) populations which predate on juvenile and immature tortoises. Other factors which have had a negative effect on desert tortoise populations include diseases such as *Mycoplasma agassizii*, herpes virus and shell diseases such as cutaneous dyskeratosis. Although, it is believed these diseases may have been around for several decades, when combined with environmental stress factors such as drought, air pollution and increased predation from ravens and dogs the otherwise and somewhat previous acceptable levels of disease and mortality within the population began to increase rapidly. Large die-offs in the populations were reported in the 1980s and 1990s during study plots conducted by Dr. Kristin Berry and others in the California deserts which has led to further concern for their long-term viability. Natural predators include coyotes, mountain lions and badgers.

Desert tortoise habitat can include desert washes, desert flats, bajadas, alluvial fans, rolling hills, rocky hills and valleys. Vegetation communities that are known to provide suitable habitat include creosote scrub, saltbush scrub, Joshua tree woodlands, Mojave mixed-woody scrub, juniper woodlands and blackbrush scrub within elevations of 300 to 5,000 feet (USFWS, 2010). Preferred tortoise habitat (areas of high density), in the Mojave Desert, typically include areas along mid-upper bajadas with abundant annuals; washes and friable soils for burrow excavation in the 2,500 to 3,500 elevation zone.

Desert tortoises can be active during any month of the year but usually are dormant through most of the winter months and during hottest periods of the summer. Tortoise activity increases significantly with the onset of spring annual vegetation when temperatures range from the 75-85 °F and during periods of precipitation. Courtship and mating occur during the early spring months and egg-laying can occur during late spring to early summer. Neonates are born in late summer-early fall and usually spend several years occupying rodent burrows and feeding on annuals within close proximity of their natal burrow. Desert tortoises reach sexual maturity around twelve years of age when they reach a mean carapace length of approximately 160 millimeters. Tortoises live in dirt burrows, caliche caves and rock shelters which can be up to 6-9 meters in length. Their home range may extend up to a square mile. Tortoises are thought to live up to 60-80 years in optimum conditions. They are listed as a federally and state threatened species. It is illegal to harass, harm, pursue or take these reptiles without appropriate permits and federal/state authorization.

Mohave ground squirrel

The Mohave ground squirrel (MGS; *Xeropermophilus mohavensis*) is a small, grey squirrel, measuring 8 to 9 inches in length, whose range is confined to the western Mojave Desert. Almost the entire range of MGS lies within the West Mojave Habitat Conservation Plan

(WEMO, 2005). WEMO has been approved by the BLM for federal lands but not by the CDFW. MGS is a state threatened species that was listed on January 1, 1985. Prior to 1985, it was listed as a rare species on May 21, 1971 by the Fish and Game Commission (Gustafson, 1993).

The northern range for the MGS extends to the southern edge of Owens valley. The western range is defined by the Sierra Nevada escarpment and Mojave creosote scrub communities. The southern range occurs in the north facing slopes of the transverse mountains range in San Gabriel Mountains and extends from the town of Palmdale to Apple Valley. The historical southeastern range extends to the edge of Lucerne valley and upwards along the Mojave River and through Barstow and into the western portions of Fort Irwin Military Training Center. MGS generally occur in flat to moderate sloping terrain. The upper elevation range in the Jawbone area is approximately 5,000 feet and lower life zone ends around 2,000 feet (BLM, 2005). MGS are considered absent from steep terrain, although they can use canyons and passes or areas of unsuitable habitat during dispersal on reproductive years (Labbs, 1998). Typical soil substrates in potential habitat include sandy or loamy soils. Rocky substrates such as cobble, rocky outcrops, cliffs or caliche hardpan are not considered habitat (BLM, 2005). MGS can occur in creosote scrub, mixed woody desert scrub and saltbush scrub at lower elevations and Joshua tree woodlands and monotypic blackbrush scrub at elevations between 4,000 and 6,000 feet (Wessman, 1977).

In the northern range, certain indicator plants have been associated with areas where MGS have been trapped consistently over several years (Leitner, 2002). Indicator plants at the long term Coso geothermal study sites include Winterfat (*Krasheninnikovia lanata*) and Spiny hopsage (*Grayia spinosa*). These plants have been present in fecal samples and may play an important role in long term survivability during drought years. It is hypothesized that areas of sufficient forage plants and/or diversity act as refugia or source populations from which populations may expand and disperse outwards during abundant rainfall years. Due to the MGS ability to forgo reproduction during drought years the populations are expected to contract and then expand after subsequent wet years. This gives local MGS populations a dynamic nature of contraction and expansion throughout its range and may also create a dynamic ebb and flow to portions of the range boundary. Other shrubs that are known to be an important source of forage and shelter include boxthorns (*Lycium andersonii* and *L. cooperii*). MGS have been observed perched in *L. cooperii* in Freeman gulch study site and along Highway 14 (Pers. observ.). Annuals that provide an important forage source in reproductive years include eremalche (*Eremalche sp.*), milkvetch (*Astragalus sp.*), goldfields (*Lasthania glabrata*), desert pinchusion (*Chaenactis sp*.), desert dandelion (*Malacothrix glabrata*), *Coreopsis bigelovei*, and devil's lettuce (*Amsinkia tesselata*) flowers tops.

MGS are usually solitary but may form loose colonies in optimum habitat conditions (pers. observ.). Males typically emerge from hibernation in early-mid February and females emerge late February to early March. If rainfall totals are sufficient, approximately 75-80 mm or

more, MGS will reproduce. During drought years, adult MGS will merely forage on available shrubs in order to gain enough weight to survive hibernation. In drought years, abundance of suitable forage plants may be the limiting factor in sustaining a local population. Males can begin hibernation as early as June. Females can remain above ground through July in order to gain sufficient fat reserves prior to hibernation. Juveniles emerge from the natal burrows from early to late May. Once juvenile MGS have been weaned, they begin to venture out from the natal burrow area and may disperse up to 3-6 miles. Juveniles may remain above ground as late as August prior to entering hibernation.

Other squirrels which occur within the MGS range include: white tailed antelope squirrel (AGS; *Ammospermophilus leucurus*), California ground squirrel (CGS; *Spermophilus beecheyi*) and round tailed ground squirrel (RTGS; *Spermophilus tereticaudus*). AGS occur throughout the range of MGS. RTGS occur only along the eastern edge of the MGS range, mostly in the vicinity of Barstow, Fort Irwin Military Base and Lucerne Valley. CGS typically occurs near urban environments, near areas of perennial water and forage sources, residential areas and in the foothills surrounding the western Mojave Desert. Key distinguishing features of the MGS include: (1) lack of a white stripe on each side, (2) general silver-grey appearance, (3) lack of noticeable ears, (4) typically solitary, (5) active from February to August, and (6) may emit a high pitched "peep" as an alarm call.

Burrowing Owl

Burrowing owls (*Athene cunicularia*) are a small, long-legged, ground-dwelling owl that occurs from British Columbia, throughout North America and portions of Central and South America. They are typically nocturnal but are also known to be crepuscular (active dawn and dusk). Typical prey items include invertebrates, small mammals, lizards, snakes and small birds. They nest underground in burrows and clutches range between 9-11 eggs. Burrow entrances and nests area adorned with cow chips, feathers, grass, food items and dog feces. They are typically monogamous and tend to exist in colonies. They exhibit high nest fidelity and will return to the same burrow nest site for multiple years.

Burrowing owls occur in a variety habitat types throughout California; such as, annual and perennial grasslands, agriculture fields, deserts and scrublands characterized by low-growing vegetation (CBOC, 1993). Suitable owl habitat may also include areas with trees and shrubs where canopy cover is less than 30% of ground surface. Suitable burrows may include both artificial and natural burrows that provide shelter from the elements as well as protection from predators. Burrowing owls also use burrows for nesting during spring and early summer months. California ground squirrel (CGS; *Spermophilus beecheyi)* is known to provide suitable burrows as well as inactive coyote, kit fox, badger and desert tortoise burrows. Burrowing owls can also create and/or modify existing burrows. Artificial burrows may include culverts, concrete pipes, wood debris piles and openings beneath cement or asphalt.

In desert scrub habitat, they are usually associated with canid (i.e. fox and coyote) and CGS burrows along mounds that provide vistas for viewing prey and predators. They are also found along washes and wash banks where small mammal and invertebrate abundance is higher. Burrowing owls are a DRECP Planning species and a California species of special concern. They are also protected under the Migratory Bird Treaty Act (MBTA) and within sections 3503, 3503.5 and 3800 of the California Department of Fish and Game Code which prohibits the take, possession, or destruction of birds, their nests or eggs (CBOC, 1993).

Desert Kit Fox

The desert kit fox (DKF; *Vulpes macrotis arsipus)* is a small fox that measures approximately 20 inches as an adult. The desert kit fox have long eggs and large ears with coats that range from tan in summer to silvery-gray in winter. DKF range is scattered throughout the arid and semi-arid regions of the contiguous US, and extends between the Sierra Nevada Range and the Rockies and is bordered on the south by the north central states of Mexico. It is listed as a DRECP Planning species and is protected as a fur-bearing mammal under California Code of Regulations, Title 14. The desert kit fox is not listed as a threatened or endangered species. The separate and distinct sub-species of San Joaquin kit fox (SJKF; *Vulpes macrotis mutica)* was listed as federally endangered in 1967 and subsequently listed as endangered by the state of California in 1971. SJKF inhabit the San Joaquin Valley and adjacent valleys, and the site is not within the known range of SJKF (Patterson et al., 2003).

DKF prey is varied and usually includes abundant nocturnal rodents and lagomorph species. Primary prey species composition includes kangaroo rats, ground squirrels, and mice. DKF often coexist with coyotes by exploiting certain prey species more effectively. By constructing and maintaining many dens throughout its home range, the DKF more effectively preys on many fossorial rodent species (IUCN, 2008).

Kit fox are nocturnal and take cover in dens during the day to escape the elements and predators. Dens have many entrances and are primarily constructed in friable soils of grassland and desert-scrub habitat. However, the modification of other animal burrows facilitates den construction in different soil types. Active dens are identified by a steep slope with loose soil debris and natal dens exhibit many entrances. Mating occurs between January and March with gestation lasting between 48-52 days. Once born, males provide food while females are lactating. However, once lactation terminates females may change natal dens 1-2 times per month. At approximately 4-5 months of age, pups disperse from the den.

The distribution of desert kit fox has been largely affected by habitat loss and fragmentation, specifically oil and gas, residential and other development. Such habitat fragmentation has decreased availability of wildlife corridors, thus making it more difficult to maintain a genetically viable population. Human induced mortality factors also include shooting, road kill, and agricultural development.

American Badger

The American badger (AB; *Taxidea taxus*) is a medium sized fossorial mustelid with short legs, a wide flattened body and head, and a distinguishing white dorsal stripe. Males are typically 25-35 inches in length. The CDFW listed the badger as a species of special concern in 1986. They inhabit primarily open, dry plains areas including the western US, north through central western Canada, and south through mountainous northern regions of Mexico. In California they inhabit most of the state with the exception of the humid northern coastal forests. Suitable habitat includes herbaceous shrub and open scrub with friable soils. Badgers also occur in habitat with a sparse canopy cover and dry sandy soils (Whitaker, 1996).

Mainly nocturnal, the American badger prey on fossorial rodents including pocket gopher, ground squirrels, kangaroo rats, and some insects and birds. Mating occurs in late summer or early autumn. However, delayed implantation causes offspring to be born in early spring in litters of 1-5. Badgers are solitary with the exception of raising young until 4-5 months of age. During winter, badgers cycle through stages of torpor, taking cover in a single den. Badgers create dens rapidly, using massive shoulder muscles to shovel friable soils. Their ability to create dens quickly allows the badger to have multiple dens, often using a single den for food storage, a single den for birthing, and a single den for cover from the elements. Den entrances are 8-12 inches in width with elliptical openings.

Human induced factors have caused a loss in population. Indiscriminate poisoning has decreased the numbers across the contiguous US. Vehicular accidents and conversion of habitat to agricultural land and/or development have also caused a decrease in the population.

Antelope Valley Swainson's hawk

The Swainson's hawk (SWHA; *Buteo swainsoni*) is a slender buteo averaging 19 inches long with a wingspan of 51 inches. The coloring of Swainson's ranges from light to dark with many intermediate morphs. They are distinguishable in flight by white wing linings that contrast with dark flight feathers. Unlike other buteos, Swainson's migrate between North America and South America each year. Most of the California population winters in Argentina, however the wintering habits of the Antelope Valley population specifically are unknown. The California population has steadily decreased and was listed as threatened by the CDFW in 1983 (CDFW, 2010).

The breeding season begins in late March to early April when birds typically return to nest sites. Nest site fidelity is high for Swainson's hawk. Pairs form immediately and nest building occurs over a one to two week period. Both males and females are involved in nest building. Nests are usually easily identified as courtship displays involve circling the nesting site and frequent vocalizations. Antelope Valley Swainson's Hawk have historically nested in Joshua Trees. In other parts of California, cottonwood, oaks, sycamores and willows provide suitable

nesting habitat (Bloom, 1980). During the month of May incubation and hatching occurs. Females remain well-hidden in the nest. Males forage for hours and rarely return to nesting site to prevent predators from recognizing nest location. Clutch sizes vary from 2-5. Once hatched, hatchlings remain in the nest until July or August. Between June and mid-July both males and females leave the nest often as fledglings are relatively safe from predators. In July or August, fledglings leave the nest and migratory flocks begin to form in August and September. Migratory flocks usually reach wintering grounds by November.

Swainson's hawks are aerial foragers, soaring over foraging habitat in search of prey. Historically they have foraged in native desert scrub communities. Much of the historical foraging habitat has been lost to development or conversion to incompatible crop types. However, Swainson's hawks also forage in irrigated pastures and alfalfa fields that can support a suitable prey base. Throughout breeding season Swainson's prey on mostly ground squirrels, voles, and other small mammals. Unlike other buteos, Swainson's hawks also forage for insects such as grasshoppers and crickets during non-breeding season. The home range is indirectly proportional to abundance or ease of locating prey. For example, alfalfa fields provide cover, forage and water for small rodents; therefore home range grows to increase the ability of locating prey. The Swainson's hawk is listed as a California state threatened species under the California Endangered Species Act (CESA) under the California Department of Fish and Wildlife. They are also protected under the Migratory Bird Treaty Act (MBTA) and within sections 3503, 3503.5 and 3800 of the California Department of Fish and Game Code which prohibits the take, possession, or destruction of birds, their nests or eggs (CBOC, 1993).

Rare Plants: Alkali Mariposa Lily (*Calochortus striatus*) and Sagebrush Loeflingia *(Loeflingia squarrosa var. artemisium*)

There were two rare plant species, sagebrush loeflingia *(Loeflingia squarrosa var. artemisium)* and alkali mariposa lily (*Calochortus striatus*) identified in the CNDDB rarefind 3 database that have potential habitat on the site, with multiple occurrences having been identified within the nine quadrangle database search.

Sagebrush loeflingia is a compact annual dicot in the family Caryophyllaceae. It is branched at the base and has glandular hair stems that may be erect or prostrate. Green flowers appear April through May and may be distinguished from the California loeflingia (*Loeflingia squarrosa var. Squarrosa*) by its shorter, straight, equal length petals. Sagebrush loeflingia prefers sandy flats including hard packed sandy soils in desert scrub habitat.

Alkali mariposa lily (*Calochortus striatus*) is a perennial herb in the family Liliaceae. It flowers between April and June with an umbel-like inflorescence. The petals are white to lavender in color with irregularly toothed tips and conspicuous purple veins. Its preferred habitat is alkaline meadows and ephemeral washes in chenopod scrub habitat.

CNDDB Rarefind Database and Literature Review Results:

A thorough California natural diversity database (CNDDB) literature review was conducted to determine which species occur within a nine quadrangle database search. (Exhibit 5; Table 1). Thirty-one sensitive species were detected within the search parameters. Multiple habitat types fall within the search parameters; San Gabriel Mountains foothills, and desert scrub (saltbush, creosote scrub or mixed Mojave desert scrub), playa lake beds, and Joshua tree woodland habitat. Therefore, several species fall out of range limits for potential habitat type given the specific characteristics of the site. Additionally, due to the disturbed nature of the site, suitable habitat does not exist for most sensitive species occurring within the surrounding nine quadrangles. (See Table 1 for habitat potential for all 31 species).

Species that are known to occur within the nine quadrangles, with potential habitat type on the site, include burrowing owl (*Athene cuncicularia*), sagebrush loeflingia *(Loeflingia squarrosa var. artemisium*), and alkali mariposa lily (*Calochortus striatus*).

Desert Tortoise

Only two desert tortoise occurrences were found within the nine quadrangle CNDDB search. Both desert tortoise detections occurred more than five miles from the site boundaries. The West Mojave Plan (WEMO) tortoise range and density map, depicted on Exhibit 8, shows that the site is situated approximately 3 miles west from the estimated population density range layer of 50-100 tortoises per square mile. 15 miles to the north, there is an estimated population density range of 20-50 tortoises per square mile. The density layer estimate increases to 100-150 within the Edwards Air Force Base Significant Ecological Area (SEA). Although the site falls within desert tortoise range, habitat is not suitable to support desert tortoise due to the historic land use practices. Soil friability is low and annual vegetation is sparse, providing little to no foraging habitat. Given the poor habitat suitability, a focused desert tortoise survey is not necessary for this site.

Mohave Ground Squirrel

There are 37 occurrences of MGS within the nine quadrangle CNDDB database search. All occurrences detected were located at least four miles (or more) from the site. The MGS occurrence map (Exhibit 6) shows that the proposed the site is situated along the lower eastern boundary of the MGS range. However, the habitat present on site is not conducive to MGS. Due to the low friability of soil and sparse vegetation, small mammal burrows were noticeably absent during the field reconnaissance. It is not anticipated that the site could support an MGS population. Given the poor habitat suitability, a focused MGS survey is not necessary for this site.

Burrowing Owl

There are 36 records for burrowing owl presence from the CNDDB search. All burrowing owl occurrences were located within a three mile radius of the site. These records are concentrated entirely to the west, northwest, and north. Potential burrowing owl habitat does occur on site. Due to the proximity of CNDDB occurrences and the potential habitat that exists at this site, focused surveys for burrowing owl were performed on the site as described in this report below.

Birds

Three (3) Swainson's hawk (*Buteo swainsoni*) occurrences were detected through the CNDDB five mile radius search within the last five (5) years (Table 1, Exhibit 9). Two occurrences (CNDDB #2415 and #1777) were located more than three miles from the site, and were confirmed present as of January 15, 2014. Nest occurrence CNDDB #2416 was not present as of January 15, 2014 or July 15, 2014, and CNDDB records indicate that the chick and adult female associated with this nest were found dead in July 2012 from natural causes (CNDDB, 2014).

The CNDDB database search also included presence of prairie falcon *(Falco mexicanus)* and Cooper's hawk *(Accipiter cooperii)* within the nine quadrangle search parameters. Vegetation diversity and availability are low on the site. Due to the lack of shrubs, forage, rodent burrows and cover for small mammals, foraging and nesting raptor habitat is not expected. Le Conte's Thrasher *(Toxostoma lecontei)* occurrences are concentrated to the southeast boundary. However, Le Conte's Thrasher was recently down-graded and the Mojave Desert population is no longer recognized as a sensitive species. In addition, Loggerhead shrike (*Lanius ludovicianus)* occurred within the 10 mile radius CNDDB search. There is no nesting habitat on the site but some marginal foraging habitat may exist for loggerhead shrike. All nesting birds are covered under the Migratory Bird Treaty Act (MBTA). There is low probability for nesting habitat to occur for most bird species from the CNDDB search as vegetation is sparse. All potential bird species should be included in a nesting bird survey if project occurs during the spring as they are protected under the MBTA.

Mammals, Desert Kit Fox, Wildlife Corridors

Roosting and foraging habitat is not present for the western mastiff bat (*Eumops perotis californicus*). Rodent burrows are very sparse on site and that habitat for special-status rodents seems to be lacking.

Although habitat is not present for any mammal species occurring in the nine quadrangle CNDDB search radius, DKF sign was detected during the field reconnaissance –

specifically, a marking station with desert kit fox scat were observed in one location near the middle, eastern half of the site, and two desert kit fox burrows were identified on the site. No desert kit fox pups were observed on the site or other signs that these burrows are natal dens. The desert kit fox is not listed as a threatened or endangered species, but is protected as a fur-bearing mammal under California Code of Regulations, Title 14 and is a DRECP Planning species.

The site is surrounded by open land for several miles in all directions, with little development or other improvements. Residential development is low and the vacant land and agricultural fields provide unobstructed habitat for movement of wildlife. This open space promotes movement of species within the area and around the project site. The majority of the surrounding land is owned by Los Angeles Sanitation District and development is not anticipated. Due to the open space surrounding land use, the impact of the project to wildlife corridors, whether for DKF or other species, are not expected to be significant.

Rare plants

There were two rare plant species, sagebrush loeflingia *(Loeflingia squarrosa var. artemisium)* and alkali mariposa lily (*Calochortus striatus*) identified in the CNDDB rarefind 3 database that have potential habitat on site and multiple occurrences with the CNDDB search parameters.

The California Native Plant Society (CNPS) has created 5 lists (or ranks) in an effort to categorize degrees of concern. Plants that fall under list 2 are plants that are rare, threatened, or endangered in California, but are more common elsewhere. All of the plants constituting California Rare Plant Rank 2 meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Secs. 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Code, and are eligible for state listing. (Tibor, ed. 2001). It is mandatory that they be fully considered during preparation of environmental documents relating to CEQA. The CNPS Threat Rank is an extension added onto the California Rare Plant Rank and designates the level of endangerment by a .1 to .3 ranking with .1 being the most threatened, .2 being fairly threatened, and .3 being not very threatened. Sagebrush loeflingia and alkali mariposa are listed as List 2.2 and 2.3, respectively.

There were six occurrences of sagebrush loeflingia (*Loeflingia squarrosa var. artemisiarum*) in the ten mile radius CNDDB search. Hard packed soils occur on site providing potential habitat for sagebrush loeflingia. Forty-five occurrences of alkali mariposa lily (*Calochortus striatus*) were detected within the ten mile radius CNDDB search. Alkali mariposa lily habitat typically consists of chenopod (saltbush) scrub and saline soils which are in low quantities. However, due to the land use practices the potential for this to occur is low.

Habitat on the site is not conducive to the other three rare plants found in the CNDDB search identified on Table 1. Nevertheless, a botanical survey was performed on the site as described in this report below.

Proximity to Conservation Areas

The Fremont Kramer DWMA is situated approximately 11 miles to the east. The objectives of these management areas are to provide critical habitat for desert tortoise conservation, population recovery and to provide connectivity and linkages between populations. Los Angeles County also designates Significant Ecological Areas (SEAs) as those areas that provide habitat for significant biological resources and to provide corridors and linkages between different habitat types. The Edwards Air Force Base SEA and the Rosamond Lake SEA are situated approximately 3 miles to the northeast and 5 miles to the northwest, respectively. The site is not within nor does it border an SEA.

Jurisdictional Drainages

The U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW) collectively regulate jurisdictional waters of the U.S. and state. There are no streambeds or other aquatic resources identified on the site that require a jurisdictional determination.

Table 1: CNDDB Ten Miles Search Results & Habitat Potential

	Scientific Name	Common Name	Occurrence #	Federal Status	State Status	CNPS Ranking	Habitat Potential
Reptiles	*Anniella pulchra pulchra*	silvery legless lizard	37, 45, 51, 52, 53, 79	None	Species of Special Concern	N/A	Habitat is not present on site for this species. This species prefers loose sandy or loamy soils to burrow in.
	Gopherus agassizii	desert tortoise	1, 33	Threatened	Threatened	N/A	Habitat is not present on this site. There is low annual vegetation and low soil friability.
	Phrynosoma blainvillii	coast horned lizard	146, 147	None	Species of Special Concern	N/A	Project site is outside the species range. Not expected to occur.
Birds	*Accipiter cooperii*	Cooper's hawk	35	None	Species of Special Concern	N/A	Nesting habitat is not present. Relatively poor foraging habitat may be present but unlikely.
	Agelaius tricolor	tricolored blackbird	205, 401	None	Species of Special Concern	N/A	Nesting/foraging habitat is not present. This species prefers wetlands, ponds, lakes with emergent vegetation.
	Asio flammeus	short eared owl	1	None	Species of Special Concern	N/A	Nesting/foraging habitat is not present.
	Athene cunicularia	burrowing owl	709, 711, 750, 751, 788, 798, 799,814, 939, 964, 1057, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1555, 1556,	None	Species of Special Concern	N/A	Potential habitat is present for this species. There are numerous records in close proximity and the site is within the species range.

		1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1573				
Buteo regalis	ferruginous hawk	55	None	None	N/A	Nesting habitat is not present. Relatively poor foraging habitat may be present but unlikely.
Buteo swainsonii	Swainson's hawk	1777, 2415, 2416, (within 5 miles and 5 years)	None	Threatened	N/A	Nesting habitat is not present. Relatively poor foraging habitat may be present but unlikely.
Charadrius alexandrinus nivosus	western snowy plover	94	Threatened	Species of Special Concern	N/A	Habitat is not present on this site. Prefers sandy beaches or shores of large alkali lakes.
Charadrius montanus	mountain plover	37, 42, 57, 58, 59, 60, 61, 62, 67, 68, 91,	None	Species of Special Concern	N/A	Habitat is not present on this site. Prefers short grasslands.
Falco mexicanus	prairie falcon	241	None	None	N/A	Nesting habitat is not present. Relatively poor foraging habitat may be present but unlikely.
Lanius ludovicianus	loggerhead shrike	57, 70	None	Species of Special Concern	N/A	Nesting habitat is not present / low potential for foraging habitat. No LOSH were observed on site.
Toxostoma lecontei	Le Conte's thrasher	1, 2, 58, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 131, 132, 133, 134, 156	None	No longer a sensitive species in the Mojave desert.	N/A	Nesting habitat is not present. Relatively poor foraging habitat may be present but unlikely. No thrashers were

							observed on site.
	Vireo bellii pusillus	least Bell's vireo	319	Endangered	Endangered	N/A	Habitat is not present on this site. Prefers riparian habitat.
	Plegadis chihi	White-faced ibis	28	None	Species of Special Concern	N/A	Habitat includes freshwater marshes, lakes, cultivated fields (during irrigation/flooding), canals and ditches. Habitat is not present on site.
Mammals	*Dipodomys merriami parvus*	San Bernardino kangaroo rat	48, 49	Endangered	Species of Special Concern	N/A	Nesting/foraging habitat is not present. Outside the species range.
	Eumops perotis californicus	western mastiff bat	84	None	Species of Special Concern	N/A	Roosting/foraging habitat is not present.
	Onychomys torridus ramona	southern grasshopper mouse	25	None	Species of Special Concern	N/A	Nesting/foraging habitat is not present.
	Perognathus inornatus inornatus	San Joaquin pocket mouse	1	None	None	N/A	Nesting/foraging habitat is not present.
	Taxidea taxus	American Badger	150	None	Species of Special Concern	N/A	Low potential for habitat and not observed on the site. Prefers open desert scrub and suitable prey base is not present. AB and their burrows were not observed on site.
	Xerospermophilus mohavensis	Mohave ground squirrel	23, 24, 25, 26, 45, 134, 135, 190, 226, 227, 228, 229, 230, 255, 256, 265, 267, 268, 271, 279, 280, 292, 293, 294,	None	Threatened	N/A	The site is within the species range. However, habitat type is not conducive to this species. Vegetation is low-absent, limiting the forage and cover.

			295, 309, 377, 378, 381, 382, 402, 414, 415, 416, 424, 443, 453				
Plants	*Astragalus preussii var. laxiflorus*	Lancaster milk-vetch	1, 2, 3, 4	None	None	1B.1	Low potential. Marginal habitat may be present on this site. Prefers chenopod scrub. Not observed during botanical surveys.
	Canbya candida	white pygmy-poppy	11, 12	None	None	4.2	Habitat is not present on site for this species. Prefers rocky slopes.
	Chorizanthe parryi var. parryi	Parry's spine flowe	38	None	None	1B.1	Habitat is not present on this site. Prefers coastal scrub and chaparral.
	Cymopterus deserticola	desert cymopterus	5, 6, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 62, 71	None	None	1B.2	Habitat is not present on this site. Prefers Joshua Tree woodland.
	Delphinium recurvatum	Recurved larkspur	69	None	None	1B.2	Occurs in chenopod scrub, cismontane woodland, valley and foothill grasslands in alkaline soils (3-750 meter, blooms Mar-May). Marginal habitat present on site. Species not present during focused botanical surveys.
	Eriophyllum mohavense	Barstow woolly sunflower	38	None	None	1B.2	Low potential. Marginal habitat may be present

						on site. Prefers chenopod scrub. Not observed during botanical surveys.
Eschscholzia minutiflora	Red rock poppy	19	None	None	1B.2	Occurs in Mojavean desert scrub in rocky substrate (680-1,230 meters, Blooms Mar-May). Habitat is not present.
Layia heterotricha	pale-yellow layia	35	None	None	1B.1	Low potential on site. Prefers pinyon-juniper woodland, valley and foothill grassland. Not observed during botanical surveys.
Loeflingia squarrosa var. artemisiarum	sagebrush loeflingia	1, 18, 23, 24, 25, 26	None	None	2B.2	Low potential, marginal habitat may be present. Prefers hard-packed sandy soils along dirt roads, blow-sand, stabilized dunes. Not observed during botanical surveys.
Opuntia basilaris var. brachyclada	short-joint beavertail	54	None	None	1B.2	Habitat is not present on site for this species. Prefers fine, rocky granitic alluvium along the foothills of the San Gabriel Mountains.
Plagiobothrys parishii	Parish's popcorn flower	3	None	None	1B.1	Low potential, marginal habitat may be present on site. Prefers desert scrub and ephemeral washes. Not observed during botanical surveys.

	Calochortus striatus	alkali mariposa lilly	10, 11, 14, 15, 16, 17, 18, 19, 22, 23, 44, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 58, 59, 60, 61, 62, 64, 65, 66, 67, 68, 69, 72, 73, 75, 76, 77, 78, 82, 86, 94, 96, 97, 101	None	None	1B.2	Low potential, marginal habitat may be present on site. Can prefer chenopod scrub. Not observed during botanical surveys.

Habitat Assessment Results:

The results of the habitat assessment indicate that the area proposed for development is situated within a highly disturbed, sparsely covered fallow agricultural field. In general, the soils are hard packed and there is low plant abundance and low diversity on site. Less than 15 total saltbush shrubs (*Atriplex spinifera*) were detected during the site visit on January 15, 2014. Only two species, common raven (*Corvus corax*) and Brewer's blackbird (*Euphagus cyanocephalus*) were observed (see Table 2).

The site has low habitat potential for most special status species occurring within the ten mile radius CNDDB search. Additionally there is no nesting habitat for raptors and very low likelihood of foraging habitat. Vegetation is sparse and low growing. The vascular plant list provided on Table 3. Habitat potential on the site is low in general for most sensitive vertebrate species occurring in the ten mile radius CNDDB search.

Burrowing Owl Survey Results:

A focused burrowing owl survey was performed on the site in accordance with the California Burrowing Owl Consortium burrowing owl survey guidelines (CBOC, 1993; CDFW, 2012). As part of the burrowing owl study, the site was reviewed for signs of desert kit fox and American badger.

Site visits were conducted on the following dates with the following weather conditions:

Table 2: Burrowing Owl Survey Weather Summary

Date	Begin Temp (°C)	End Temp (°C)	Begin Cloud %	End Cloud %	Begin Wind (MPH)	End Wind (MPH)
04/14/2014	16.5	22.1	15	15	10	5
05/05/2014	20.1	24.3	1	5	2	3
05/29/2014	36.1	30.5	5	3	7	7
06/20/2014	28	40	20	25	5	7
07/15/2014	30	40	5	5	5	7

The result of the burrowing owl survey indicates:

- There is one (1) inactive burrowing owl burrow on the site (see Exhibit 10 & Figure G). Owl sign (whitewash) were present near the burrow, but no owl was observed on the site. Judging by the amount of whitewash, it appears that a migrant burrowing owl utilized the burrow for 1-2 months and then left the area. During successive site visits, cobwebs and natural debris covered the entrance of the site which implies the burrow is inactive. Additionally, the soils at the burrow mound and within the apron of the burrow have a hard-crust top-layer that is indicative of inactivity. Typically, active burrows display soft, friable soils with noticeable tracks at the burrow entrance and mound that indicate activity. No tracks were observed, and the soils were undisturbed (Exhibit G). As described above, the Site is low quality for burrowing owl habitat. However, Applicant has agreed to pay an in-lieu fee to a non-profit organization in support of a project that assists in the preservation of burrowing owl habitat (MM-07), with the amount of such in-lieu fee determined based on an assessment of the benefit of the in-lieu project to the preservation of the burrowing owl habitat and the loss of the potential burrowing owl habitat on the Site, which is low quality habitat for burrowing owl.
- Two active desert kit fox (DKF) burrows were observed on site. Two marking stations were also detected on the site. A DKF and two coyotes were captured, via an automated trail camera that was placed on site, near one of the active kit fox burrows (Figure E). No DKF pups were observed on the site, or other signs that these burrows are natal dens. The DKF burrows appear to the result of an unmated adult DKF.

<u>Rare Plant Survey Results:</u>

A focused rare plant survey was performed in accordance with United States Fish and Wildlife Service and California Native Plant Society Methodologies (USFWS, 2000; CNPS, 2001). The survey was performed on May 2, 2014, under weather conditions consisting of sunny, clear skies with temperatures ranging between 65 ^{o}F and 88 ^{o}F with winds ranging between 4 and 10 MPH.

The results of the botanical survey indicate that there are no known sensitive plant species present. The main target sensitive plant species of concern, sagebrush loeflingia and Alkali mariposa lily, were not detected on site. A known Alkali mariposa lily CNDDB reference site population was visited on the same date (CNDDB Occurrence #23 at Avenue E and Sierra Hwy), and multiple alkali mariposa lily plants were observed flowering or about to flower at the reference site (Figure F). Based on this information it can be reasonably assumed that, if present at the site, the species would have been detected during the 2014 spring survey season.

Recommendations for General Mitigation Measure (MM):

Below are proposed, general mitigation measures resulting from this habitat assessment and focused surveys. The mitigation measures related to desert tortoise awareness are provided, even though the presence of desert tortoise on the site is unlikely to occur.

- **MM-01: Pre-Construction Surveys:**
  - A pre-construction burrowing owl survey should be conducted no less than 14 days prior to the initiation of ground disturbance activities and a final survey should also be conducted no earlier than 24 hours prior to ground disturbance. If no burrowing owls are detected during the pre-construction survey, ground disturbance activities can proceed without further consideration of this species. If burrowing owls are detected during the take avoidance survey, additional avoidance and minimization measures would then be required, under the guidance of the CDFW, provided that mitigation acreage acquired for Swainson's hawk (if required) that is similar to the relatively low quality of the site will also be sufficient to replace lost burrowing owl habitat.

  - Conduct a 30-day DKF and AB pre-construction survey prior to ground disturbance to identify any desert kit fox burrows on the Site. If any burrows are identified and determined to be inactive, a qualified biologist shall excavate such burrows by hand. If any burrows are actively being used as natal dens, a 250 foot buffer around such burrows shall be established until such burrows are no

longer being used as natal dens. If any burrows are actively being used, but not as natal dens, the kit fox may be encouraged to depart the site, provided that no "take" may occur, and once such burrows are inactive, they can be excavated to prevent further occupancy.

- To comply with the Migratory Bird Treaty Act (MBTA), if any ground disturbance is anticipated during the nesting bird season (February-August) the project proponent will initiate a breeding/nesting bird survey to ensure no nesting birds are impacted. If a nesting bird is detected, the area will be avoided and a 50 meter buffer will be installed until the nesting birds have fledged and have been observed to be foraging independently.

- A CNDDB form should be submitted for any burrowing owl any other sensitive species encountered in order to provide the resource agency personnel and biological consultants with a better understanding of sensitive species distribution in this area.

- **MM-02: Swainson's hawk:** Conduct a 30-day pre-construction survey of the Swainson's hawk nest location identified in CNDDB #2416. If no nest is identified, or if a nest is identified but subsequently determined to be unsuccessful, construction activities can proceed without further consideration of this species. If a Swainson's hawk nest is identified and successfully established, all construction activities shall be postponed until CDFW is consulted. If any mitigation land is required for Swainson's hawk, mitigation land for Phase 1 of the Project shall be obtained prior to ground disturbance for Phase 1 of the Project, and mitigation land for Phase 2 of the Project shall be obtained prior to ground disturbance for Phase 2 of the Project.

- **MM-03: Worker Awareness Education:** Construction workers should be provided with an information pamphlet on burrowing owl biology and (although unlikely to occur on the site) general desert tortoise biology, how to recognize and avoid burrowing owl and desert tortoises, authorized speed limits while working within the site, trash abatement and checking under parked vehicles and equipment prior to moving. If a burrowing owl or desert tortoise is detected on site, all construction activity would be suspended and the resource agencies notified to determine appropriate measures.

- **MM-04: Trash Abatement Program:** Provide a trash abatement program with sealed trash containers on site to prevent unwanted tortoise predators such as ravens and coyotes.

- **MM-05: Vehicle Speeds:** Vehicular speed limits of 15 miles per hour on all project related access roads and work areas.

- **MM-06: Avoid Off-Road Travel:** Utilize existing roads, whenever possible, to minimize disturbance to potential habitat.

- **MM-07**: **In-Lieu Project**: Applicant has agreed to pay an in-lieu fee to a non-profit organization in support of a project that assists in the preservation of burrowing owl habitat (the "In-Lieu Project"). The amount of the in-lieu fee shall be acceptable to the County and determined based on an assessment of the benefit of the In-Lieu Project to the preservation of the burrowing owl habitat and the loss of the potential burrowing owl habitat on the Site, which is acknowledged to be low quality habitat for burrowing owl. As an example, an In-Lieu Project that provides fencing around a conservation area that contains high-quality habitat for burrowing owl would be the type of In-Lieu Project acceptable to the County.

Literature Cited:

Baldwin, Bruce B., et. al. The Jepson Desert Manual: Vascular Plants of California. 2002 University of California Press, Berkeley, CA

Bloom, P.H. 1980. The status of the Swainson's Hawk in California, 1979. Wildlife Mgmt. Branch, Nongame Wildlife Investigation, Job II-8.0. California Department of Fish and Game, Sacramento, California.

Bureau of Land Management
1998. Surface Management Status Desert Access Guide. California. Desert District Palm Springs. 1:100,000-Scale Topographic Map.

Bureau of Land Management
January 2005. Final Environmental Impact Report and Statement for the WestMojave Plan. Vol. 1A.

Bureau of Land Management
2002. Geographic Information Systems Desert Tortoise Density Layer.
California Burrowing Owl Consortium. Burrowing Owl Survey Protocol and Mitigation Guidelines. April 1993.

California Department of Fish and Game
Rarefind 3 Natural Diversity Database. Habitat and Data Analysis Branch. Sacramento, CA, 2010.

California Department of Fish and Game
Staff Report on Burrowing Owl Mitigation. March 7, 2012.

California Department of Fish and Game
Biogeographic Data Branch, California Natural Diversity Database. Species Animals (883) taxa. 2009.

California Department of Fish and Game
Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties. 2010.

Grinnell, Joseph & Miller, A. H. The Distribution of the Birds of California. Cooper Ornithological Club, 1994.

IUCN SCC Canid Specialist Group (North America Regional Section) 2008. *Vulpes macrotis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>.

Jones, L.C., Lovich R.E. Lizards of the American Southwest. A Photographic Field Guide. Rio Nuevo Publishers. Tucson, Arizona. 2009

Knute, Adrienne. Plants of the East Mojave. Wide Horizons Press. Cima, CA. 1991,2002.

McKay, Pam. Mojave Desert Wildflowers. The Globe Pequot Press. Guilford, Connecticut. 2003.

Patterson, B.D., G. Ceballos, W. Sechrest, M.F. Tognelli, T. Brooks, L. Luna, P. Ortega, I. Salazar, and B.E. Young. 2003. Digital Distribution Maps of the Mammals of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia, USA

Sanders, Andy. Herbarium, Department of Botany and Plant Sciences, University of California, Riverside, CA 92521-0124.

Stebbins, R.C. Western Reptiles and Amphibians. Third Edition. Peterson Field Guide Series. 2003.

Tibor, David P., ed. Inventory of Rare and Endangered Plants of California (Sixth Edition). California Native Plant Society. Sacramento, CA, 2001.

United States Department of Agriculture, Natural Resource Conservation Service. 2014. http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

United States Fish and Wildlife Service
January 1992. Field Survey Protocol for any Federal Action that may occur within the range of the Desert Tortoise.

United States Fish and Wildlife Service
Preparing for any action that may occur within the range of the Mojave desert tortoise (*Gopherus agassizii*), 2010.

United States Fish and Wildlife Service
Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants. January, 2000. (http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/)

Whitaker, Jr. John O. National Audubon Society Field Guide to North American Mammals. Chanticleer Press, Inc. New York. 1996.

Zeiner, D.C.,W.F. Laudenslayer, Jr., K.E.Mayer, and M.White, eds. 1988-1990.California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

This concludes the habitat assessment and focused surveys for the approximately 80 acre survey (Antelope Valley Solar Project; APN #3307-016-012 & -013) within Los Angeles County, California.

Certification: *I hereby certify that the statements furnished above and in the attached exhibits present the data and information presented are true and correct to the best of my knowledge and belief. Field work conducted for this report was performed by me or under my direct supervision. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest in the project. Any federally and/or state threatened/endangered species cannot be taken under State and Federal law. The report and recommended mitigation measures included in this report do not constitute authorization for incidental take of the desert tortoise or any other sensitive species.*

Field Work Performed BY:

Date: July 15, 2014 Signature: _____

Ryan Young, Senior Biologist & Principal

Biological Technical Report Prepared BY:

Date: October 6, 2014 Signature: _____

Ryan Young, Senior Biologist & Principal

Tina Brazil, Associate Biologist

Exhibit 1: Regional Map

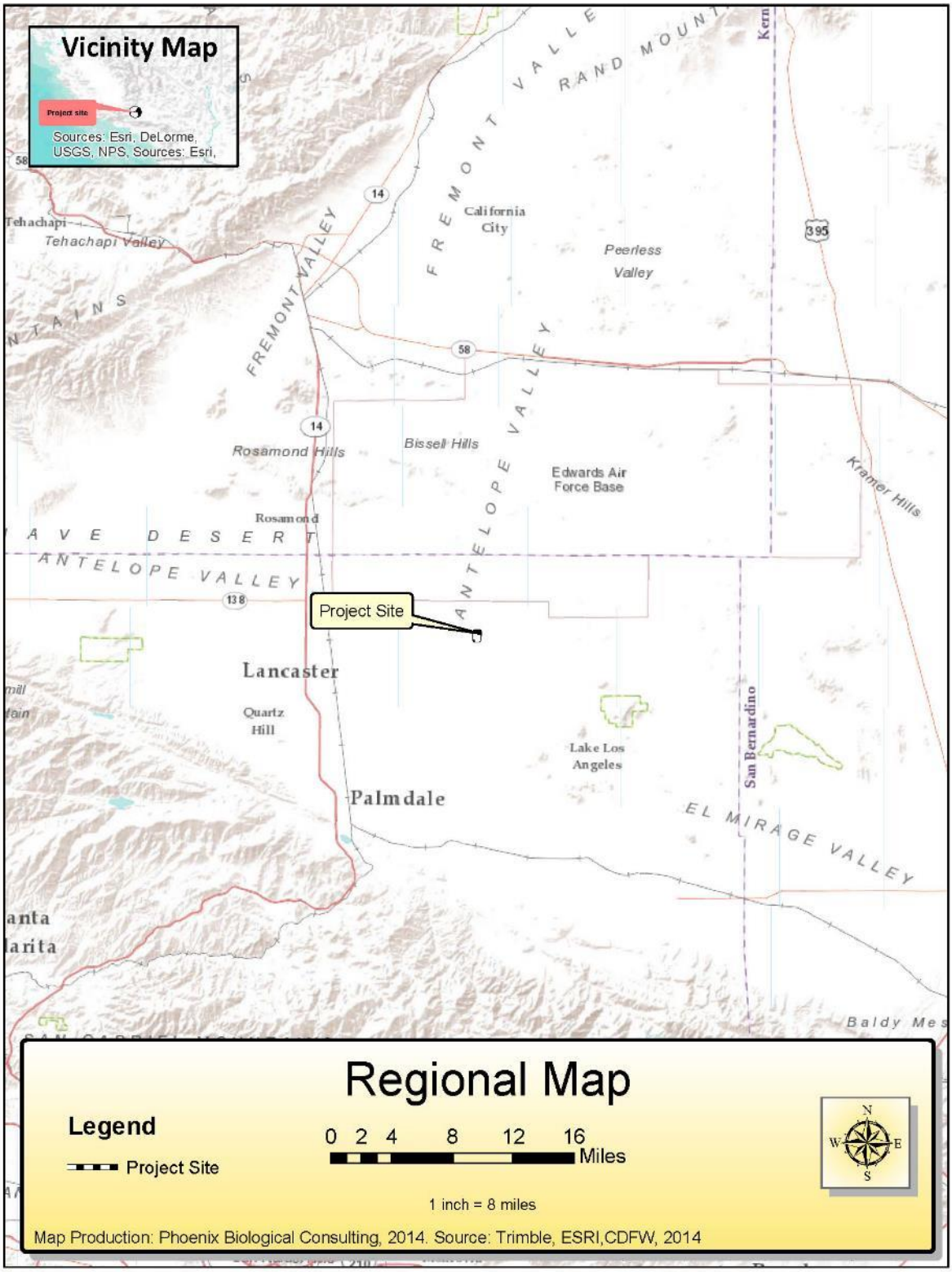


Exhibit 2: Topographic View

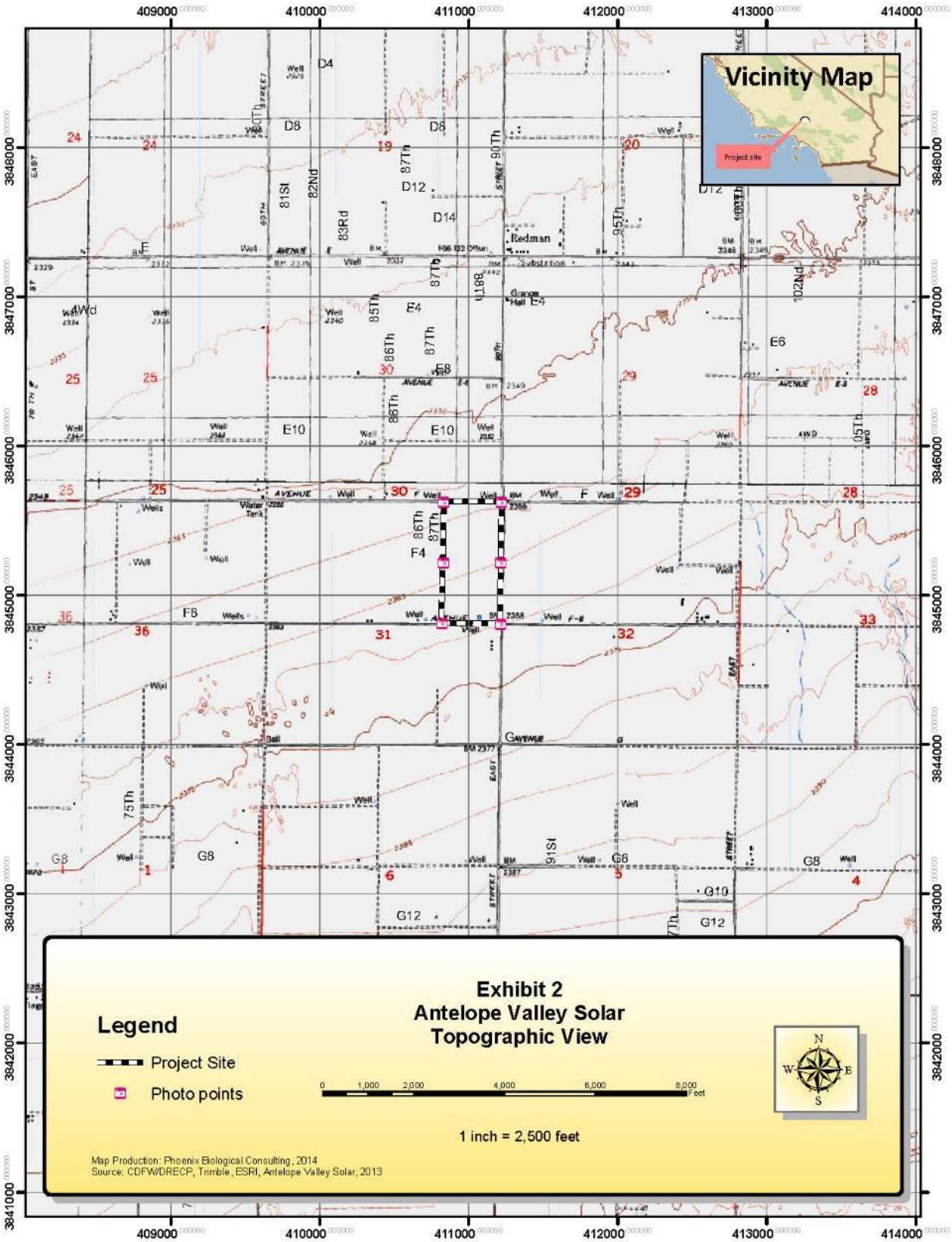


Exhibit 3: Vegetation Classification

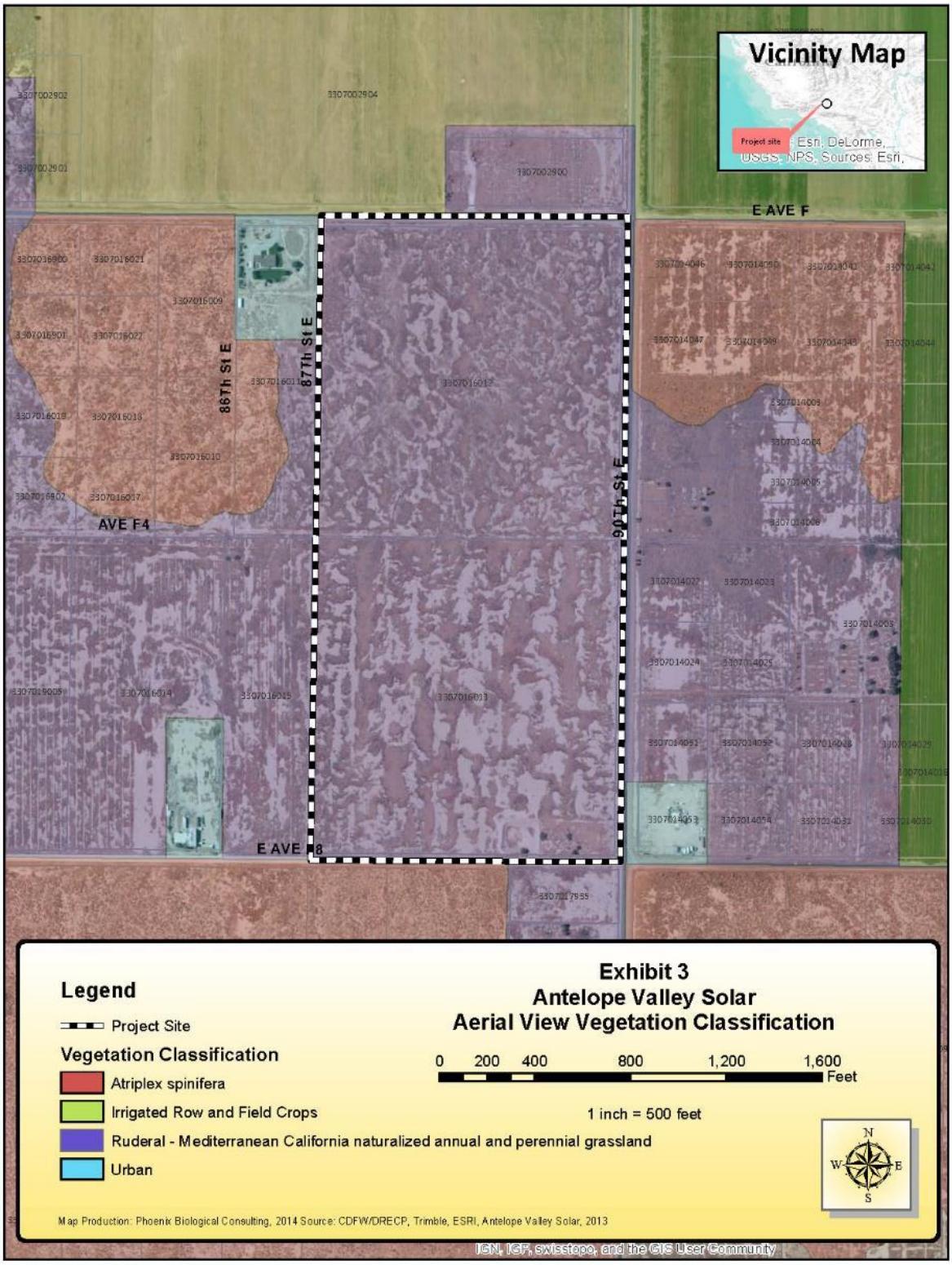


Exhibit 4: Soil Classification

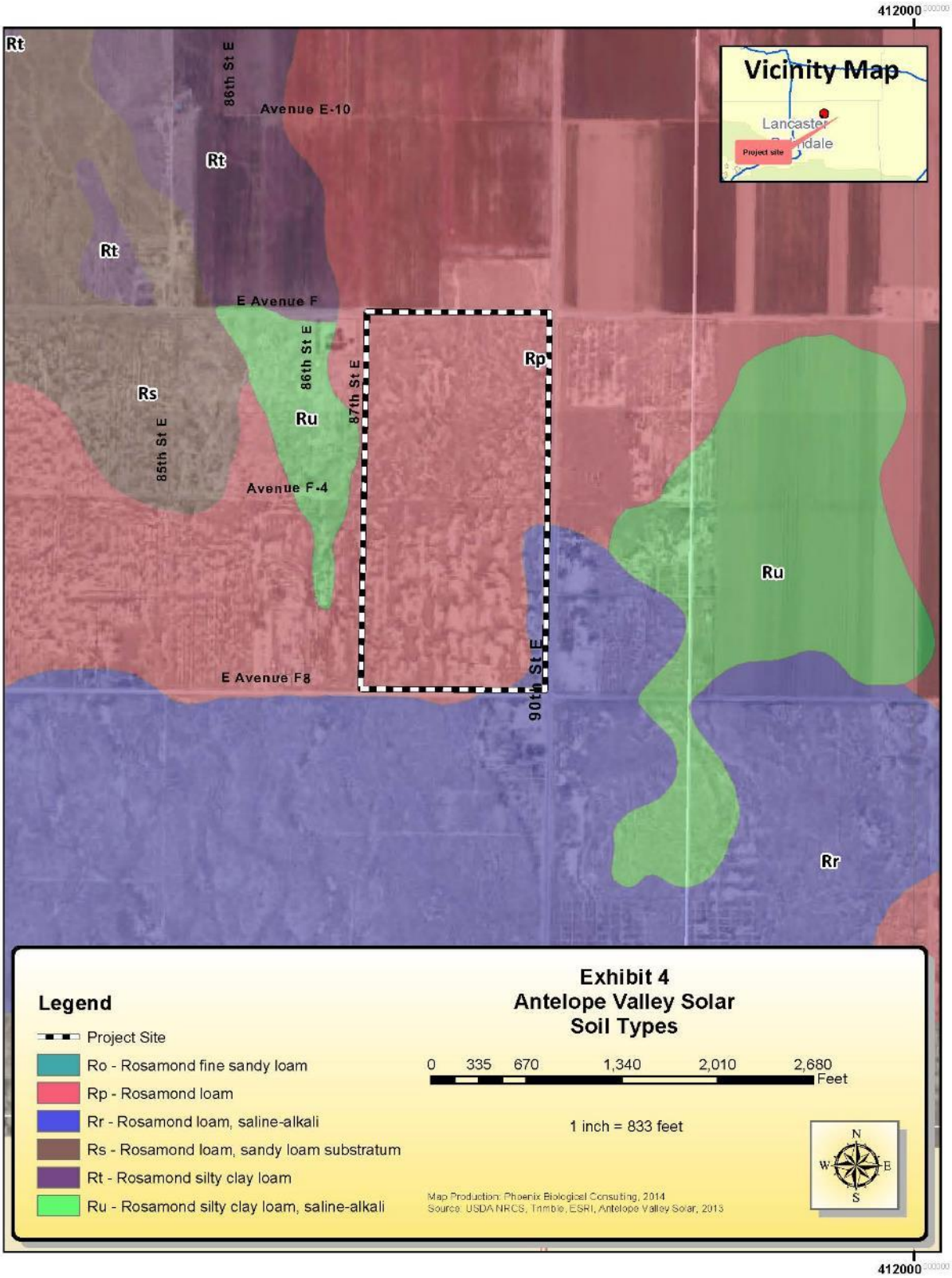


Exhibit 5: Nine Quadrangle CNDDB Search Results

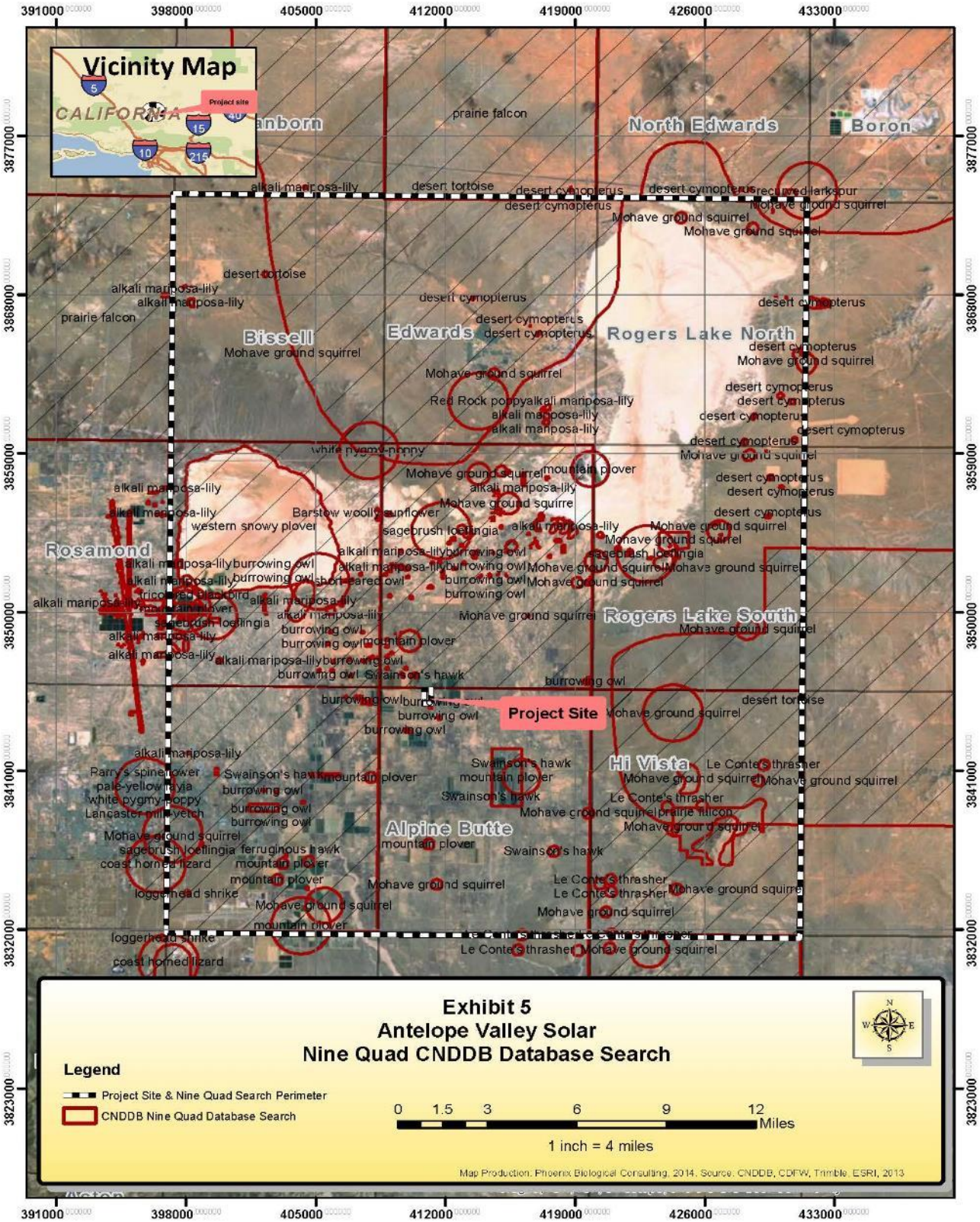


Exhibit 6: Mohave Ground Squirrel CNDDB Records and Range Boundary

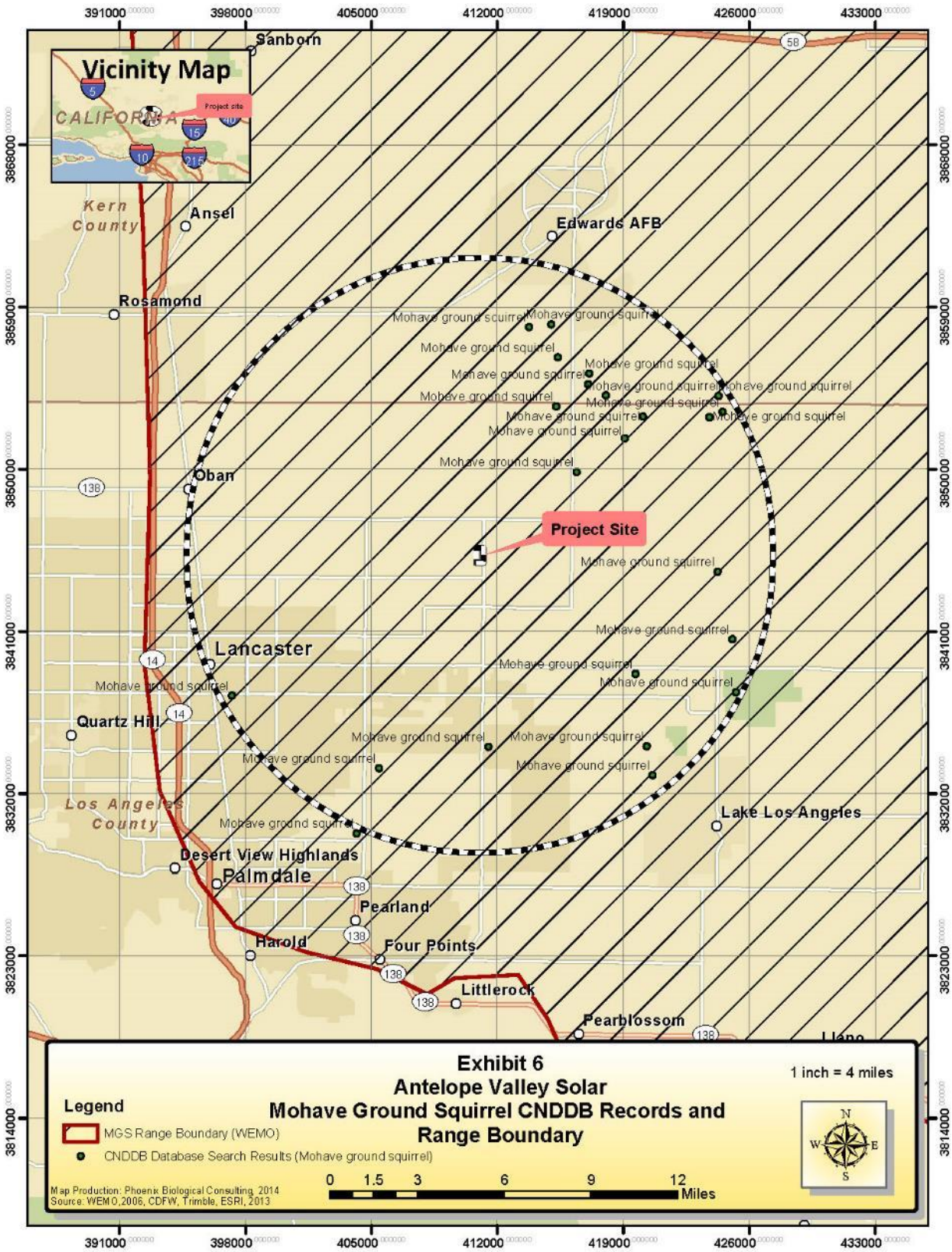


Exhibit 7: Proximity to Conservation Areas

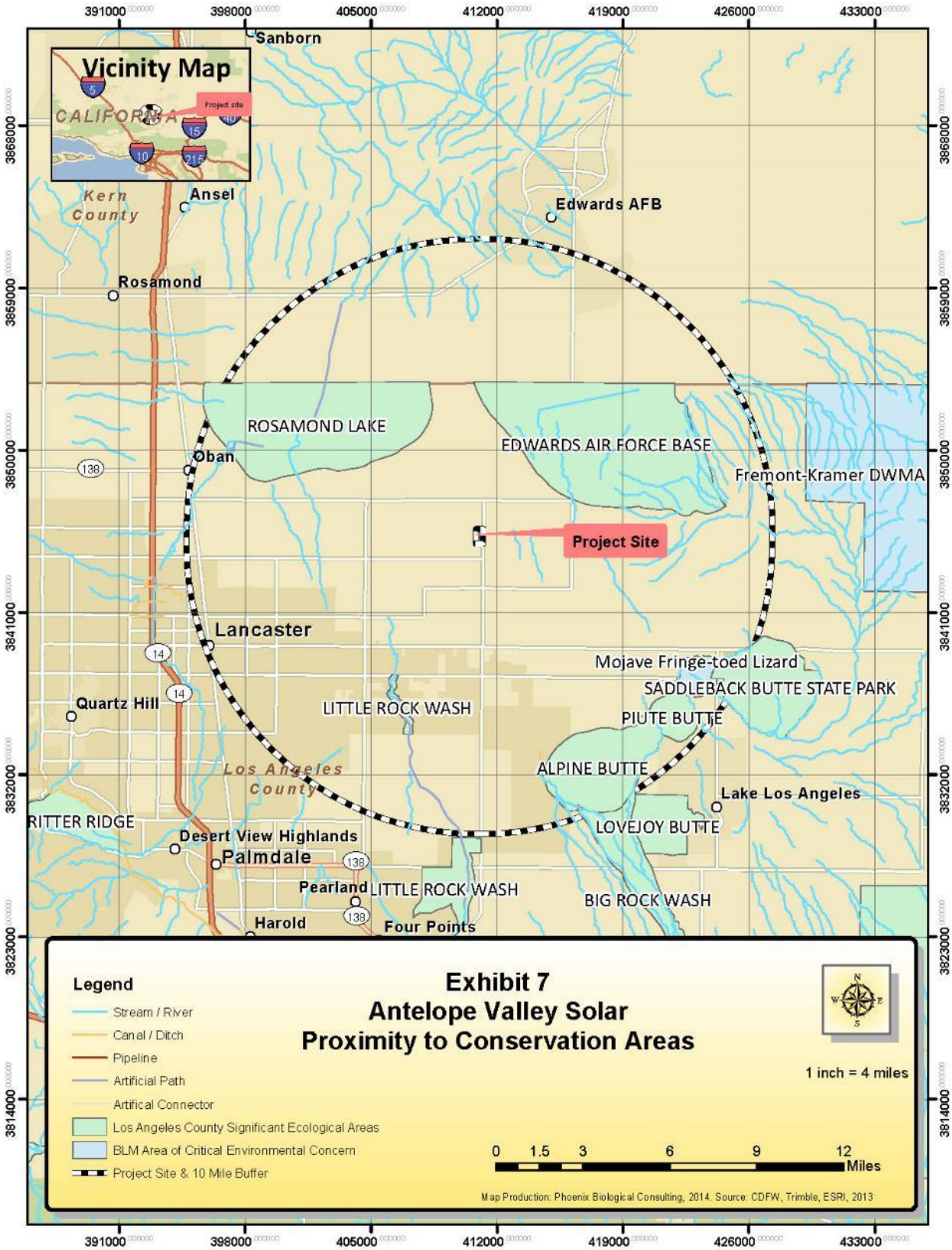


Exhibit 8: Desert Tortoise Density and CNDDB Search Results

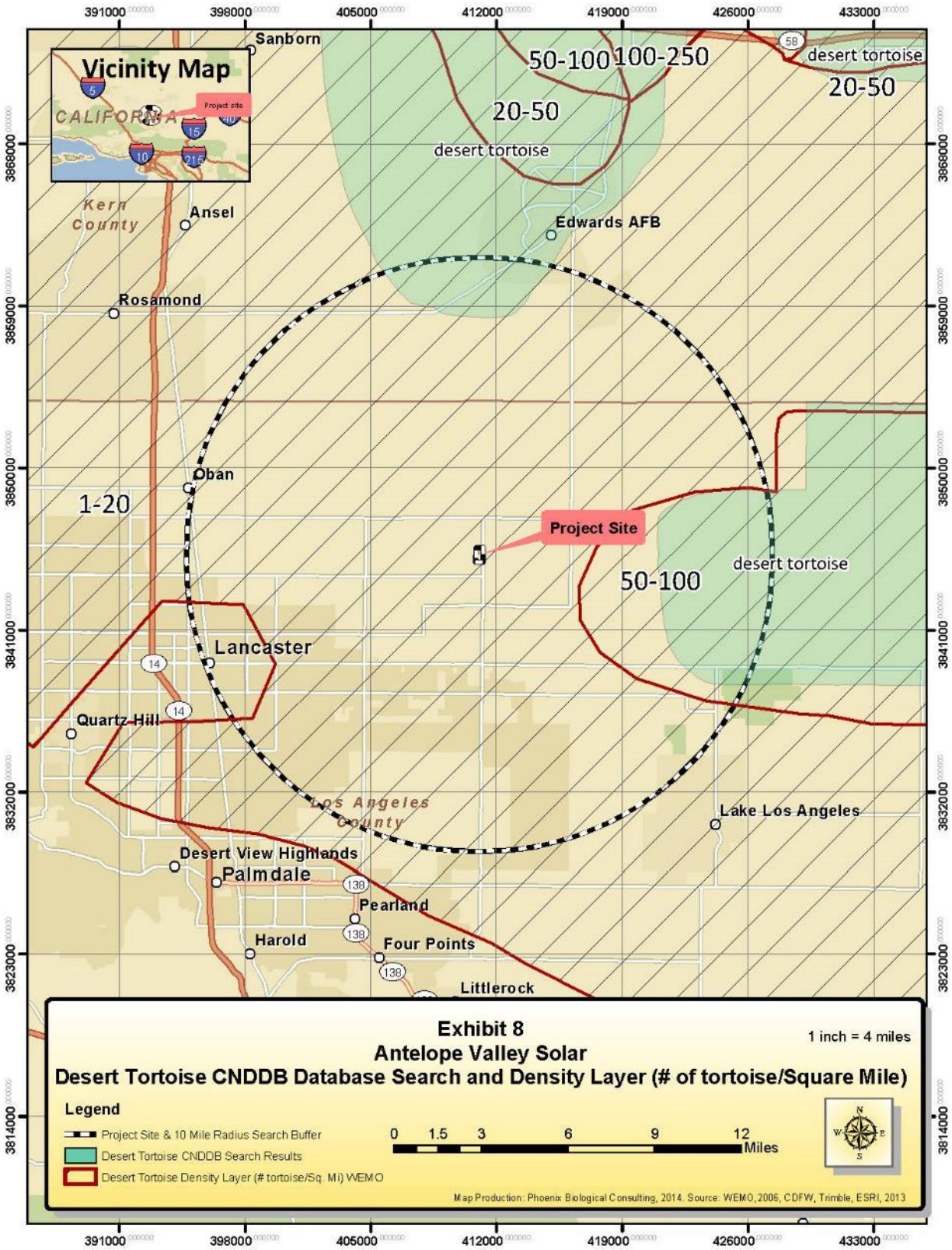


Exhibit 9: Swainson's hawk CNDDB Records

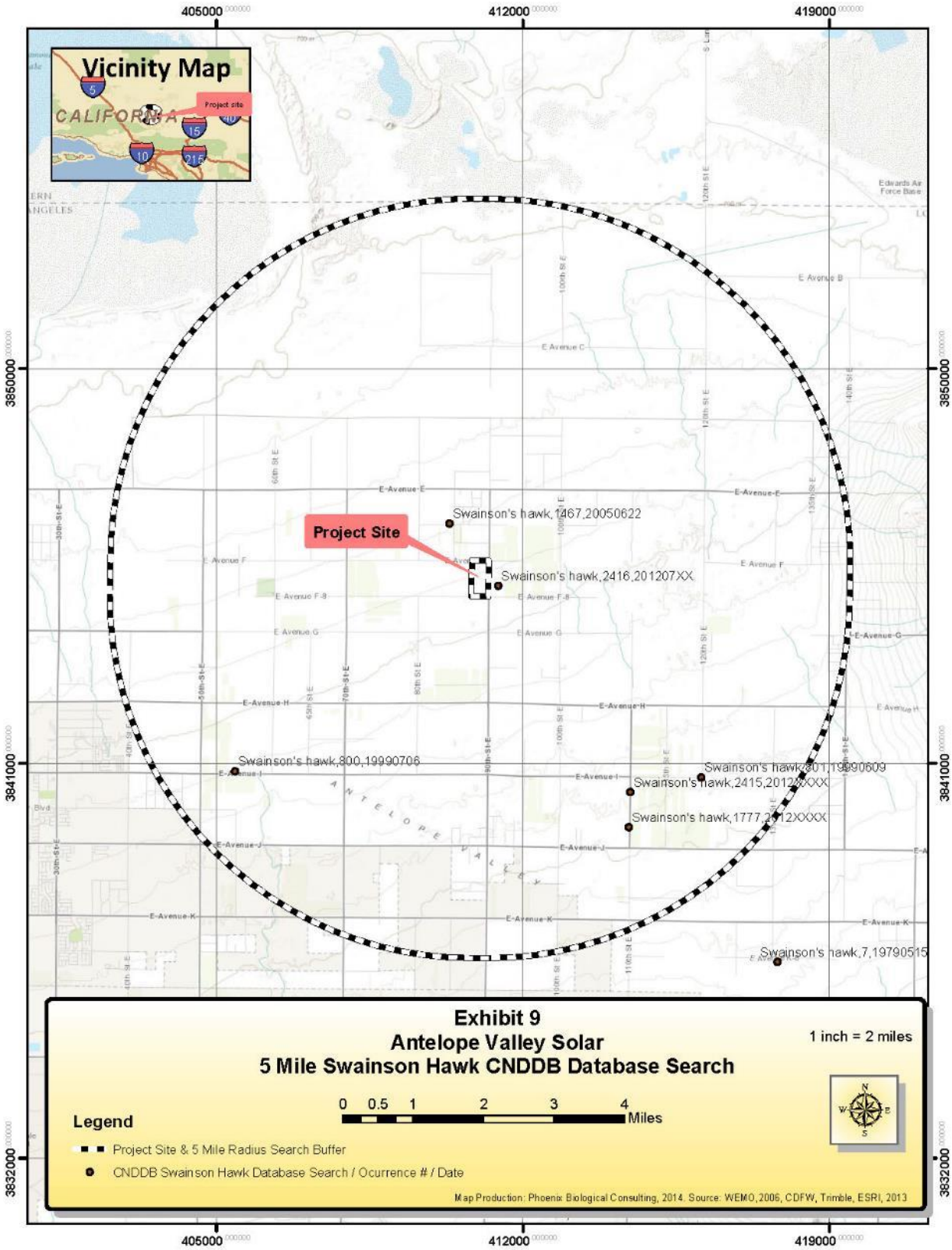


Exhibit 10: Aerial of Survey Results

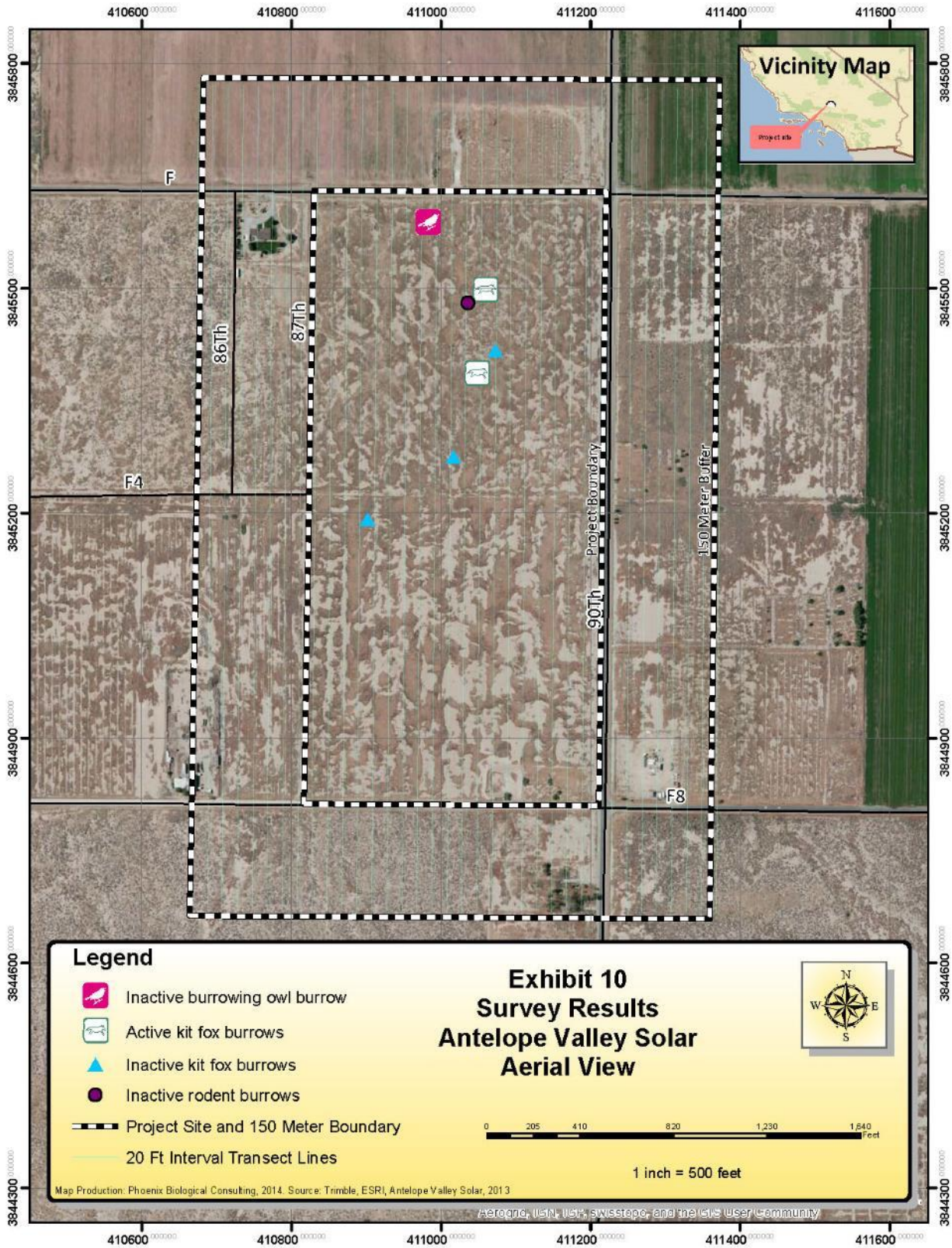


Exhibit 11: Antelope Valley Solar Site Plan

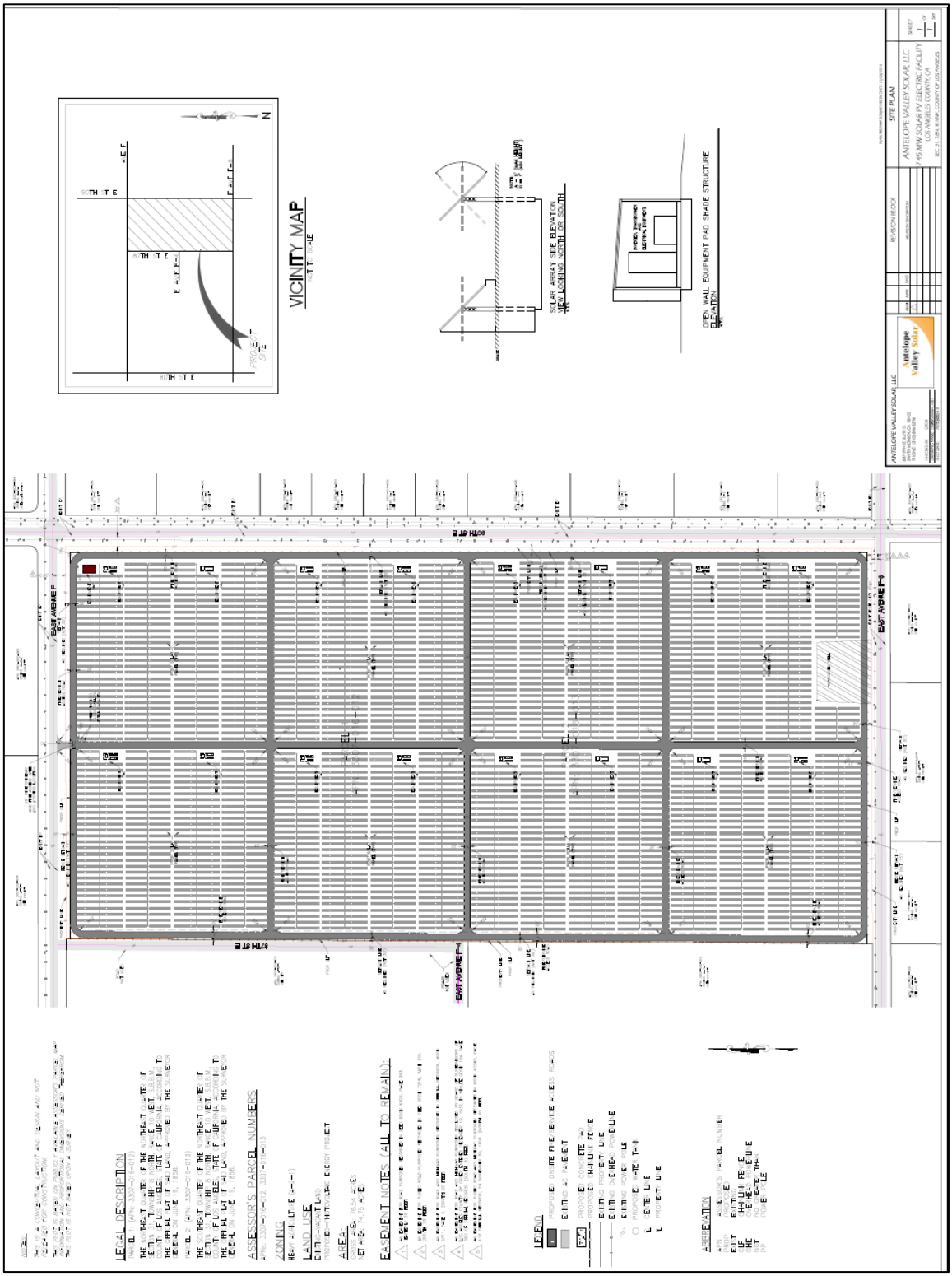
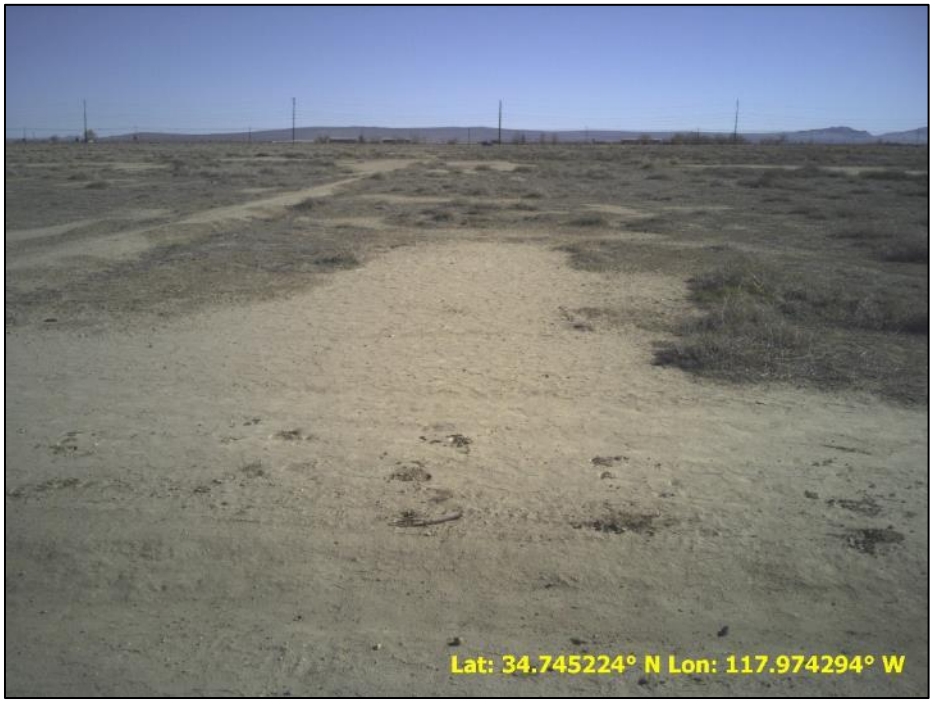


Figure A: Site Photos

Stand-pipe. Eastern Half Facing West



Western Half Facing East

Figure B: Site Photos (Corners)

NW corner looking to center of site

NE corner looking to center of site

Figure C: Site Photos (corners)

SW corner looking to center of site

SE corner looking to center of site

Figure D: Site Photos (Kit Fox)

Kit Fox Marking Site near the middle eastern half of site

Figure E: Trail Camera Photo Results

Trail Camera Photo: Two Coyotes on site.May 29, 2014.

Trail Camera Photo: Resident desert kit fox near active burrow.

Figure F: Reference Site Observation

Alkali mariposa lily flowering at reference site on May 2, 2014. CNNDB # 23 at Avenue E and Sierra Highway

Exhibit G: Inactive Burrowing Owl Burrow On Site

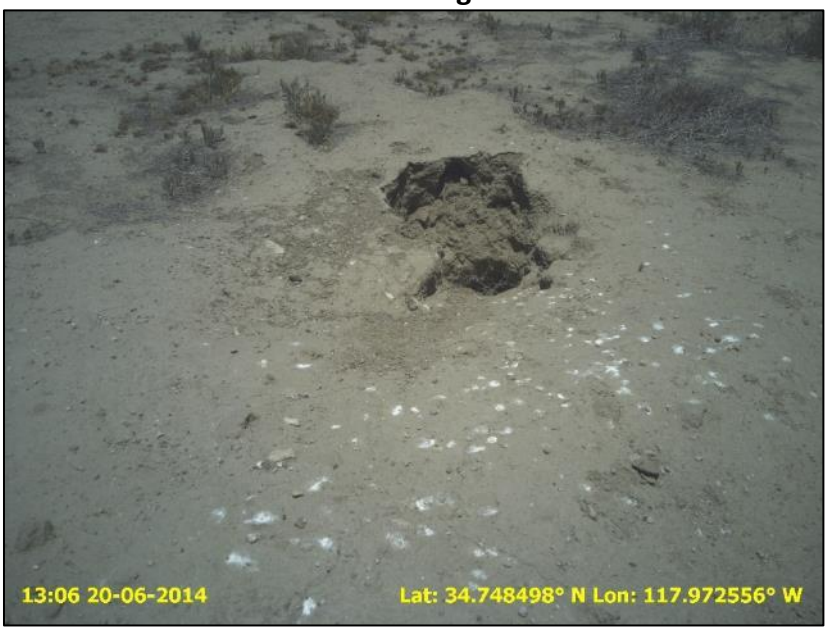


Table 3: Vertebrates Detected During Site Visit

Mammals
California ground squirrel (*Speromphilus beecheyii*) Burrows only
Coyote (*Canis latrans*) Trail camera detection
Desert kit fox *(Vulpes macrotis)* tracks & scat, trail camera detection
Birds
Brewer's blackbird *(Euphagus cyanocephalus)*
Burrowing owl (Athene cunicularia)-sign only
Common raven *(Corvus corax)*

Table 4: Vascular Plants Detected During Site Visit

FAMILY Species	Common Name	Habit
ASTERACEAE		
Chaenactis fremontii	Pincushion	annual
Lasthenia glabrata	Goldfields	annual
Malacothrix glabrata	Desert dandelion	annual
BORAGINACEAE		
Amsinkia tesselata	Devil's lettuce	annual
BRASSICACEAE		
Descurainia pinnata	Tansy mustard	annual
CHENOPODIACEAE		
Atriplex spinifera	Mojave salt bush	shrub
Atriplex phyllostegia	Arrowscale	annual
Salsola sp.	Tumbleweed	non-native annual
GERANIACEAE		
Erodium cicutarium	Redstem filaree	non-native annual
POACEAE		
Bromus madritensis	Foxtail chess	annual
Schismus barbatus	Mediterranean grass	perennial bunchgrass
TAMARACEAE		
Tamarix sp.	Tamarisk	annual

CULTURAL RESOURCES ASSESSMENT

Antelope Valley Solar Project
Unincorporated Los Angeles County, California

Prepared for:

Antelope Valley Solar, LLC
837 9th Street, Suite D
Santa Monica, California 90403

Prepared by:

David Brunzell, M.A., RPA
Contributions by Daniel Leonard, PhD
BCR Consulting LLC
1420 Guadalajara Place
Claremont, California 91711

Project No. AVS1401

National Archaeological Data Base (NADB) Information:
Type of Study: Intensive Survey
Resources Recorded: AVS1401-H-1
Keywords: Los Angeles County, Historic-period Retention Basin
USGS Topographic Quadrangle: 7.5-minute *Alpine Butte, California* (1992)

BCRCONSULTING LLC

March 24, 2014

MANAGEMENT SUMMARY

BCR Consulting LLC (BCR Consulting) is under contract to Antelope Valley Solar, LLC to complete a Cultural Resources Assessment of the proposed 75-acre Antelope Valley Solar Project including potential offsite improvements (project) in Los Angeles County, California. The project is bounded by East Avenue F on the north, 90th Street East on the east, East Avenue F8 on the south, and 87th Street East on the west. Additional areas were subject to this study to encompass potential offsite improvements for the point of interconnection. These include a 30-meter buffer around the distribution pole alignment on the north shoulder of East Avenue F, and a 30-meter buffer around the distribution pole alignment on the east shoulder of 90th Street East. A cultural resources records search, additional research, intensive-level pedestrian field survey, and vertebrate paleontological resources assessment were conducted for the project in partial fulfillment of the California Environmental Quality Act (CEQA). The records search revealed that five previous cultural resources studies have taken place, and seven cultural resources (all prehistoric isolates) have been recorded within one mile of the project site. Of the five previous studies, three have previously assessed portions of the project site, and no cultural resources have been previously recorded within its boundaries.

During the field survey, BCR Consulting archaeologists identified one historic-period retention basin, associated irrigation features, and two nearby glass scatters containing sun-colored amethyst glass mixed with other historic-period and modern glass, all designated as AVS1401-H-1. The resource is not recommended eligible for the California Register of Historical Resources (California Register), and as such is not recommended a “historical resource” under CEQA. It does not warrant further consideration. BCR Consulting recommends that no additional cultural resources work or monitoring is necessary for any proposed project activities. However, if previously undocumented cultural resources are identified during earthmoving activities, a qualified archaeologist shall be contacted to assess the nature and significance of the find, diverting construction excavation if necessary. A detailed aerial photograph of the study area, including potential offsite improvements, is provided as Appendix A. Department of Park and Recreation (DPR) 523 forms have been used to document the historic-period resource and are included in Appendix B. Native American Consultation results are included in Appendix C, the Paleontological Resources Assessment is included as Appendix D, and project photographs are included as Appendix E.

If human remains are encountered during the undertaking, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC.

TABLE OF CONTENTS

MANAGEMENT SUMMARY ii
INTRODUCTION 1
NATURAL SETTING 1
GEOLOGY 1
HYDROLOGY 1
BIOLOGY 1
CULTURAL SETTING 3
PREHISTORY 3
ETHNOGRAPHY 5
HISTORY 5
PERSONNEL 6
RESEARCH DESIGN 6
METHODS 7
RESEARCH 7
FIELD SURVEY 7
RESULTS 8
RESEARCH 8
FIELD SURVEY 8
SIGNIFICANCE EVALUATIONS 9
SIGNIFICANCE CRITERIA 9
EVALUATION 9
RECOMMENDATIONS 10
CERTIFICATION 11
REFERENCES 12

FIGURES

1: Project Location Map 2

TABLES

A: Cultural Resources and Reports Within One Mile of the Project Site 8

APPENDICES

A: DETAILED AERIAL PHOTOGRAPH OF STUDY AREA
B: DEPARTMENT OF PARK AND RECREATION 523 FORMS
C: NATIVE AMERICAN CONSULTATION
D: PALEONTOLOGICAL RESOURCES ASSESSMENT
E: PROJECT PHOTOGRAPHS

INTRODUCTION

BCR Consulting LLC (BCR Consulting) is under contract to Antelope Valley Solar, LLC to complete a Cultural Resources Assessment of the proposed Antelope Valley Solar Project including potential offsite improvements (project), in Los Angeles County, California. A cultural resources records search, additional research, intensive-level pedestrian field survey, and vertebrate paleontological resources assessment were conducted for the project in partial fulfillment of the California Environmental Quality Act (CEQA). The proposed project consists of approximately 75 acres and involves the development of a solar photovoltaic system, including potential offsite impacts for the point of interconnection. The project is bounded by East Avenue F on the north, 90th Street East on the east, East Avenue F8 on the south, and 87th Street East on the west. Additional areas were subject to this study to encompass potential offsite improvements for the point of interconnection. These include a 30-meter buffer around the distribution pole alignment on the north shoulder of East Avenue F, and a 30-meter buffer around the distribution pole alignment on the east shoulder of 90th Street East. The project and potential offsite improvements are primarily located in the northeast quarter of Section 31, and include small portions of Sections 30 and 32, Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The project and potential offsite improvements are depicted on the United States Geological Survey (USGS) *Alpine Butte, California* (1992) 7.5-minute topographic quadrangle (Figure 1; Appendix A).

NATURAL SETTING

Geology

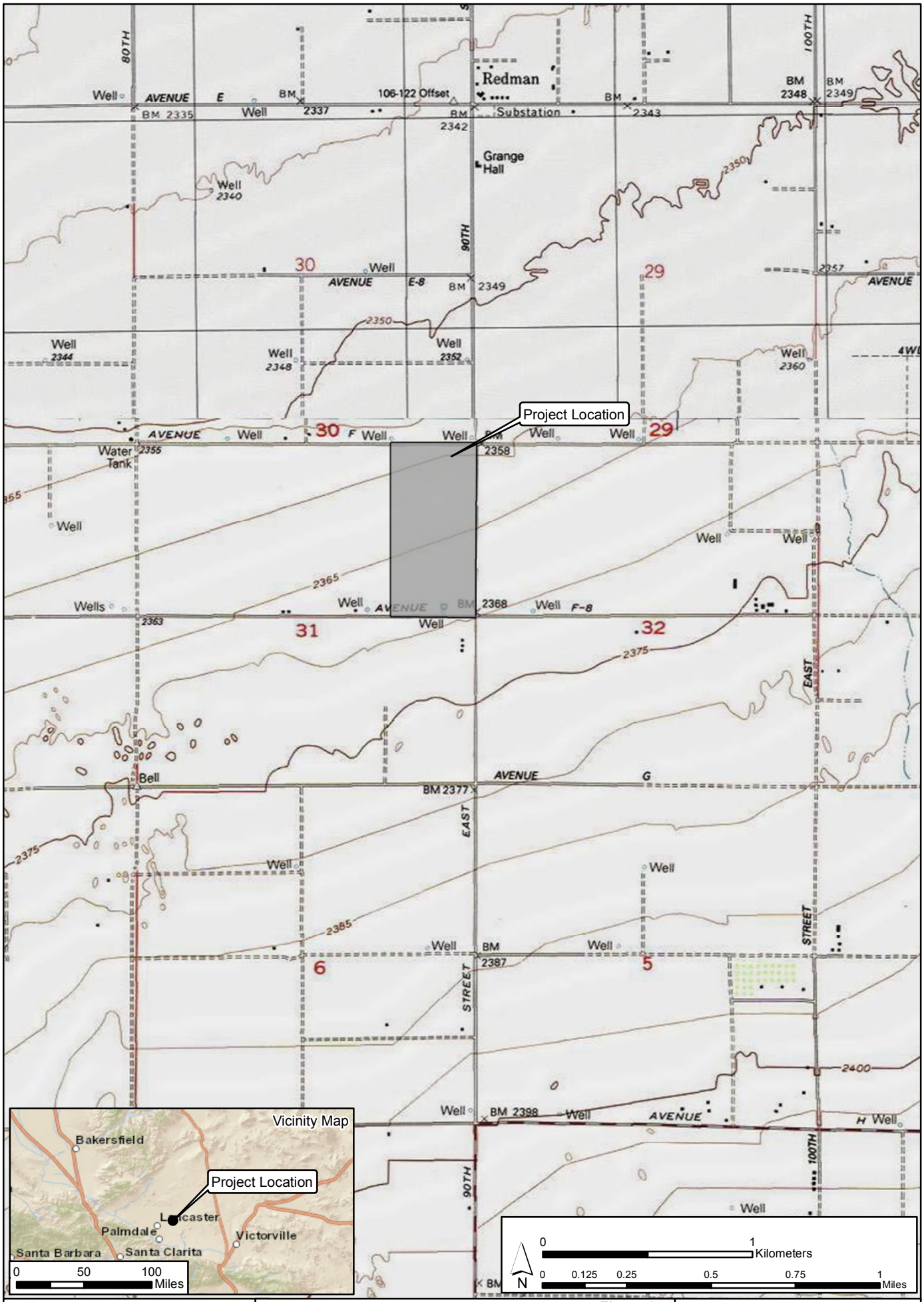
The project is located in Antelope Valley, in the southwestern portion of the Mojave Desert. Sediments within the project boundaries include a geologic unit composed of young alluvial fan deposits formed during the late Pleistocene and Holocene Epochs of the Quaternary Period (Miller and Matti 2006, Lambert 1994:17). The unit is composed of “slightly consolidated, undissected to slightly dissected deposits of poorly sorted sand and silt containing scattered subangular pebbles” (Miller and Matti 2006). Field observations during the current study are basically consistent with these descriptions. None of the materials observed during the field survey exhibited evidence of the manufacture or acquisition of prehistoric stone tools or materials.

Hydrology

The project elevation ranges from approximately 2,360 to 2,370 feet above mean sea level (AMSL). To the south, the peaks of the San Gabriel Mountains rise above 10,000 feet and are often capped with snow until late spring or early summer. The closest significant waterway is an ephemeral stream called Little Rock Wash. It originates as Little Rock Creek in the foothills of the San Gabriel Mountains and terminates approximately 3 miles southwest of the project site (USGS 1992). The area currently exhibits an arid climate, with dry, hot summers and cool winters. Rainfall ranges from five to 15 inches annually (Jaeger and Smith 1971:36-37). Precipitation usually occurs in the form of winter and spring rain or snow at high elevations, with occasional warm monsoonal showers in late summer.

Biology

The mild climate of the late Pleistocene allowed piñon-juniper woodland to thrive throughout most of the Mojave (Van Devender et al. 1987). The vegetation and climate during that



BCRCONSULTING LLC
Claremont Napa Tehachapi
www.bcrconsulting.net
909-525-7078

Project Location Site
Antelope Valley Solar Project

Figure 1

Reference: ESRI; USGS Quad: Alpine Butte (1992), CA

Antelope Valley Solar LLC
837 9th Street, Suite D
Santa Monica, California 90403

epoch attracted significant numbers of Rancholabrean fauna, including dire wolf, saber-toothed cat, short-faced bear, horse, camel, antelope, mammoth, pelican, goose, duck, cormorant, and eagle (Reynolds 1988). The drier climate of the middle Holocene resulted in the local development of complementary flora and fauna, which remain largely intact to this day. Common native plants currently include creosote, cacti (various species), rabbit bush, interior golden bush, cheesebush, sage (various species), buckwheat (at high elevations and near drainages), Joshua tree, and seasonal grasses. Common native animals include coyotes, cottontail and jackrabbits, rats, mice, desert tortoises, roadrunners, raptors, turkey vultures, and other bird species (see Williams et al. 2008).

CULTURAL SETTING

Prehistory

The prehistoric cultural setting of the Mojave Desert has been organized into many chronological frameworks (see Warren and Crabtree 1986; Bettinger and Taylor 1974; Lanning 1963; Hunt 1960; Wallace 1958, 1962, 1977; Wallace and Taylor 1978; Campbell and Campbell 1935), although there is no definitive sequence for the region. The difficulties in establishing cultural chronologies for the Mojave are a function of its enormous size and the small amount of archaeological excavations conducted there. Moreover, throughout prehistory many groups have occupied the Mojave and their territories often overlap spatially and chronologically resulting in mixed artifact deposits. Due to dry climate and capricious geological processes, these artifacts rarely become integrated in-situ. Lacking a milieu hospitable to the preservation of cultural midden, Mojave chronologies have relied upon temporally diagnostic artifacts, such as projectile points, or upon the presence/absence of other temporal indicators, such as groundstone. Such methods are instructive, but can be limited by prehistoric occupants' concurrent use of different artifact styles, or by artifact re-use or re-sharpening, as well as researchers' mistaken diagnosis, and other factors (see Flenniken 1985; Flenniken and Raymond 1986; Flenniken and Wilke 1989). Recognizing the shortcomings of comparative temporal indicators, this study synthesizes Warren and Crabree (1986), who have drawn upon this method to produce a commonly cited and relatively comprehensive chronology.

Paleoindian (12,000 to 10,000 BP) and Lake Mojave (10,000 to 7,000 BP) Periods. Climatic warming characterizes the transition from the Paleoindian Period to the Lake Mojave Period. This transition also marks the end of Pleistocene Epoch and ushers in the Holocene. The Paleoindian Period has been loosely defined by isolated fluted (such as Clovis) projectile points, dated by their association with similar artifacts discovered in-situ in the Great Plains (Sutton 1996:227-228). Some fluted bifaces have been associated with fossil remains of Rancholabrean mammals approximately dated to ca. 13,300-10,800 BP near China Lake in the northern Mojave Desert. The Lake Mojave Period has been associated with cultural adaptations to moist conditions, and resource allocation pointing to more lacustrine environments than previously (Bedwell 1973; Hester 1973). Artifacts that characterize this period include stemmed points, flake and core scrapers, choppers, hammerstones, and crescentics (Warren and Crabtree 1986:184). Projectile points associated with the period include the Silver Lake and Lake Mojave styles. Lake Mojave sites commonly occur on shorelines of Pleistocene lakes and streams, where geological surfaces of that epoch have been identified (Basgall and Hall 1994:69).

Pinto Period (7,000 to 4,000 BP). The Pinto Period has been largely characterized by desiccation of the Mojave. As formerly rich lacustrine environments began to disappear, the

artifact record reveals more sporadic occupation of the Mojave, indicating occupants' recession to the more hospitable fringes (Warren 1984). Pinto Period sites are rare, and are characterized by surface manifestations that usually lack significant in-situ remains. Artifacts from this era include Pinto projectile points and a flake industry similar to the Lake Mojave tool complex (Warren 1984), though use of Pinto projectile points as an index artifact for the era has been disputed (see Schroth 1994). Milling stones have also occasionally been associated with sites of this period (Warren 1984).

Gypsum Period. (4,000 to 1,500 BP). A temporary return to moister conditions during the Gypsum Period is postulated to have encouraged technological diversification afforded by the relative abundance of resources (Warren 1984:419-420; Warren and Crabtree 1986:189). Lacustrine environments reappear and begin to be exploited during this era (Shutler 1961, 1968). Concurrently a more diverse artifact assemblage reflects intensified reliance on plant resources. The new artifacts include milling stones, mortars, pestles, and a proliferation of Humboldt Concave Base, Gypsum Cave, Elko Eared, and Elko Corner-notched dart points (Warren 1984; Warren and Crabtree 1986). Other artifacts include leaf-shaped projectile points, rectangular-based knives, drills, large scraper planes, choppers, hammer stones, shaft straighteners, incised stone pendants, and drilled slate tubes. The bow and arrow appears around 2,000 BP, evidenced by the presence of a smaller type of projectile point, the Rose Spring point (Rogers 1939; Shutler 1961; Yohe 1992).

Saratoga Springs Period (1,500 to 800 BP). During the Saratoga Springs Period regional cultural diversifications of Gypsum Period developments are evident within the Mojave. Basketmaker III (Anasazi) pottery appears during this period, and has been associated with turquoise mining in the eastern Mojave Desert (Warren and Crabtree 1986:191). Influences from Patayan/Yuman assemblages are apparent in the southern Mojave, and include buff and brown wares often associated with Cottonwood and Desert Side-notched projectile points (Warren 1984:423). Obsidian becomes more commonly used throughout the Mojave and characteristic artifacts of the period include milling stones, mortars, pestles, ceramics, and ornamental and ritual objects. More structured settlement patterns are evidenced by the presence of large villages, and three types of identifiable archaeological sites (major habitation, temporary camps, and processing stations) emerge (McGuire and Hall 1988). Diversity of resource exploitation continues to expand, indicating a much more generalized, somewhat less mobile subsistence strategy.

Shoshonean Period (800 BP to Contact). The Shoshonean period is the first to benefit from contact-era ethnography –as well as be subject to its inherent biases. Interviews of living informants allowed anthropologists to match artifact assemblages and particular traditions with linguistic groups, and plot them geographically (see Kroeber 1925; Gifford 1918; Strong 1929). During the Shoshonean Period continued diversification of site assemblages, and reduced Anasazi influence both coincide with the expansion of Numic (Uto-Aztecan language family) speakers across the Great Basin, Takic (Uto-Aztecan language family) speakers into southern California, and the Hopi across the Southwest (Sutton 1996). Hunting and gathering continued to diversify, and the diagnostic arrow points include desert side-notch and cottonwood triangular. Ceramics continue to proliferate, though are more common in the southern Mojave during this period (Warren and Crabtree 1986). Trade routes have become well established across the Mojave, particularly the Mojave Trail, which transported goods and news across the desert via the Mojave River, to the west of the current project. Trade in the western Mojave was more closely related to coastal groups than others.

Ethnography

The Uto-Aztecan "Serrano" people occupied the western Mojave Desert periphery. Kroeber (1925) applied the generic term "Serrano" to four groups, each with distinct territories: the Kitanemuk, Tataviam, Vanyume, and Serrano. Only one group, in the San Bernardino Mountains and West-Central Mojave Desert, ethnically claims the term Serrano. Bean and Smith (1978) indicate that the Vanyume, an obscure Takic population, was found along the Mojave River at the time of Spanish contact. The Kitanemuk lived to the north and west, while the Tataviam lived to the west. The Serrano lived mainly to the south (Bean and Smith 1978). All may have used the western Mojave area seasonally. Historical records are unclear concerning precise territory and village locations. It is doubtful that any group, except the Vanyume, actually lived in the region for several seasons yearly.

History

Historic-era California is generally divided into three periods: the Spanish or Mission Period (1769 to 1821), the Mexican or Rancho Period (1821 to 1848), and the American Period (1848 to present).

Spanish Period. The first European to pass through the area is thought to be a Spaniard called Father Francisco Garces. Having become familiar with the area, Garces acted as a guide to Juan Bautista de Anza, who had been commissioned to lead a group across the desert from a Spanish outpost in Arizona to set up quarters at the Mission San Gabriel in 1771 near what today is Pasadena (Beck and Haase 1974). This is the first recorded group crossing of the Mojave Desert and, according to Father Garces' journal, they camped at the headwaters of the Mojave River, one night less than a day's march from the mountains. Today, this is estimated to have been approximately 11 miles southeast of Victorville (Marenczuk 1962). Garces was followed by Alta California Governor Pedro Fages, who briefly explored the western Mojave region in 1772. Searching for San Diego Presidio deserters, Fages had traveled north through Riverside to San Bernardino, crossed over the mountains into the Mojave Desert, and then journeyed westward to the San Joaquin Valley (Beck and Haase 1974).

Mexican Period. In 1821, Mexico overthrew Spanish rule and the missions began to decline. By 1833, the Mexican government passed the Secularization Act, and the missions, reorganized as parish churches, lost their vast land holdings, and released their neophytes (Beattie and Beattie 1974).

American Period. The American Period, 1848–Present, began with the Treaty of Guadalupe Hidalgo. In 1850, California was accepted into the Union of the United States primarily due to the population increase created by the Gold Rush of 1849. The cattle industry reached its greatest prosperity during the first years of the American Period. Mexican Period land grants had created large pastoral estates in California, and demand for beef during the Gold Rush led to a cattle boom that lasted from 1849–1855. However, beginning about 1855, the demand for beef began to decline due to imports of sheep from New Mexico and cattle from the Mississippi and Missouri Valleys. When the beef market collapsed, many California ranchers lost their ranchos through foreclosure. A series of disastrous floods in 1861–1862, followed by a significant drought diminished the economic impact of local ranching. This decline combined with ubiquitous agricultural and real estate developments of the late 19th century, set the stage for diversified economic pursuits that have continued to proliferate to this day (Beattie and Beattie 1974; Cleland 1941).

Local Sequence. Although the project site is located in unincorporated Los Angeles County, it is within the historical influence of the City of Lancaster. Lancaster grew up around the Southern Pacific Railroad, which entered the area in 1876. The railroad brought speculators that used artesian wells to found an early local agricultural and horticultural economy. A newspaper was established in 1884, and grammar schools and a local post office soon followed (Lewis Publishing Company 1889:350). Parcels within the new town were originally settled near today's I Street and the Sierra Highway. Although farming was initially successful, it was also subject to the caprices of desert rainfall that varies dramatically and almost disappeared completely during the early 20th century. Continued well drilling and the advancement of more efficient water pumps managed to revive local agriculture, which by 1920 was dominated by alfalfa. This combined with mining and the continued influence of the railroad to result in an economic resurgence. Municipal advancements included paved streets in 1916, the formation of a local Los Angeles County Waterworks district in 1919, a fire department in 1921, and electric service brought by Southern California Edison in 1923. Although the economy slowed again during the depression and World War II, the founding of the Muroc Lake Bombing and Gunnery Range (now Edwards Air Force Base) in 1933 compensated somewhat for the losses, and mining and alfalfa farming remained locally viable (Ford 1998). The post war years brought an economic boom to Lancaster, which was locally punctuated by the opening of the first local ready-mix plant and development of the Antelope Valley Freeway plan. By 1970 the local population had grown to over 40,000, and Lancaster finally incorporated in 1977. Since that time Lancaster has continued to grow as a bedroom community, and has remained a hub for farming, mining, transportation, and (most recently) renewable energy developments (City of Lancaster 2012).

PERSONNEL

David Brunzell, M.A., RPA acted as the Project Manager and Principal Investigator for the current study. He also completed the technical report. BCR Consulting Field Director Daniel Leonard, PhD, performed the cultural resources records search and additional research, completed the field survey, and contributed to the technical report.

RESEARCH DESIGN

This work was completed pursuant to CEQA, the Public Resources Code (PRC) Chapter 2.6, Section 21083.2, and California Code of Regulations (CCR) Title 14, Chapter 3, Article 5, Section 15064.5. The pedestrian cultural resources survey is intended to locate and document previously recorded or new cultural resources, including archaeological sites, features, isolates, and historic buildings, that exceed 45 years in age within defined project boundaries. The project site was examined using 15 meter transect intervals, where accessible.

The study is intended to determine whether cultural resources are located within the project boundaries, whether any cultural resources are significant pursuant to the above-referenced regulations and standards, and to develop specific mitigation measures that will address potential impacts to existing or potential resources. Tasks pursued to achieve that end include:

- Completion of Department of Park and Recreation (DPR) 523 forms for any discovered cultural resources (Appendix B)
- Sacred Lands File Search through the Native American Heritage Commission, and sending consultation letters to recommended tribes and individuals (Appendix C)
- Vertebrate paleontology resources report through Dr. Samuel McLeod of the Natural History Museum of Los Angeles County (Appendix D)
- Cultural resources records search to review any studies conducted and the resulting cultural resources recorded within a one-mile radius of the project boundaries;
- Additional research through various local and regional resources
- Systematic pedestrian survey of the entire project site
- Evaluation of California Register of Historical Resources (California Register) eligibility for any cultural resources discovered
- Development of recommendations and mitigation measures for cultural resources documented within the project boundaries, following CEQA guidelines;

METHODS

Research

Prior to fieldwork, a records search was conducted at the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton. This archival research reviewed the status of all recorded historic and prehistoric cultural resources, and survey and excavation reports completed within one mile of the current project. Additional resources reviewed included the National Register of Historic Places (National Register), the California Register, and documents and inventories published by the California Office of Historic Preservation. These include the lists of California Historical Landmarks, California Points of Historical Interest, Listing of National Register Properties, and the Inventory of Historic Structures. Additional research was completed through local and regional resources, including the Antelope Valley Genealogical Society, the Lancaster Branch of the Los Angeles County Library, Bureau of Land Management land patent records of the General Land Office, and various Internet resources.

Field Survey

An intensive-level cultural resources field survey of the project site was conducted on March 7 and 8, 2014. The survey was conducted by walking parallel transects spaced approximately 20 meters apart across 100 percent of the project site, where accessible. Cultural Resources were recorded on DPR 523 forms. Ground visibility averaged approximately 70 percent within project boundaries. Digital photographs were taken at various points within the project site. These included overviews as well as detail photographs of all cultural resources. Cultural resources were recorded per the California OHP *Instructions for Recording Historical Resources* in the field using:

- Detailed note taking for entry on DPR Forms (see Appendix B)
- Hand-held Garmin Global Positioning systems for mapping purposes
- Digital photography of all cultural resources and various points within the project site (see Appendix B and Appendix E).

RESULTS

Research

Data from the SCCIC revealed that five previous cultural resources studies have taken place, and seven cultural resources (all prehistoric isolates) have been recorded within one-mile of the project site. Of the five previous studies, three have assessed portions of the project site, and no cultural resources have been previously recorded within its boundaries. The records search is summarized as follows:

Table A. Cultural Resources and Reports Within One Mile of the Project Site

USGS 7.5 Minute Quadrangle	Cultural Resources Within One Mile of Project Site	Cultural Resource Studies Within One Mile of Project Site
Alpine Butte (1992)	P-19-100548, 100549, 100550, 100551	LA-7991*, 10490, 11012*, 11455*, 11834
Redman (1973)	P-19-100543, 100544, 100545	LA-7991*

*Cultural resource studies that previously assessed a portion of the project site.

Additional research revealed that the east half of Section 31 (including the project site) was granted to the Southern Pacific Railroad in 1903. The southern Pacific Railroad was granted over 18,000 acres at this time, and there is no evidence that the railroad developed any of the project site or parcels in the immediate area (General Land Office 1903). The project site and the 75-acre contiguous parcel to the west were under alfalfa cultivation prior to 1945 (USGS 1945) and remained cultivated until at least 1975 (United States Department of Agriculture [USDA] 1959, USGS 1975).

Field Survey

During the field survey Daniel Leonard carefully inspected the project site for cultural remains. Topography on the property was essentially flat. While Creosote Scrub or Joshua Tree Woodland vegetation communities locally predominate, past agricultural activities have mainly limited project site vegetation to low grass with occasional patches of rabbit bush. Sediments included light brown silty clay. Stone inclusions represented approximately 15 percent of the matrix and included quartz and granite gravels one to two centimeters in diameter. Surface visibility on the property was 70 percent. Disturbances observed on the property included some physical remnants of former agricultural activities, off road vehicle tracks, and modern trash. The survey yielded one historic-period resource, temporarily designated as AVS1401-H-1.

AVS1401-H-1. This resource consists of a historic-period water retention basin and other irrigation features associated with local farming that began on the project site prior to 1945 and continued until at least 1975 (see Research section above). The basin is an above ground earthen structure measuring approximately 150 feet square with nine-foot sloped earthen walls. Associated irrigation features include concrete and metal standpipes, a small segment of a buried pipe, a concrete footing (possibly supporting a former water pump), and a bell-shaped cistern. These features apparently fed buried piping, as indicated by a row of 12 five-inch diameter capped standpipes standing three to 12 inches above ground in an east-west orientation. Two glass scatters containing several pieces of sun-colored amethyst glass mixed with other historic-period and modern glass were noted near the retention basin. Prior to 1945, several buildings existed in the southeastern corner of the property

near the retention basin, but these have been removed (USGS 1945). The retention basin was certainly in place prior to 1945, and the presence of sun-colored amethyst glass indicates that the area may have been occupied prior to 1916 (Polak 2005). However, while sun-colored amethyst glass was manufactured prior to 1916, modern disturbances make its date of deposit impossible to substantiate.

SIGNIFICANCE EVALUATIONS

During the field survey, one historic-period resource was identified. CEQA (PRC Chapter 2.6, Section 21083.2 and CCR Title 145, Chapter 3, Article 5, Section 15064.5) calls for the evaluation and recordation of historic and archaeological resources. The criteria for determining the significance of impacts to cultural resources are based on Section 15064.5 of the *CEQA Guidelines* and Guidelines for the Nomination of Properties to the California Register. Properties eligible for listing in the California Register and subject to review under CEQA are those meeting the criteria for listing in the California Register, National Register, or designation under a local ordinance.

Significance Criteria

California Register of Historical Resources. The California Register criteria are based on National Register criteria. For a property to be eligible for inclusion on the California Register, one or more of the following criteria must be met:

1. It is associated with the events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the U.S.;
2. It is associated with the lives of persons important to local, California, or U.S. history;
3. It embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of a master, possesses high artistic values; and/or
4. It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition to meeting one or more of the above criteria, the California Register requires that sufficient time has passed since a resource's period of significance to "obtain a scholarly perspective on the events or individuals associated with the resources." (CCR 4852 [d][2]). The California Register also requires that a resource possess integrity. This is defined as the ability for the resource to convey its significance through seven aspects: location, setting, design, materials, workmanship, feeling, and association.

Evaluation

AVS1401-H-1. Like many properties in the Lancaster area, this historic-period water retention basin, associated irrigation features, and mixed historic-period and modern glass scatters represent an early to mid-20th century agricultural development. Formerly associated buildings have been removed and the water retention basin and associated irrigation features no longer function. Also, the glass scatters contain modern and historic-period glass. As a result AVS1401-H-1 has lost integrity of setting, design, materials, workmanship, feeling, and association.

Criterion 1: AVS1401-H-1 represents farm development common throughout the region during the period of significance (early to mid-20th century) and as such is not associated with any events that have made a significant contribution to the broad patterns of local or regional history. Criterion 2: Extensive research has failed to specifically associate the resource with any individuals who have been notable in local, state, or national history. Criterion 3: As a common water retention/irrigation feature accompanied by historic-period and modern glass scatters, the resource does not contain any elements that embody the distinctive characteristics of a type, period, region, or method of construction, or represent the work of an important creative individual or possess high artistic values. Criterion 4: Extensive research has exhausted the resource's data potential, and as such the resource has not and is not likely to yield information important in prehistory or history. AVS1401-H-1 is therefore not recommended eligible under any of the four criteria for listing on the California Register and has been shown to lack integrity of setting, design, materials, workmanship, feeling, and association. As a result AVS1401-H-1 is not recommended a historical resource under CEQA.

RECOMMENDATIONS

Based on these results, BCR Consulting recommends that no additional cultural resources work or monitoring is necessary during proposed project activities associated with the Antelope Valley Solar Project. Therefore, no significant impacts related to archaeological or historical resources is anticipated and no further investigations are recommended for the proposed project unless:

- the proposed project is changed to include areas not subject to this study;
- the proposed project is changed to include the construction of additional facilities;
- cultural materials are encountered during project activities.

Although the current study has not indicated sensitivity for cultural resources within the project boundaries, ground disturbing activities always have the potential to reveal buried deposits not observed on the surface during previous surveys. Prior to the initiation of ground-disturbing activities, field personnel should be alerted to the possibility of buried prehistoric or historic cultural deposits. In the event that field personnel encounter buried cultural materials, work in the immediate vicinity of the find should cease and a qualified archaeologist should be retained to assess the significance of the find. The qualified archaeologist shall have the authority to stop or divert construction excavation as necessary. If the qualified archaeologist finds that any cultural resources present meet eligibility requirements for listing on the California Register or the National Register, plans for the treatment, evaluation, and mitigation of impacts to the find will need to be developed. Prehistoric or historic cultural materials that may be encountered during ground-disturbing activities include:

- historic artifacts such as glass bottles and fragments, cans, nails, ceramic and pottery fragments, and other metal objects;
- historic structural or building foundations, walkways, cisterns, pipes, privies, and other structural elements;

- prehistoric flaked-stone artifacts and debitage (waste material), consisting of obsidian, basalt, and/or cryptocrystalline silicates;
- groundstone artifacts, including mortars, pestles, and grinding slabs;
- dark, greasy soil that may be associated with charcoal, ash, bone, shell, flaked stone, groundstone, and fire affected rocks.

If human remains are encountered during the undertaking, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC.

CERTIFICATION

I hereby certify that the statements furnished above and in the attached appendices present the data and information required for this archaeological report, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Date: March 24, 2014	
	David Brunzell
Authorized Signature	Printed Name
Registered Professional Archaeologist (RPA)	

REFERENCES

Basgall, Mark E., and M.C. Hall
1994 Perspectives on the Early Holocene Archaeological Record of the Mojave Desert. In *Kelso Conference Papers 1987-1992,* edited by G.D. Everson and J.S. Schneider, pp. 63-81. California State University, Bakersfield, Museum of Anthropology, Occasional Papers in Anthropology 4.

Bean, Lowell John, and Charles R. Smith
1978 *California*, edited by R.F. Heizer. Handbook of North American Indians, Vol. 8, W.C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Beattie, George W., and Helen P. Beattie
1974 *Heritage of the Valley: San Bernardino's First Century*. Biobooks: Oakland.

Beck, Warren A., and Ynez D. Haase
1974 *Historical Atlas of California*. Oklahoma City: University of Oklahoma Press.

Bedwell, S.F.
1973 *Fort Rock Basin: Prehistory and Environment.* University of Oregon Books, Eugene.

Bettinger, Robert L., and R.E. Taylor
1974 Suggested Revisions in Archaeological Sequences of the Great Basin and Interior Southern California. *Nevada Archaeological Survey Research Papers* 3:1-26.

Campbell, E., and W. Campbell
1935 The Pinto Basin. *Southwest Museum Papers* 9:1-51.

City of Lancaster
2012 *History of Lancaster.* Electronic Document: http://www.cityoflancasterca.org/index .aspx?page=218. Accessed March 14, 2014.

Cleland, Robert Glass
1941 *The Cattle on a Thousand Hills—Southern California, 1850-80.* San Marino, California: Huntington Library.

Flenniken, J.J.
1985 Stone Tool Reduction Techniques as Cultural Markers. *Stone Tool Analysis: Essays in Honor of Don E. Crabtree,* edited by M.G. Plew, J.C. Woods, and M.G. Pavesic. University of New Mexico Press, Albuquerque.

Flenniken, J.J. and A.W. Raymond
1986 Morphological Projectile Point Typology: Replication, Experimentation, and Technological Analysis. *American Antiquity* 51:603-614.

Flenniken, J.J. and Philip J. Wilke
1989 Typology, Technology, and Chronology of Great Basin Dart Points. *American Anthropologist* 91:149-158.

Ford, Daniel
1998 *The Diary of a Bomber Pilot.* Smithsonian Institution Press. Washington D.C.

General Land Office
1903 Land Patent Record for Document Number 125, BLM Serial Number CACAAA 072932. Electronic Document: http://www.glorecords.blm.gov/details/patent/default.aspx?accession= CACAAA%20072932&docClass=SER&sid=fb5rqj0t.mwk#patentDetailsTabIndex=0. Accessed March 22, 2014

Gifford, Edward W.
1918 Clans and Moieties in Southern California. *University of California Publications in American Archaeology and Anthropology* 14(22)155-219.

Hester, T.R.
1973 *Chronological Ordering of Great Basin Prehistory.* Contributions of the Archaeological Research Facility 17, University of California, Berkeley.

Hunt, Alice P.
1960 *The Archaeology of the Death Valley Salt Pan, California.* University of Utah Anthropological Papers No. 47.

Jaeger, Edmund C., and Arthur C. Smith
1971 *Introduction to the Natural History of Southern California*. California Natural History Guides: 13. Los Angeles: University of California Press.

Kroeber, Alfred L.
1925 *Handbook of the Indians of California.* Bureau of American Ethnology Bulletin 78. Washington D.C.: Smithsonian Institution. Reprinted in 1976, New York: Dover.

Lambert, David
1994 *The Field Guide to Prehistoric Life.* Diagram Visual Information Ltd., New York.

Lanning, Edward P.
1963 The Archaeology of the Rose Spring Site (Iny-372). *University of California Publications in American Archaeology and Ethnology* 49(3):237-336.

Lewis Publishing Company
1889 *An Illustrated History of Los Angeles County, California.* Lewis Publishing Company. Chicago.

Marenczuk, Wesley
1962 *The Story of Oro Grande.* Published by Author. Victor Valley College.

McGuire, K.R., and M.C. Hall
1988 *The Archaeology of Tiefort Basin, Fort Irwin, San Bernardino County, California.* Report Prepared by Far Western Anthropological Research Group, Inc., Davis, California, for the U.S. Army Corps of Engineers, Los Angeles District.

Miller Fred K. and Jonathan C. Matti
2006 *Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangles, California.* U.S. Geological Survey, Spokane and Tucson.

Polak, Michael
2005 *Warman's Bottles Field Guide.* Krause Publications. Iola, Wisconsin

Reynolds, R.E.
1988 *Paleontologic Resource Overview and Management Plan for Edwards Air Force Base, California.* San Bernardino County Museum, Redlands, California.

Rogers, M.J.
1939 *Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas.* San Diego Museum Papers No. 3.

Schroth, Adella Beverly
1994 *The Pinto Point Controversy in the Western United States.* Unpublished PhD Dissertation, University of California, Riverside.

Shutler, Richard, Jr.
1961 *Lost City, Pueblo Grande de Nevada.* NV State Museum Anthropological Papers 5.

1968 The Great Basin Archaic. In Prehistory in the Western United States. *Contributions in Anthropology* 1(3):24-26. Edited by C. Irwin-Williams, Eastern New Mexico Univ.

Strong, William Duncan
1929 Aboriginal Society in Southern California. *University of California Publications in American Archaeology and Ethnology* 26(1):1-358.

Sutton, Mark Q.
1996 The Current Status of Archaeological Research in the Mojave Desert. *Journal of California and Great Basin Anthropology* 18(2):221-257.

United States Department of Agriculture
1959 Aerial Photos of Los Angeles County. Electronic Document: historicaerials.com; Accessed March 22, 2014.

United States Geological Survey
1945 *Alpine Butte, California* 7.5-minute topographic quadrangle map.

1975 *Alpine Butte, California* 7.5-minute topographic quadrangle map.

1992 *Alpine Butte, California* 7.5-minute topographic quadrangle map.

1973 *Redman, California* 7.5-minute topographic quadrangle map.

Van Devender, Larry M., Gary L. Shumway, and Russell D. Hartill
1987 *Desert Fever: An Overview of Mining in the California Desert.* Living West Press, Canoga Park, California.

Wallace, William J.
1958 Archaeological Investigation in Death Valley National Monument. *University of California Archaeological Survey Reports* 42:7-22.

1962 Prehistoric Cultural Development in the Southern California Deserts. *American Antiquity* 28(2):172-180.

1977 A Half Century of Death Valley Archaeology. *The Journal of California Anthropology* 4(2):249-258.

Wallace, William J., and Edith S. Taylor
1978 *Ancient Peoples and Cultures of Death Valley National Monument.* Acoma Books, Ramona, California.

Warren, Claude N.
1984 The Desert Region. In *California Archaeology*, by M. Moratto, contributions by D.A. Fredrickson, C. Raven, and C.N. Warren, pp. 339–430. Academic Press, Orlando, Florida.

Warren, Claude N., and R.H. Crabtree
1986 The Prehistory of the Southwestern Great Basin. In *Handbook of the North American Indians, Vol. 11, Great Basin,* edited by W.L. d'Azevedo, pp.183-193. W.C. Sturtevant, General Editor. Smithsonian Institution, Washington D.C.

Williams, Patricia, Leah Messinger, Sarah Johnson
2008 *Habitats Alive! An Ecological Guide to California's Diverse Habitats.* California Institute for Biodiversity, Claremont, California.

Yohe, Robert M., II
1992 *Reevaluation of W. Great Basin Cultural Chronology and Evidence for the Timing of the Introduction of the Bow and Arrow to E. California Based on New Excavation at the Rose Spring Site (CA-INY-372).* Unpublished PhD Dissertation, UCR.

APPENDIX A

DETAILED AERIAL PHOTOGRAPH OF STUDY AREA

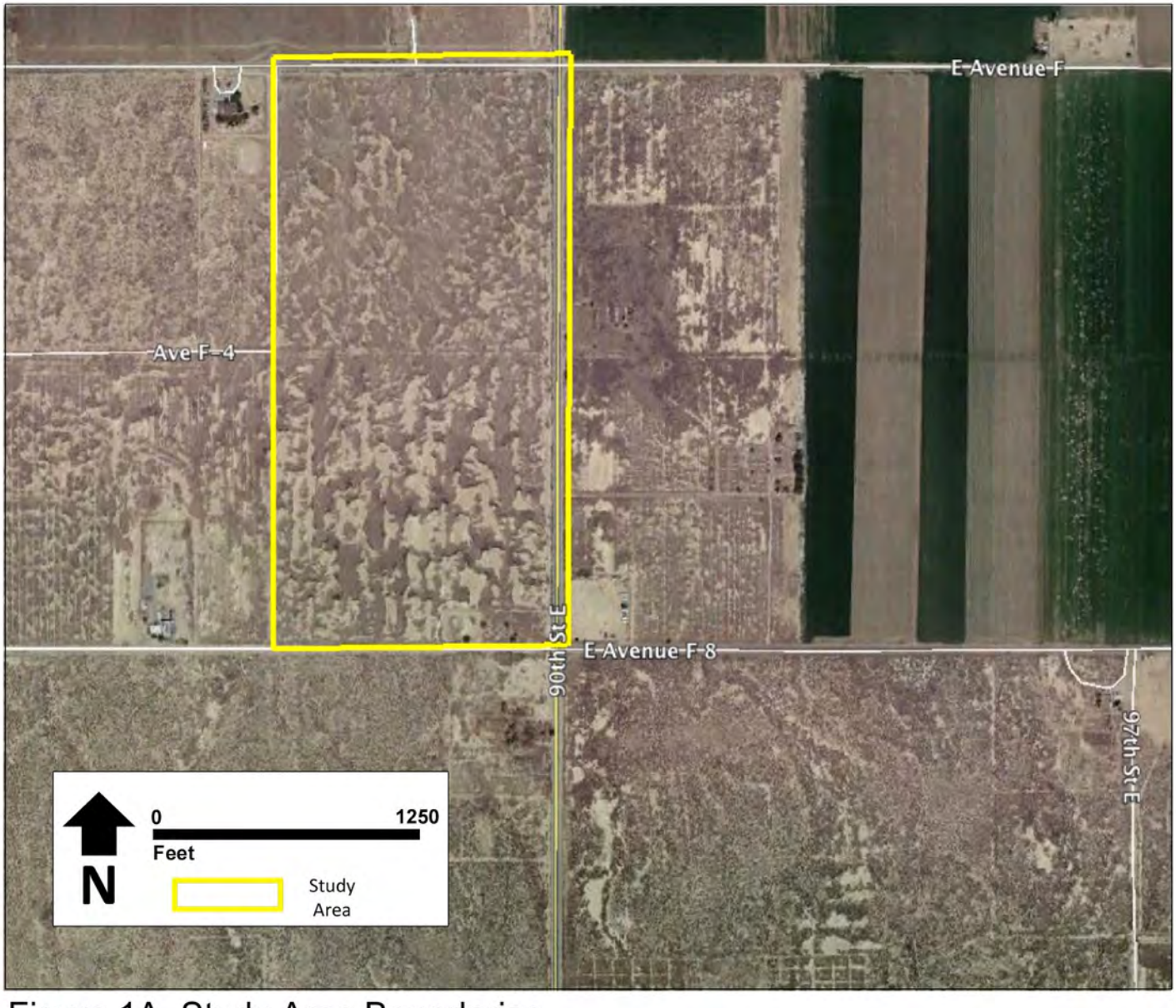


Figure 1A. Study Area Boundaries
Google Earth Aerial Imagry 2013

APPENDIX B

DPR523 FORMS

State of California — The Resources Agency DEPARTMENT OF PARKS AND RECREATION **PRIMARY RECORD**	Primary # HRI # Trinomial NRHP Status Code
Other Listings Review Code	Reviewer Date

 ***Resource Name or #:** AVS1401-H-1

P1. Other Identifier:

***P2. Location:** ☐ **Not for Publication** ☑ **Unrestricted** ***a. County:** Los Angeles

***b. USGS 7.5' Quad:** *Alpine Butte, California* **Date:** 1992 **T** 8N; **R** 10W; NE ¼ of Section 31; SBBM

c. Address: N/A City: Zip:

d. UTM: Zone: 11S; 411089mE/ 3844843mN (NAD83) Elevation: 2365' AMSL

e. Other Locational Data: The property is at the northwest corner of the intersection of 90th Street East and East Avenue F8 near the City of Lancaster in unincorporated Los Angeles County.

***P3a. Description:** (Describe resource and its major elements: design, materials, condition, alterations, size, setting, boundaries)
This resource consists of a historic-period water retention basin and other irrigation features associated with local farming. The basin is an above-ground earthen structure measuring approximately 150 feet square with 9-foot sloped earthen walls. Associated irrigation features include concrete and metal standpipes, a small segment of a below-ground pipe, a concrete footing (possibly supporting a former water pump), and a bell-shaped cistern. These features apparently fed buried piping indicated by a row of 12 small (five-inch diameter) capped standpipes standing three to 12 inches above ground in an east-west orientation. Two glass scatters containing several pieces of sun-colored amethyst glass mixed with other historic-period and modern glass were noted near the retention basin. Prior to 1945, several buildings existed in the southeaster corner of the property near the retention basin, but these have been removed (United States Geological Survey 1945). The condition of the resource is fair. Disturbances on the property included off-road vehicle tracks and modern trash. The setting is a flat, dry, abandoned farm field characterized by low grasses and patches of bare silty soil. The retention basin was certainly in place prior to 1945, and the presence of sun-colored amethyst glass indicates that the area may have been occupied prior to 1916 (Polak 2005). However, while sun-colored amethyst glass was manufactured prior to 1916, modern disturbances make its date of deposit impossible to substantiate.

References:

Polak, Michael. 2005. *Warman's Bottles Field Guide.* Krause Publications. Iola, Wisconsin.
United States Geological Survey. 1945. *Alpine Butte, California* 7.5-Minute Topographic Quadrangle Map.

***P3b. Resource Attributes:** AH6. Water Conveyance System

***P4. Resources Present:** ☐ Building ☑Structure ☐Object ☐Site ☐District ☐Element of District ☐Other

P5a. Photo or Drawing (Photo required for buildings, structures, objects.)

P5b. Description of Photo: (View, date, accession #) Photo 454: Retention Basin (View N).

***P6. Date Constructed/ Age and Sources:** ☑Historic pre-1945 ☐Prehistoric ☐Both (Source: USGS 1945)

***P7. Owner and Address:**
Antelope Valley Solar, LLC
837 9th Street, Suite D
Santa Monica, CA 90403

***P8. Recorded by:**
Daniel Leonard
BCR Consulting
1420 Guadalajara Place
Claremont, California 91711

***P9. Date Surveyed:** 3/7/14

***P10. Survey Type:** Intensive.

***P11. Report Citation:** *Cultural Resources Assessment of the Antelope Valley Solar Project, Unincorporated Los Angeles County, California*

***Attachments:** ☐NONE ☑ Location Map ☐ Sketch Map ☐ Continuation Sheet ☐Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐Other (List):

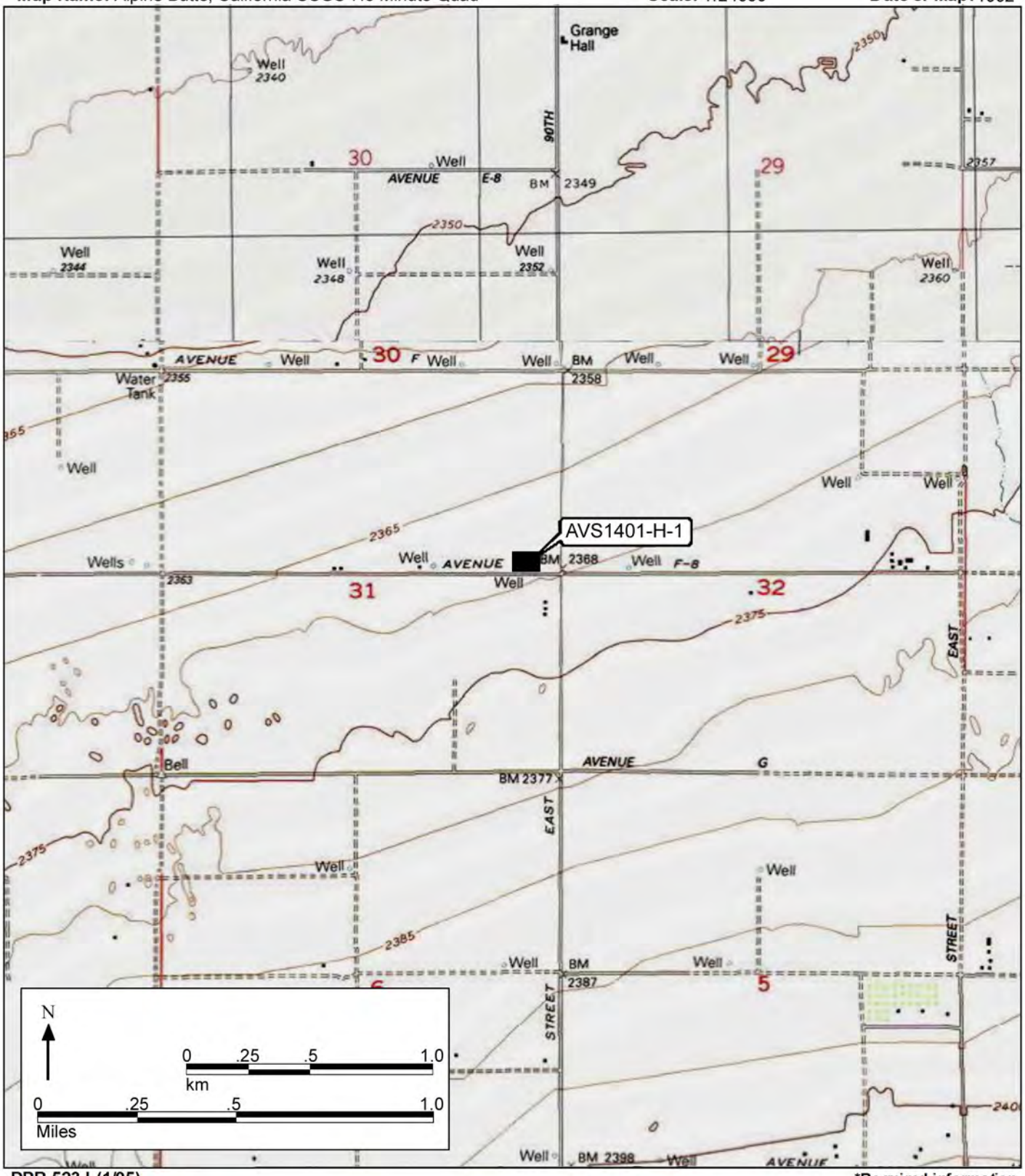
State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary #
HRI#
Trinomial

*Resource Name or#: AVS1401-H-1

*Map Name: Alpine Butte, California USGS 7.5 Minute Quad *Scale: 1:24000 *Date of Map: 1992



*Required information

APPENDIX C

NATIVE AMERICAN CONSULTATION

Subject:	BCR Consulting Antelope Valley Solar SLF and List of Tribes Request
From:	David Brunzell (david.brunzell@yahoo.com)
To:	ds_nahc@pacbell.net;
Date:	Wednesday, March 5, 2014 12:02 PM

Hi Dave,

I'd like to request a Sacred Lands File search and list of potentially interested tribes for the proposed Antelope Valley Solar Project (75 Acres). The proposed project is located in Unincorporated Los Angeles County, California, within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. It is depicted on the *Alpine Buttes* 7.5-minute USGS topographic quadrangle (see attached map)*. Please send the results and list to my email or the below fax number and please get in touch with any questions.

Thanks,

David Brunzell
Principal Investigator/Archaeologist

BCR Consulting LLC
Certified Small Business (SB)
1420 Guadalajara Place
Claremont, California 91711
Tel: 909-525-7078
Fax: 909-992-3065

www.bcrconsulting.net

*See Report Figure 1.

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
(916) 373-3715
Fax (916) 373-5471
Web Site www.nahc.ca.gov
Ds_nahc@pacbell.net

March 12, 2014

Mr. David Brunzell, RPA, Principal
BCR Consulting, Inc.
1420 Guadalajara Place
Claremont, CA 91711

Sent by FAX to: 909-992-3065
No. of Pages: 3

RE: Sacred Lands File Search and Native American Contacts list for the **"Antelope Valley Solar Project;"** located on 75-acres in the Southern Antelope Valley; Los Angeles County, California

Dear Mr. Brunzell:

A record search of the NAHC Sacred Lands Inventory **failed to indicate** the presence of Native American traditional cultural places in the Project site(s) or 'areas of Potential effect' (APE), submitted to this office. Note also that the absence of archaeological and/or Native American cultural resources does not preclude their existence at the subsurface level.

In the 1985 Appellate Court decision (170 Cal App 3rd 604), the Court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources impacted by proposed projects, including archaeological places of religious significance to Native Americans, and to Native American burial sites.

Attached is a list of Native American tribes, Native American individuals or organizations that may have knowledge of cultural resources in or near the proposed project area (APE). As part of the consultation process, the NAHC recommends that local government and project developers contact the tribal governments and native American individuals on the list in order to determine if the proposed action might impact any cultural places or sacred sites. If a response from those listed on the attachment is not received in two weeks of notification, the NAHC request that a follow-up telephone call be made to ensure the project information has been received.

California Government Code Sections 65040.12(e) defines 'environmental justice' to provide "fair treatment of people...with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations and policies." Also, Executive Order B-10-11 requires that state agencies "consult with Native American tribes, their elected officials and other representatives of tribal governments in order to

provide meaningful input into...the development of legislation, regulations, rules and policies on matter that may affect tribal communities."

If you have any questions or need additional information, please contact me at (916) 373-3715.

Sincerely,

Dave Singleton
Program Analyst

Attachments

Native American Contacts
Los Angeles County California
March 12, 2014

Beverly Salazar Folkes
1931 Shadybrook Drive
Thousand Oaks, CA 91362
folkes9@msn.com
805 492-7255
(805) 558-1154 - cell
folkes9@msn.com

Chumash
Tataviam
Ferrnandeño

Fernandeno Tataviam Band of Mission Indians
Larry Ortega, Chairperson
1019 - 2nd Street, Suite #1
San Fernando CA 91340
(818) 837-0794 Office

(818) 837-0796 Fax

Fernandeno
Tataviam

LA City/County Native American Indian Comm
Ron Andrade, Director
3175 West 6th St, Rm. 403
Los Angeles, CA 90020
randrade@css.lacounty.gov
(213) 351-5324
(213) 386-3995 FAX

Kitanemuk & Yowlumne Tejon Indians
Delia Dominguez, Chairperson
115 Radio Street
Bakersfield, CA 93305
deedominguez@juno.com
(626) 339-6785

Yowlumne
Kitanemuk

San Fernando Band of Mission Indians
John Valenzuela, Chairperson
P.O. Box 221838
Newhall, CA 91322
tsen2u@hotmail.com
(661) 753-9833 Office
(760) 885-0955 Cell
(760) 949-1604 Fax

Fernandeño
Tataviam
Serrano
Vanyume
Kitanemuk

Randy Guzman - Folkes
4676 Walnut Avenue
Simi Valley, CA 93063
ndnRandy@yahoo.com
(805) 905-1675 - cell
(805) 520-5915-FAX

Chumash
Fernandeño
Tataviam
Shoshone Paiute
Yaqui

San Manuel Band of Mission Indians
Daniel McCarthy, M.S.., Director-CRM Dept.
26569 Community Center. Drive
Highland, CA 92346
(909) 864-8933, Ext 3248
dmccarthy@sanmanuel-nsn.gov
(909) 862-5152 Fax

Serrano

Kern Valley Indian Council
Robert Robinson, Co-Chairperson
P.O. Box 401
Weldon, CA 93283
brobinson@iwvisp.com
(760) 378-4575 (Home)
(760) 549-2131 (Work)

Tubatulabal
Kawaiisu
Koso
Yokuts

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list s only applicable for contacting locative Americans with regard to cultural resources for the proposed
Antelope Valley Solar Project; located on 75-acres in an unincorporated area in northeastern Los Angeles County, California for which a Sacred Lands File search and Native American Contacts list were requested.

03/12/2014 09:58 FAX 916 657 5390 NAHC 003

Native American Consultation Summary for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California. Native American Heritage Commission replied to BCR Consulting Request on March 12, 2014. Results of Sacred Land File Search did not indicate presence of Native American cultural resources, and recommended that the below groups/individuals be contacted.

Groups Contacted	Letter/Email Date	Response from Tribes
Beverly Salazar Folkes	Letter: 3/14/14 Email: 3/17/14	None
John Valenzuela, Chairperson San Fernando Band of Mission Indians	Letter: 3/14/14 Email: 3/17/14	None
Larry Ortega, Chairperson Fernandeno Tataviam Band of Mission Indians	Letter: 3/14/14 Email: N/A	None
Randy Guzman-Folkes	Letter: 3/14/14 Email: 3/17/14	None
Ron Andrade, Director LA City/County Native American Indian Commission	Letter: 3/14/14 Email: 3/17/14	None
Daniel McCarthy, M.S., Director-CRM Department San Manuel Band of Mission Indians	Letter: 3/14/14 Email: 3/17/14	None
Delia Dominguez, Chairperson Kitanemuk & Yowlumne Tribe Indians	Letter: 3/14/14 Email: 3/17/14	None
Robert Robinson, Co-Chairperson Kern Valley Indian Council	Letter: 3/14/14 Email: 3/17/14	None

BCRCONSULTING LLC ARCHAEOLOGY HISTORIC PRESERVATION PALEONTOLOGY GIS
www.bcrconsulting.net 909.525.7078 Claremont Napa Tehachapi

March 14, 2014

Beverly Salazar Folkes
1931 Shadybrook Drive
Thousand Oaks, California 91362

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear Beverly:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

March 14, 2014

John Valenzuela
Chairperson
San Fernando Band of Mission Indians
P.O. Box 221838
Newhall, California 91322

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear John:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

March 14, 2014

Larry Ortega
Chairperson
Fernandeno Tataviam Band of Mission Indians
1019 2nd Street, Suite #1
San Fernando, California 91340

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear Larry:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

BCRCONSULTING LLC ARCHAEOLOGY HISTORIC PRESERVATION PALEONTOLOGY GIS
www.bcrconsulting.net 909.525.7078 Claremont Napa Tehachapi

March 14, 2014

Randy Guzman-Folkes
4676 Walnut Ave.
Simi Valley, California 93063

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear Randy:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

March 14, 2014

Ron Andrade
Director
LA City/County Native American Indian Commission
3175 West 6th Street, Rm. 403
Los Angeles, California 90020

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear Ron:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

BCRCONSULTING LLC ARCHAEOLOGY HISTORIC PRESERVATION PALEONTOLOGY GIS
www.bcrconsulting.net 909.525.7078 Claremont Napa Tehachapi

March 14, 2014

Daniel McCarthy, M.S.
Director-CRM Department
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, California 92346

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear Daniel:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

BCRCONSULTING LLC ARCHAEOLOGY HISTORIC PRESERVATION PALEONTOLOGY GIS
www.bcrconsulting.net 909.525.7078 Claremont Napa Tehachapi

March 14, 2014

Delia Dominguez
Chairperson
Kitanemuk & Yowlumne Tejon Indians
115 Radio Street
Bakersfield, California 93305

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear Delia:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

BCRCONSULTING LLC ARCHAEOLOGY HISTORIC PRESERVATION PALEONTOLOGY GIS
www.bcrconsulting.net 909.525.7078 Claremont Napa Tehachapi

March 14, 2014

Robert Robinson
Co-Chairperson
Kern Valley Indian Council
P.O. Box 401
Weldon, California 93283

Subject: Tribal Consultation for the Antelope Valley Solar Project, located on 75 acres in Southern Antelope Valley, Los Angeles County, California

Dear Robert:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, cultural landscapes including traditional beliefs and practices. The proposed project is located within Section 31 of Township 8 North, Range 10 West, San Bernardino Baseline and Meridian. The property is depicted on the *Alpine Butte* (1992), *California* 7.5-minute USGS topographic quadrangles, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting, Attn: David Brunzell, 1420 Guadalajara Street, Claremont, California 91711. I request a response by April 18, 2014. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist
Attachment: USGS Map

7012 0470 0001 5570 6634

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
THOUSAND OAKS CA 91362
OFFICIAL USE

Postage	$ $0.70	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $4.00	03/14/2014

Sent To: Beverly Salazar Folkes
Street, Apt. No.; or PO Box No.: 1931 Shadybrook Drive
City, State, ZIP+4: Thousand Oaks, CA. 91362

PS Form 3800, August 2006 — See Reverse for Instructions

7012 0470 0001 5570 6696

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
NEWHALL CA 91322
OFFICIAL USE

Postage	$ $0.70	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $4.00	03/14/2014

Sent To: John Valenzuela
Street, Apt. No.; or PO Box No.: P.O. Box 221938
City, State, ZIP+4: Newhall, CA 91322

7012 0470 0001 5570 6658

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
SAN FERNANDO CA 91340
OFFICIAL USE

Postage	$ $0.70	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $4.00	03/14/2014

Sent To: Larry Ortega
Street, Apt. No.; or PO Box No.: 1019 2nd St. Suite 1
City, State, ZIP+4: San Fernando, CA 91340

7012 0470 0001 5570 6641

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
SIMI VALLEY CA 93063
OFFICIAL USE

Postage	$ $0.70	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $4.00	03/14/2014

Sent To: Rondy Guzman-Folkes
Street, Apt. No.; or PO Box No.: 4676 Walnut Ave
City, State, ZIP+4: Simi Valley, CA. 93063

PS Form 3800, August 2006 — See Reverse for Instructions

7012 0470 0001 5570 6672

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
LOS ANGELES CA 90020
OFFICIAL USE

Postage	$ $0.70	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $4.00	03/14/2014

Sent To: Ron Andrade
Street, Apt. No.; or PO Box No.: 3175 West 6th St. Rm. 403
City, State, ZIP+4: Los Angeles, CA 90020

PS Form 3800, August 2006 — See Reverse for Instructions

7012 0470 0001 5570 6665

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
HIGHLAND CA 92346
OFFICIAL USE

Postage	$ $0.70	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $4.00	03/14/2014

Sent To: Daniel McCarthy
Street, Apt. No.; or PO Box No.: 26569 Community Center Dr.
City, State, ZIP+4: Highland, CA. 92346

PS Form 3800, August 2006 — See Reverse for Instructions

7012 0470 0001 5570 6726

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
BAKERSFIELD CA 93305
OFFICIAL USE

Postage	$ $0.49	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $3.79	03/14/2014

Sent To: Delia Dominguez
Street, Apt. No.; or PO Box No.: 115 Rudd Street
City, State, ZIP+4: Bakersfield, CA. 93305

PS Form 3800, August 2006 — See Reverse for Instructions

7012 0470 0001 5570 6689

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®
WELDON CA 93283
OFFICIAL USE

Postage	$ $0.70	0005
Certified Fee	$3.30	07
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $4.00	03/14/2014

Sent To: Robert Robinson
Street, Apt. No.; or PO Box No.: P.O. Box 401
City, State, ZIP+4: Weldon, CA. 93283

PS Form 3800, August 2006 — See Reverse for Instructions

APPENDIX D

PALEONTOLOGICAL RESOURCES ASSESSMENT

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325
Fax: (213) 746-7431
e-mail: smcleod@nhm.org

26 March 2014

BCR Consulting
1420 Guadalajara Place
Claremont, CA 91711

Attn: David Brunzell, Principal Investigator / Archaeologist

re: Paleontological resources for the proposed Antelope Valley Solar Project, near Redman, Los Angeles County, project area

Dear David:

I have conducted a thorough check of our paleontology collection records for the locality and specimen data for the proposed Antelope Valley Solar Project, near Redman, Los Angeles County, project area as outlined on the portion of the Alpine Butte USGS topographic quadrangle map that you sent to me via e-mail on 5 March 2014. We do not have any vertebrate fossil localities that lie directly within the project boundaries, but we do have localities nearby from the same sedimentary deposits that occur in the proposed project area.

The entire proposed project area has surface deposits that consist of younger Quaternary Alluvium, derived primarily as alluvial fan deposits from the San Gabriel Mountains to the south. Typically, these deposits do not contain significant vertebrate fossils, at least in the uppermost layers, but they may well contain significant fossil vertebrate remains at depth. Our closest vertebrate fossil locality from these deposits is LACM 7853, due west of the proposed project area north of the eastern side of Lancaster, that at a depth of only three feet below the surface produced fossil specimens of smelt, Osmeridae, western whiptail lizard, *Aspidocelis tigris*, desert iguana, *Dipsosaurus dorsalis*, desert spiny lizard, *Sceloporus magister*, side-blotched lizard, *Uta stansburiana*, desert night lizard, *Xantusia vigilis*, skink, *Plestiodon*, whip snake, *Masticophis*, leaf-nosed snake, *Phyllorhynchus*, western lyre snake, *Trimorphodon biscutatus*, wood rat, *Neotoma*, field mouse, *Peromyscus*, pocket gopher, *Thomomys bottae*, kangaroo rat, *Dipodomys*,

pocket mouse, *Perognathus*, Audubon's cottontail rabbit, *Sylvilagus audubonii*, and antelope ground squirrel, *Ammospermophilus leucurus*. Slightly further to the west-southwest of the proposed project area, but still on the northeast side of Lancaster, our vertebrate fossil locality LACM 7884 produced a fossil specimen of camel, *Camelops hesternus*, from only four feet below the surface.

Even shallow excavations in the younger Quaternary Alluvium exposed in the proposed project area may well uncover significant fossil vertebrate remains. Any substantial excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Because some of the nearby localities from similar sedimentary deposits have produced only very small fossils that would be missed in paleontological monitoring of typical construction projects, it is recommended that sediment samples be collected to determine the small vertebrate fossil potential in these rock units. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

APPENDIX E

PROJECT PHOTOGRAPHS

Photo 1: Project Overview from Northwest Corner (View South)

Photo 2: Project Overview from Northwest Corner (View Southeast)

Photo 3: Project Overview from Midsection (View West)

Photo 4: Modern/Historic-period Glass Scatter at AVS1401-H-1 (View North)

GEOTECHNICAL ENGINEERING REPORT

Proposed Solar Photovoltaic Project –
Antelope Valley Solar Project
APN 3307-016-012 and 013
Avenue F and 90th Street East
Los Angeles County, California
PL-07647-02

Prepared For

ANTELOPE VALLEY SOLAR, LLC

May 30, 2014

Prepared By

Earth Systems
Southern California
1024 West Avenue M-4
Palmdale, California 93551
(661) 948-7538
FAX (661) 948-7963

Earth Systems
Southern California

1024 West Avenue M-4
Palmdale, California 93551
(661) 948-7538
Fax (661) 948-7963

May 30, 2014

PL-07647-02

Antelope Valley Solar, LLC
837 9th Street, Suite D
Santa Monica, California 90403

Attention: Mr. David Revelt

Subject: **Geotechnical Engineering Report**
Proposed Solar Photovoltaic Project
Antelope Valley Solar Project
APN 3307-016-012 and 013
Avenue F and 90th Street East
Los Angeles County, California

Presented herewith is Earth Systems Southern California's (Earth Systems') Geotechnical Engineering Report prepared, as authorized, for the site of a proposed solar power generation facility in Los Angeles County, California. The approximate 80-acre project site is located adjacent to the southwest corner of East Avenue F and 90th Street East, in an unincorporated portion of Los Angeles County, near Lancaster, California. The conclusions and recommendations contained in this report are based upon Earth Systems' understanding of the proposed development and on analyses of the data obtained from the field and laboratory testing programs. The recommendations provided in this report generally relate to criteria for site grading and foundation design. Earth Systems strives to provide its analyses and recommendations in accordance with the applicable standards of care for the geotechnical engineering profession at the time this study was conducted.

This report completes Earth Systems' scope of geotechnical engineering services authorized on March 17, 2004 which were performed in accordance with Earth Systems' proposal dated March 13, 2014. Other services that may be required, such as pile load testing, particulate emission potential, grading observation and construction testing, are additional services and will be billed according to the Fee Schedule in effect at the time such services are provided. Budgets for these services, which are dependent upon design and construction schedules, can be provided when requested. Earth Systems appreciates this opportunity to provide professional geotechnical engineering services for this project. If you need clarification of the information contained in this report, or if Earth Systems can be of additional service, please contact the undersigned.

Respectfully submitted,
Earth Systems Southern California

Bruce A. Hick
Project Geotechnical Engineer

Distribution: 4 – Antelope Valley Solar, LLC

TABLE OF CONTENTS

PAGE

INTRODUCTION 1

PROJECT DESCRIPTION 1

PURPOSE AND SCOPE OF SERVICES 2

SITE DESCRIPTION 2

FIELD EXPLORATION 3

LABORATORY TESTING 4

SUBSURFACE SOIL CONDITIONS 5

GROUNDWATER 5

REGIONAL GEOLOGY 5

GEOLOGIC HAZARDS 6

DISCUSSION AND CONCLUSIONS 10

RECOMMENDATIONS 11

A. Site Preparation 11
B. Excavations 14
C. Utility Trenches 15
D. Foundations 15
E. Slab-on-Grade Construction 18
F. Lateral Earth Pressures 20
G. Expansive Soil 21
H. Preliminary Pavement Sections 22
I. Soil Chemical Testing 23
J. Soil Thermal Resistivity Testing 24
K. Slope Stability 24

CLIENT OPTIONAL SERVICES 24

LIMITATIONS AND UNIFORMITY OF CONDITIONS 25

CLOSURE 26

APPENDIX A Project Vicinity Map
Boring Location Map
Unified Soil Classification System
Terms Describing Consistency or Condition
Symbols Commonly Used on Boring Logs
Boring Logs

APPENDIX B Summary of Laboratory Test Results

APPENDIX C Design Plates

GEOTECHNICAL ENGINEERING REPORT
PROPOSED SOLAR PHOTOVOLTAIC PROJECT
ANTELOPE VALLEY SOLAR PROJECT
APN 3307-016-012 AND 013
AVENUE F AND 90TH STREET EAST
LOS ANGELES COUNTY, CALIFORNIA

INTRODUCTION

This Geotechnical Engineering Report has been prepared for a proposed solar power generation facility in Los Angeles County, California. The approximate 80-acre project site is located adjacent to the southwest corner of East Avenue F and 90th Street East, in an unincorporated portion of Los Angeles County, near Lancaster, California (see Project Vicinity Map in Appendix A). The purpose of Earth Systems Southern California's (Earth Systems') services was to evaluate the geotechnical engineering characteristics of the on-site subsurface soils relative to the anticipated site development.

This report includes:

1. Descriptions of the field exploration and laboratory tests performed.

2. Conclusions and recommendations relating to construction of the proposed development based upon analyses of data obtained from the exploration and testing programs and on knowledge of the general and site specific characteristics of the subsurface soils.

PROJECT DESCRIPTION

Based upon review of the submitted Site Plan, Earth Systems understands that plans are to construct solar photovoltaic (PV) systems on the project site. Based upon discussions with project representatives, the solar systems are to be supported by driven pile foundations. These foundations are anticipated to resist both uplift and lateral loads. The facility is anticipated to include solar panel arrays, inverter/electrical equipment pads, access and interior roads, perimeter security fencing and other associated improvements. Estimated maximum structural loads for site structures are 2,000 plf for continuous foundations and 50 kips for isolated column loads.

Due to the relatively flat site topography, Earth Systems has assumed that conventional cut and fill methods will be used to grade the site, with maximum slope heights of five feet. No sewage disposal systems are anticipated for this development. The above assumptions were used as the bases for the exploration, testing, and analyses programs and for the recommendations contained in this report.

PURPOSE AND SCOPE OF SERVICES

The purpose of Earth Systems' services was to evaluate the project site soil conditions and to provide preliminary geotechnical engineering conclusions and recommendations relative to the project site and the proposed development. Earth Systems' scope of services included the following:

A. A general geotechnical engineering reconnaissance of the site.

B. Shallow subsurface exploration of the project site by drilling eight (8) test borings.

C. Geotechnical laboratory testing of selected soil samples obtained from the exploratory soil boring excavated for this project.

D. Engineering analyses of the data obtained from the exploration and testing programs.

E. A summary of findings and recommendations in this written report.

Contained in this report are:

1. Discussions on local and site specific soil conditions.

2. Results of laboratory tests and field data.

3. Recommendations relating to the proposed site development, including allowable foundation bearing capacity, recommendations for foundation design, estimated total and differential settlements, site grading criteria, lateral earth pressures, soil expansion characteristics, soil corrosion potential, site liquefaction potential, and preliminary pavement sections.

SITE DESCRIPTION

The approximate 80-acre rectangular-shaped project site is located adjacent to the southwest corner of East Avenue F and 90 Street East, in an unincorporated portion of Los Angeles County, near Lancaster, Los Angeles County, California (see attached Project Vicinity Map). The geographic coordinates of the proposed facility are approximately 34.7416N latitude and 117.9741W longitude. Access to the site is available from East Avenue F and 90th Street East, both paved streets located adjacent to the northern and eastern boundaries of the site, respectively. Avenue F-8 and 87th Street East, both poorly maintained dirt roads, form the southern and western boundaries of the site, respectively (see attached Boring Location Map).

Topographically, the site consists of relatively flat ground that is sloping to the north at an approximate one percent gradient. There is less than 10 feet of elevation differential across the site.

At the time of the field exploration, the site was vacant, undeveloped land. An abandoned water reservoir and well are located in the extreme southeastern portion of the site adjacent to Avenue F-8. The site was vegetated with a light covering of typical desert vegetation, consisting of weeds, grasses, brush, and scattered bushes. The above cited descriptions are intended to be illustrative, and are specifically not intended for use as a legal description of the subject property in any matter.

FIELD EXPLORATION

The field exploration for this study, conducted on March 26, 2014, consisted of eight (8) exploratory soil borings drilled to depths ranging from approximately 16 to 51 feet below the existing ground surface. The borings were drilled with a Mobil B-61 truck-mounted drilling rig using eight-inch diameter continuous flight hollow stem auger in accordance with generally accepted geotechnical exploration procedures (ASTM D 1452). The approximate location of the exploratory borings, as indicated on the attached Boring Location Map in Appendix A, were determined by sighting and tape measuring from existing site improvements. The exploration locations should be considered accurate only to the degree implied by the measurement method used.

Bulk disturbed samples of the subsurface soils were obtained from tailings developed during excavation of the test borings. These samples were secured for classification and testing purposes and represent a mixture of soils within the noted depths.

Soil samples ("ring samples") were secured from within the soil borings using a three-inch O. D. ring sampler (ASTM D 3550). The sampler shoe is similar to the type specified in ASTM D 1586. A 140-pound hammer falling approximately 30 inches (ASTM D 1586) drove the sampler. Following seating of the sampler, the number of blows required to drive the sampler one-foot was recorded in six-inch increments, in general accordance with procedures presented in ASTM D 1586. Recovered soil samples were sealed in plastic containers and brought to Earth Systems' laboratory for further classification and testing.

The Boring Logs for this report, included in Appendix A, represent Earth Systems' interpretation of the field logs prepared for each boring by Earth Systems' staff, along with their interpretation of soil conditions between samples and results of laboratory tests. While the noted stratification lines represent approximate boundaries between soil types, the actual transitions may be gradual. GPS coordinates for the borings are indicated on the Boring Logs

LABORATORY TESTING

After visual and tactile classification in the field, the soil samples were brought to Earth Systems' laboratory. The soil classifications were checked in accordance with the Unified Soil Classification System and a testing program was established as follows:

A. Soil samples and field logs were reviewed to assess which samples would be analyzed further.

B. In-situ moisture content and dry unit weight for soil core samples were developed in accordance with ASTM D 2937.

C. The relative strength characteristics of the subsurface soils were estimated from the results of direct shear tests (ASTM D 3080) conducted on select ring samples. The samples were placed in contact with water for at least 24 hours before testing and then sheared under normal loads ranging from 0.5 to 2.3 KSF. Testing was conducted to obtain residual (ultimate) shear strengths.

D. The relative strength characteristics of the near-surface soils were estimated from the results of direct shear tests (ASTM D 3080) conducted on samples remolded to approximately 90% of maximum dry density as determined by ASTM D 1557 test procedures. The remolded samples were placed in contact with water for at least 24 hours before testing and then sheared under normal loads ranging from approximately 0.5 to 2.3 KSF. Testing was conducted to obtain residual (ultimate) shear strengths.

E. Consolidation tests (ASTM D 2435) were conducted on select samples obtained from the ring sampler. The maximum stress during testing was 4.6 KSF. The samples were saturated at 2.3 KSF to check the hydrocompression potential. The samples were unloaded to 1.2 KSF to check the rebound.

F. Soil classification tests consisted of Particle Size Analysis – Mechanical Method and Hydrometer Method (ASTM D 422).

G. HDR/Schiff & Associates of Claremont, California performed soil chemistry tests on a sample of the site soil provided by Earth Systems. Tests consisted of sulfate, pH and soil resistivity, as well as several other chemical content tests.

H. Thermal Resistivity (ASTM 5334) tests were conducted on an in-situ sample of the site soil (Boring #3 at 2 feet).

I. Additional tests consisted of Maximum Density-Optimum Moisture (ASTM D 1557), Expansion Index (ASTM D 4829) and "R"-Value (California Test Method 301).

Refer to Appendix B for the laboratory test results. Presentation of the test results provides only that information considered pertinent. References to ASTM and other test standards refer to the standard currently in effect.

SUBSURFACE SOIL CONDITIONS

The soils encountered in the exploratory borings are alluvial deposits, consisting of interbedded layers of silty sands, clayey sands, relatively clean sands, sandy silts and sandy and silty clays (SM, SC, SP, ML and CL soil types based upon the Unified Soil Classification System). Some of the upper two to three feet of the native site soils were found to be relatively loose/soft, non-uniform, and of low relative compaction. The underlying coarse-grained soils (SM and SP soil types) encountered below a depth of approximately three feet were found to be medium dense to dense. The underlying fine-grained soils (ML and CL soil types) encountered below a depth of approximately three feet were found to be medium stiff to stiff. The Boring Logs in Appendix A contain more detailed descriptions of the soil encountered in the exploratory test borings. Per 2013 California Building Code (CBC) Table 1613.5.2, the site class is a stiff soil profile (D).

Based upon the consolidation test results, some of the native site soils within the top two to three feet are anticipated to demonstrate a slight to moderate tendency to hydrocompress (experience a loss in volume upon wetting, with or without additional loading; commonly referred to as "collapsing soil"). The soils tested below a depth of approximately three feet, through the depths tested, were found to demonstrate a negligible to slight tendency to hydrocompress.

Based upon the Expansion Index Test (ASTM D 4829) results, the upper site soils are considered to have a "very low" (0-20) expansion potential. Refer to Section G of the Recommendations section for explanations and recommendations for dealing with expansive soils.

GROUNDWATER

Free groundwater or perched water was not encountered in the borings at the time of drilling. Static aquifer groundwater levels in the vicinity of the site are estimated to be deeper than 50 feet below the existing surface (based upon borings performed for this report). Fluctuations in groundwater levels may occur due to variations in rainfall, regional climate, and other factors.

REGIONAL GEOLOGY

The project site is located in the south-central portion of the Antelope Valley. Lithologic units exposed in this area consist predominantly of deep Quaternary sediments. Local active faults are typically located along the margins of the Antelope Valley.

The San Andreas rift zone, which is several miles wide, dominates the geology of the southern Antelope Valley. The rift zone is an extensive zone of active and potentially active faults that extends from the Gulf of California to Cape Mendocino in northern California. The San Andreas fault, and associated subsidiary faults, is the closest active fault to the site. The San Andreas fault, at its nearest point, is approximately 15 miles southwest of the site. No known active faults exist within the project site boundaries.

GEOLOGIC HAZARDS

Based on the site reconnaissance and a review of selected geologic references, the geologic hazards that could affect the proposed development generally include seismically related hazards. These hazards are discussed below.

Fault Rupture

No active faults have been mapped across the project site. Therefore, the potential hazard due to active fault ground rupture is considered minimal. The site is not located within an Alquist-Priolo Earthquake Fault Zone, as currently published by the State of California. These zones are defined by the California State Division of Mines and Geology to delineate known active or potentially active faults.

Liquefaction

Liquefaction is defined as a loss of strength of saturated cohesionless soil generally due to seismic shaking. Soil types most susceptible to liquefaction are loose, saturated silty to clean fine sands. Based on the site exploration, the shallow alluvial soils below this site consist of sands that are generally in a medium dense to dense state. Static groundwater depths on this site are greater than 50 feet. Where groundwater levels are greater than 50 feet deep, it is generally thought that surface damage from deeper liquefaction will not occur. Therefore, since the static groundwater level under the site is greater than 50 feet deep and the foundation soils are relatively dense in nature, it is Earth Systems' opinion that hazards from liquefaction on this site should be negligible.

Seismic Hazards

The site is located in Southern California, which is an active seismic area. The site is within Seismic Zone 4 as designated by the 2001 edition of the Uniform Building Code. Major historic earthquakes felt in the vicinity of Antelope Valley have usually originated from faults located outside the area. These include the 1857 Fort Tejon, 1872 Owens Valley, 1952 Arvin-Tehachapi, 1971 San Fernando, 1987 Whittier, 1992 Landers and Big Bear events, 1994 Northridge and the 1999 Hector Mine earthquakes. Table I (page 7) lists significant recorded earthquakes felt in the Antelope Valley area and the estimated intensity of ground shaking at the site based on the Modified Mercalli Scale. A description of the Modified Mercalli Scale is included as Table II (page 8) of this report.

TABLE I

Earthquake (Fault)	Approx. Distance to Epicenter (miles)	Earthquake Magnitude*	Estimated Intensity at the Site **	Date
Fort Tejon (San Andreas)	110	8.0	VIII	1857
Owens Valley (Sierra Nevada)	135	7.6	VI	1872
Arvin-Tehachapi (White Wolf)	62	7.5	VII	1952
San Fernando (San Fernando)	33	6.6	VI	1971
Whittier	47	5.9	IV	1987
Landers	95	7.3	V	1992
Northridge	49	6.7	V	1994
Hector Mine	97	7.1	V	1999

*Moment Magnitude
**Modified Mercalli Scale

From Table I, it appears that the past maximum intensity of historic earthquakes felt in the Antelope Valley area due to regional faults has been on the order of VIII on the Modified Mercalli Scale. Estimated maximum Mercalli intensities at the site for a 7.9+ moment magnitude earthquake occurring on the local San Andreas Fault are approximately VIII. Intense ground shaking lasting at least 60 seconds is anticipated. Aftershocks with magnitudes up to 7 are expected.

Table II
Modified Mercalli Intensity Scale of 1931[1], (1956 version)[2]

Masonry A, B, C, D. To avoid ambiguity of language, the quality of masonry, brick or otherwise, is specified by the following lettering.

Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally and bound together by using steel, concrete, etc.; designed to resist lateral forces.

Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.

Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.

Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

I.	**Not felt. Marginal and long-period effects of large earthquakes.**
II.	**Felt by persons at rest, on upper floors, or favorably placed.**
III.	**Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.**
IV.	**Hanging objects swing. Vibrations like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV wooden walls and frame creak.**
V	**Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.**
VI.	**Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken visibly, or heard to rustle.**
VII.	**Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices also unbraced parapets and architectural ornaments. Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.**
VIII.	**Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.**
IX.	**General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. General damage to foundations. Frame structures, if not bolted, shifted off foundations. Frames racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas sand and mud ejected, earthquake fountains, sand craters.**
X.	**Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.**
XI.	**Rails bent greatly. Underground pipelines completely out of service.**
XII.	**Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.**

[1]Original 1931 version in Wood, H. O., and Neumann, F., 1931, Modified Mercalli intensity scale of 1931: Seismological Society of America Bulletin, v. 53, no. 5, p. 979-987.
[2]1956 version prepared by Charles F. Richter, in Elementary Seismology, 1958, p. 137-138, W. H. Freeman & Co.

Ground Fissuring

Areal subsidence could also occur at the site, but would probably occur on a regional basis. Ground fissuring is a recently observed phenomenon in the northwest Lancaster area and at Edwards Air Force Base. It is thought to occur due to areal subsidence related to extensive groundwater withdrawal, tensional stresses, and erosion. Documented hazards from ground surface fissuring observed in other areas of California have included foundation distress and adverse settlement, as well as cracking of pavement and utility.

At this time, the areas of predominant fissuring in the Antelope Valley are located north of Avenue I in Lancaster. As of this date, Earth Systems is not aware of documented evidence of structural damage to buildings in the immediate area of the project site attributed to the ground fissuring phenomena. Earth Systems' personnel observed no obvious evidence of fissuring on this site at the time of the field exploration.

The location of ground fissuring in the Lancaster area appears to be related to specific soil types, relative location within the area of areal subsidence, and the potential for storm runoff to erode existing fissures. Accurate prediction of future areas of fissuring is beyond the current state of the art for this profession, especially as changes in groundwater pumping and location of well fields could alter the location and magnitude of areal subsidence and associated tensional stresses.

Other Secondary Seismic Hazards

Other seismic hazards related to ground shaking include ground lurching, landslides, tsunamis, seiches, and seismic-induced settlements. Ground lurching is generally associated with fault rupture and liquefaction. As these two hazards are considered unlikely, it is Earth Systems' opinion that the potential for ground lurching is also low. Due to the relatively flat site topography, hazards from landslides are considered negligible. Due to the inland location of the site, hazards from tsunamis are considered nonexistent.

No large water storage facilities are currently located upgradient of the property. Therefore, it is Earth Systems' opinion that significant hazards due to local reservoir failure (seiches) are considered unlikely.

Seismically-induced settlement may occur within the on-site younger alluvial soils. However, the near surface soils will be densified by remedial grading to mitigate most settlement potentials. Additional settlement may occur due to seismic shaking, but will most likely occur on an areal basis.

Erosion

The project site is in an area where minor sheet flooding and erosion could occur. Appropriate site analyses, project design, project construction, and site maintenance should minimize the sheet flooding potential.

DISCUSSION AND CONCLUSIONS

Based upon the field exploration, laboratory testing, Earth Systems' understanding of the proposed site development, and past experience, it is Earth Systems' opinion that the site, when modified as recommended in this report, is suitable for the intended construction.

Site Grading

As mentioned in the Soil Conditions Section, the upper two to three feet of the native soils were found to be relatively loose/soft, non-uniform, of low relative compaction, and subject to significant hydrocompression. Based upon these conditions, it is Earth Systems' opinion that the upper native soils will not provide uniform support for any proposed buildings/enclosures without remedial grading. To provide a more uniform bearing for any proposed buildings/enclosures, it is recommended that a recompacted soil mat be constructed beneath all building/enclosure foundations and slab-on-grade construction. No specific remedial grading is required for the proposed solar array structures. Refer to Section A of the Recommendations of this report for more detailed discussions and recommendations regarding site preparation.

Foundation Design and Settlements

If the preliminary recommendations for site preparation and grading are followed, conventional shallow (continuous and isolated pad) foundations may be used to support any proposed site structures and utility/equipment pads. If the preliminary recommendations for foundation design and construction are followed, total settlement of the proposed structures should be less than three-quarters of an inch. Differential settlement across a 30-foot span should be less than 0.0015 radians. Refer to Section D of the Recommendations section of this report for more detailed discussions and recommendations regarding foundation design.

The proposed solar arrays are anticipated to be supported by driven steel piles. Earth Systems has not been supplied information on the size or layout of the proposed piles. It is anticipated that the project structural engineer will produce performance criteria for pile driving operations of the steel supports. Earth Systems can provide field pile load testing to determine the ultimate uplift and lateral load capacity of the proposed piles. This testing can help minimize the required pile lengths resulting in substantial economic savings.

Sewage Disposal

No sewage disposal is proposed for this development. No special restrictions or recommendations are required for this development from a sewage disposal standpoint.

Section 111 Statement

Based on the findings summarized in this report, and provided the recommendations in this report are incorporated into site development, it is Earth System's opinion that construction of the proposed improvements will not be subject to a geologic hazard from landslides, settlement, or slippage. It is also Earth System's opinion that the proposed improvements and anticipated site grading will not adversely affect the geologic stability of the site or adjacent properties provided our recommendations are followed. Test findings and statements of professional opinions do not constitute a guarantee or warranty, expressed or implied.

RECOMMENDATIONS

Based upon the field exploration, laboratory testing, Earth Systems' interpretation of data from the exploration and testing programs, and past experience, it is Earth Systems' opinion that the following recommendations should be incorporated into site preparation, design, and construction of the proposed site development.

A. Site Preparation

1. Subject to County of Los Angeles requirements, any existing pavements, slabs, foundations, vegetation (including root balls), trash piles, abandoned underground utilities, and other debris should be removed from the proposed construction areas. All strippings and debris should be removed from the site in order to preclude their incorporation in site fill or remedial excavation backfill.

2. As discussed in the Site Description Section of the report, a water well is present in the extreme southeast portion of the site. Any water well should be properly abandoned in accordance with any applicable agency requirements.

3. Depressions resulting from removals under Items 1 above should have debris and loose soils removed and filled with suitable soils placed as recommended below.

4. In order to minimize potential settlement problems associated with a structure supported on a nonuniform thickness of compacted fill, the geotechnical engineers should be consulted for site grading recommendations relative to backfilling large and/or deep depressions resulting from removals under Item 1.

5. To provide a more uniform bearing for any proposed habitable structure foundations, structural retaining walls, and building slab-on-grade construction, the following remedial grading is recommended:

a. Existing soils beneath the proposed building areas, including a distance of at least five feet beyond the foundation perimeter, should be excavated a minimum of 30 inches below existing site grade or finished subgrade (pad elevation), whichever is lower. **The base of the remedial excavation across an individual building pad should be a level elevation.** The bottom of the remedial excavation should then be scarified (ripped) 6 inches.

b. One intent of the above remedial grading recommendations is to remove all of the existing artificial fill and the upper loose site soils subject to significant hydrocompression within the proposed building areas. All exposed ground surfaces (subgrades) at the base of the remedial excavations should be reviewed for possible loose/soft soils and tested to verify that an "in-place dry density" ("IPD") of at least **98.0 p.c.f.** is present. If this density does not exist at the specified depth, additional excavation will be required until suitable subgrade densities are found.

c. The excavated soils may be reused to backfill the remedial excavations provided they are cleaned of any deleterious materials and debris, and are properly moisture conditioned and compacted as recommended in this report. During replacement of the excavated soils in the remedial excavations, and recompaction of the scarified soils, the soils should be moisture conditioned to at least optimum moisture content and be uniformly compacted to at least 90% of maximum dry density as determined by ASTM D 1557 test procedures using mechanical compaction equipment. To aid in the compaction operation, fill should be placed in maximum six-inch compacted lifts. **Compaction should be verified by testing.**

d. The geotechnical consultants' representative should review the site grading prior to scarification of the bottom of the remedial excavations. Local variations in soil conditions may warrant increasing the depth of remedial excavation. Any deeper areas of loose soils should be removed and be replaced as compacted, engineered fill.

6. To provide a more uniform bearing for the proposed traffic-bearing Asphalt Concrete, Portland Cement Concrete pavement construction and any proposed exterior non-traffic bearing concrete flatwork (<u>utility/equipment pads</u>, sidewalks, walkways etc.), the following remedial grading is recommended:

a. Existing soils beneath the proposed pavement sections, including a distance of at least two feet beyond the pavement perimeter should be excavated a minimum of 6 inches below existing site grade or finished subgrade, whichever is lower. The bottom of the remedial excavation should then be scarified (ripped) 6 inches.

b. The excavated soils may be reused to backfill the remedial excavations provided they are cleaned of any deleterious materials and debris, and are properly moisture conditioned and compacted as recommended in this report. During replacement of the excavated soils in the remedial excavations, and recompaction of the scarified soils, the soils should be moisture conditioned to at least optimum moisture content and be uniformly compacted to at least 90% of maximum dry density as determined by ASTM D 1557 test procedures using mechanical compaction equipment. To aid in the compaction operation, fill should be placed in maximum six-inch compacted lifts. **Compaction should be verified by testing.**

c. The upper 12 inches of the fill beneath Portland Cement Concrete pavement construction should be compacted to 95% of the maximum dry density. To aid in the compaction operation, fill should be placed in maximum six-inch compacted lifts. **Compaction should be verified by testing.**

d. The geotechnical consultant's representative should review the site grading prior to scarification of the bottom of the remedial excavations. Local variations in soil conditions may warrant increasing the depth of remedial excavation. Any deeper areas of loose soils should be removed and be replaced as compacted, engineered fill.

7. Import soils should be equal to, or better than, the on-site soils in strength, expansion, compressibility, and soil chemistry characteristics. In general, import material should be free of organic matter and deleterious substances, have 100% passing a two-inch sieve, 60% to 100% passing a #4 sieve, no more than 20% passing a #200 sieve, an Expansion Index less than 20, a Liquid Limit less than 35, and a Plasticity Index less than 12. Import soils can be evaluated prior to their use, but will not be prequalified by the geotechnical consultant. Approval of import soils will be given only after the material is on the project, either in-place, or stockpiled in adequate quantity to complete the project.

8. As an alternative to soil being used as backfill, clean gravel (3/4" maximum size) or crushed aggregate base material may be used. A lean (minimum two-sack of cement) sand/cement slurry, structural concrete, or controlled low-strength material (CLSM) may also be used for remedial or foundation excavation backfill. The fluidity and lift placement thickness of any such material should be controlled in order to prevent "floating" of any "submerged" structure.

9. Suitable fill soils should be moisture conditioned to at least optimum moisture content and be uniformly compacted to at least 90% of maximum dry density as determined by ASTM D 1557 test procedures using mechanical compaction equipment. To aid in the compaction operation, fill should be placed in maximum six-inch compacted lifts. **Compaction should be verified by testing.**

10. Shrinkage due to excavation and compaction of the upper site soils is estimated to be about 14 percent of any excavated site soils. During compaction, it is estimated that approximately one-half (1/2) inch of subsidence of the underlying soils will occur. Losses due to the site demolition and debris removal operations may affect quantity calculations and should also be taken into account. The grading contractor should verify shrinkage and grading yardage estimates.

11. Drainage systems for the proposed structures should be designed so that runoff water is diverted away from any structure.

12. Final site grades should be designed and constructed so that all water is diverted away from all structures and not allowed to pond on or near pavement. Drainage devices should be constructed to divert drainage from the project site.

13. It is recommended that Earth Systems be retained to provide engineering services during the grading, excavation, and foundation phases of development. This continuity of services will allow for the geotechnical review of the design concepts and specifications relative to the recommendations of this report and will more readily allow for design changes in the event that subsurface conditions differ from those currently anticipated.

B. Excavations

1. There is a potential for construction problems involving caving of relatively deep site excavations. All excavations should be made in accordance with applicable regulations (including CAL/OSHA) for an OSHA Type "C" soil. Project safety is the responsibility of the contractor and the owner. Earth Systems will not be responsible for project safety.

2. Open excavations may be cut vertically to a maximum depth of no more than four feet. Excavations extending between 4 and 20 feet deep should be shored or sloped back from the base of the excavation to at least a 1.5:1 (horizontal to vertical) slope or flatter. If excavations dry out, sloughing will occur.

3. During the time excavations are open, no heavy grading equipment or other surcharge loads (i.e. excavation spoils) should be allowed within a horizontal distance from the top of any slope equal to the depth of the excavation (both distances measured from the top of the excavation slope).

4. Adequate measures should be taken to protect any structural foundations, pavements, or utilities adjacent to any excavations.

C. Utility Trenches

There is a potential for construction problems involving caving of relatively deep site excavations. The surface of utility trench backfill frequently settles even when backfill is placed under optimum conditions. Structural units or pavement placed over such backfill should be designed to accommodate such movements. **Jetting of utility trench backfill is not recommended.**

1. Backfill of utilities within right-of-ways should be placed in strict conformance with the requirements of the governing agency. However, as a minimum it is recommended that utility trench backfill should be moisture conditioned to at least optimum moisture content and be uniformly compacted to at least 90% of maximum dry density using mechanical compaction equipment. Any aggregate base material used for backfill should be moisture conditioned to at least optimum moisture content and uniformly compacted to at least 95% of maximum dry density using mechanical compaction equipment. To aid in the compaction operation, utility trench backfill should be placed in maximum six-inch compacted lifts. **Compaction should be verified by testing**.

2. The provisions of this report relative to minimum compaction standards should govern utility trench backfill within the project boundary. In general, service lines extending inside the site should be backfilled with native soils that have been moisture conditioned to at least optimum moisture content and uniformly compacted to at least 90% of maximum dry density using mechanical compaction equipment. Any aggregate base material used for backfill should be moisture conditioned and uniformly compacted to at least 95% of maximum dry density using mechanical compaction equipment. To aid in the compaction operation, utility trench backfill should be placed in maximum six-inch compacted lifts. **Compaction should be verified by testing.**

3. Backfill operations should be reviewed and tested by the geotechnical engineer's representative to verify conformance with these recommendations.

D. Foundations

1. It is recommended that any building or structure constructed on this site be designed to at least the minimum standards for Seismic Zone 4 as designated by the latest edition of the governing Building Code. The following Table is a summary of the estimated seismic parameters typically required for structural design per the 2013 California Building Code (CBC).

TABLE III
Summary of Seismic Parameters – 2013 CBC

Latitude	34.7416°
Longitude	117.9741°
Site Class (2013 CBC Table 1613.5.2)	D
Risk Category	I/II/III
Mapped Spectral Acceleration, Short Period* - S_S	1.276 g
Mapped Spectral Acceleration, at 1 second* - S_1	0.551 g
Spectral Response Acceleration, Short Period* - S_{DS}	0.851 g
Spectral Response Acceleration, at 1 second* - S_{D1}	0.551 g

**Based upon USGS Earthquake Ground Motion Parameters, Version 5.1.0– 2/2011*

2. Foundations for the proposed structures should be supported by compacted soils prepared as recommended in Section A. of this report.

3. Excavations for foundations should be cleaned of all loose or unsuitable soils and debris prior to placement of concrete. **Soil generated from the foundation excavations should not be placed below the floor slab unless properly moisture conditioned and compacted.**

4. Continuous (wall, strip or perimeter) foundations for the proposed project structures may be proportioned for the following values:

   a. Design Values: An allowable "net" bearing capacity of 2,000 p.s.f. can be utilized for dead and sustained live loads. This value includes a minimum safety factor of three, and may be increased by 1/3 for total loads, including seismic forces.

   b. Continuous foundations should be embedded a minimum of 12 inches below the lowest adjacent soil grade for single-story structures, 18 inches for two-story structures, and be a minimum of one foot in width. Actual depth, width, and reinforcement requirements for continuous foundations will be dependent on the Expansion Index of the bearing soils (Refer to Section G of Recommendations), applicable sections of the governing building code, and requirements of the structural engineer.

   c. The allowable bearing capacity for continuous foundations may be increased by 200 psf for each additional six inches of foundation depth and 200 psf for each additional one foot of foundation width. The allowable bearing capacity should not exceed 3,000 p.s.f. for continuous foundations to keep estimated settlements within allowable limits.

5. Isolated pad (column or pier) foundations for the proposed project structures may be proportioned for the following values:

   a. Design Values: An allowable "net" bearing capacity of 2,500 p.s.f. can be utilized for dead and sustained live loads. This value includes a minimum safety factor of three, and may be increased by 1/3 for total loads, including seismic forces.

   b. Isolated pad foundations should be embedded a minimum of 12 inches below the lowest adjacent soil grade for single-story structures, 18 inches for two-story structures, and be a minimum two feet in width. Actual depth, width, and reinforcement requirements for isolated pad foundations will be dependent on the Expansion Index of the bearing soils (Refer to Section G of Recommendations), applicable sections of the governing building code, and requirements of the structural engineer.

   c. The allowable bearing capacity for isolated pad foundations may be increased by 200 psf for each additional six inches of foundation depth and 200 psf for each additional one foot of foundation width. The allowable bearing capacity should not exceed 3,500 p.s.f. for continuous foundations to keep estimated settlements within allowable limits.

6. Friction acting along the foundation base may provide resistance to lateral loading. The coefficient of friction was estimated to be 0.35 for site soils recompacted to approximately 90% of maximum dry density as determined by ASTM D 1557 test methods, and may be used with dead loads. This value includes a reduction factor of 1/3.

7. Additional resistance to lateral loading may be provided by passive earth pressure acting against the sides of foundations or grade beams. This pressure was estimated to be 380 Z PSF, where Z = Depth (in feet) below the finished ground elevation. In passive pressure calculations, the upper one-foot of soil should be subtracted from the depth, Z, unless confined by pavement or slab. The resisting pressure provided is an ultimate value. An appropriate factor of safety should be used for design calculations (minimum of 1.5 recommended). Passive and frictional resistance can be combined without reduction.

8. The proposed solar arrays are anticipated to be supported by driven steel piles. Earth Systems has not been supplied information on the size or layout of the proposed piles. A minimum pile embedment depth of five feet (5) is required for any proposed driven pile foundation system for this project. The coefficient of friction between steel pile and soil was estimated to be 0.20. Assuming a minimum depth pile embedment of five feet (5'), an allowable downward skin friction value of

280 psf and an allowable uplift skin friction value of 190 psf may be used for design of a driven steel pile system.

9. It is anticipated that the project structural engineer will produce performance criteria for pile driving operations of the steel supports.

10. Earth Systems can provide field pile load testing to determine the ultimate uplift and lateral load capacity of the proposed piles or to verify design loads during construction. This testing can help minimize the required pile lengths resulting in substantial economic savings.

E. Slab-on-Grade Construction

1. Interior building concrete slab-on-grade construction should be supported by a minimum 36-inch uniform thickness of compacted soils prepared as recommended in Section A. 4. a. of this report (30 inches of excavated and recompacted soils and 6 inches of scarified and recompacted soils). Prior to placement of any slab reinforcement, moisture retarder, or sand material, all slab-on-grade subgrades (both interior and exterior) should be reviewed and tested for the required compaction and uniformity of conditions. **Compaction should be verified by testing.**

2. Exterior concrete slab-on-grade construction should be supported by at least 12 inches of compacted soils, uniform in thickness, prepared as recommended in Section A. 5. of this report (6 inches of excavated and recompacted soils and 6 inches of scarified and recompacted soils). Where slabs will extend over utility trench excavations, observation and testing of the trench backfill should be performed to confirm the compaction and uniformity of conditions of the utility trench excavation backfill. **Compaction should be verified by testing.**

3. In areas of moisture sensitive floor coverings, an appropriate vapor retarder should be installed in order to minimize vapor transmission from the subgrade soil to the slab. The vapor retarder should be evaluated for holes and/or punctures, and the edges overlapped and taped, prior to placement of concrete. Any holes or punctures observed should be properly repaired. The retarder should be covered with two inches of sand to help protect it during construction. The sand should be lightly moistened just prior to placing the concrete.

4. Reinforcement of slab-on-grade construction is contingent upon the structural engineer's recommendations and the Expansion Index of the supporting soils. Since the mixing of fill soils with native soils could change the Expansion Index, additional tests should be conducted during rough grading to determine the expansion characteristics of the new subgrade soils. It is recommended that all interior and exterior concrete slab-on-grade be reinforced with at least #3 bars on 18-inch

centers. **Reinforcement should be placed at mid-depth of the slab.** Additional reinforcement may be required once the final expansion potential of the subgrade soils is known. The structural engineer may also require additional slab-on-grade reinforcement.

5. It should be realized that as a field manufactured project, concrete will crack even under ideal conditions. It is Earth Systems' experience that concrete shrinkage is more pronounced in the Antelope Valley area due to environmental conditions (high winds, low humidity, and large daily temperature differentials). The use of high slump concrete for foundations and slabs on this project will increase the occurrence and magnitude of shrinkage cracks. It is recommended that the project developers consult with project concrete contractors and concrete suppliers to formulate appropriate mix designs, placement procedures, and concrete curing procedures in an attempt to reduce the occurrence and magnitude of concrete shrinkage cracking.

6. Cracks that develop in concrete slab-on-grade should be filled and sealed prior to placing floor coverings. Frequent control joints should be incorporated into the slab construction, particularly in the areas of re-entrant corners, to help control cracking.

7. Relatively impervious floor coverings (i.e. vinyl, linoleum, etc.) that cover concrete slab-on-grade may block the passage of moisture vapor through the slab, which could result in damage to the floor covering. It is suggested that after the concrete has sufficiently cured, the slab surface be sealed with a commercial sealant prior to placing the floor covering. The compatibility and recommendations for placing of the concrete sealer, mastic, and floor covering should be verified by the floor covering manufacturer prior to sealing the concrete or placing of the floor covering.

8. It is recommended that the proposed exterior perimeter slabs (sidewalks, patios, walkways, etc.) be designed to be relatively independent of foundation stems (free-floating) to help mitigate cracking due to foundation settlement and/or expansion. Frequent joint spacing should be incorporated into concrete slab-on-grade construction, particularly in the areas of re-entrant corners, to help control cracking.

9. Subgrade soils for all concrete slab-on-grade construction should be moisture conditioned to at least optimum moisture content to a depth of at least six inches below the lowest adjacent soil grade within 24-hours prior to placement of concrete. Measures should be taken to maintain optimum moisture until concrete is placed. Actual depths of pre-moistening will be dependent upon the actual Expansion Index of the subgrade soils.

F. Lateral Earth Pressures

1. Based upon analyses, the following lateral earth pressures may be used in the design of any proposed retaining walls or similar structures:

	Driving Earth Pressure*	Resisting Earth Pressure*
Well drained level soil	38	400***
Well drained 2:1 backfill soil	55	
At-rest (restrained wall)	58**	

*Equivalent fluid pressure (PSF) per foot of soil height.

**For purposes of design, a wall is considered restrained if it is prevented from movement greater than 0.002H (H = height of wall in feet) at the top of the wall.

***The upper one-foot of soil should be subtracted from the depth, Z, unless confined by pavement or slab.

NOTE: The pressures recommended above were based on the assumption that the on site soils will be compacted to approximately 90% of maximum dry density. The use of select granular fill may reduce the recommended driving earth pressure. The resisting pressure provided is an ultimate value. An appropriate factor of safety should be used for design calculations (minimum of 1.5 recommended). Frictional and passive resistance may be combined without reduction.

2. Friction acting along the foundation base may provide resistance to lateral loading. The coefficient of friction was estimated to be 0.40 for site soils recompacted to approximately 90% of maximum dry density as determined by ASTM D 1557 test procedures, and may be used with dead loads. This value includes a reduction factor of one-third. Frictional and passive resistance may be combined without reduction.

3. The lateral earth pressure to be resisted by retaining walls should be increased to allow for surcharge loads. The surcharge considered should include the loads from any structures or vehicle traffic within a distance approximately equal to the height of the retaining wall.

4. Backfill immediately behind any retaining structure should be a free-draining granular material. Comments on the characteristics of import soils will be given by the geotechnical consultant after the material is on the project, either in place, or stockpiled in adequate quantities to complete the project.

5. Backfill behind retaining walls should be with soils that have been properly moisture conditioned to at least optimum moisture content and uniformly compacted to at least 90% of maximum dry density as determined by ASTM D 1557 test procedures using mechanical compaction equipment. **Compaction should be verified by testing.** To aid in the compaction operation, retaining wall backfill should be placed in maximum six-inch compacted lifts.

6. Compaction within the area of a 1:1 slope from the bottom of wall excavations should be performed by hand operated compaction equipment. This is intended to reduce potential "locked-in" lateral pressures caused by compaction with heavy grading equipment.

7. Weepholes, backdrains, or an equivalent system of backfill drainage should be incorporated into the retaining wall design (see Plate C-I, Appendix C, for backdrain details). Waterproofing of retaining walls should be provided to help reduce the potential for efflorescent formation.

8. The final grade should be such that all water is diverted away from the retaining wall's foundation or backfill.

G. Expansive Soil

The Expansion Index (ASTM D 4829) of the subgrade soils should be considered when designing foundations. As stated in the Soil Conditions section, the preliminary Expansion Index determination of the on-site soils is in the "very low" (0-20) classification. The foundation and slab-on-grade design recommendations provided in Sections D and E of this report include generally used guidelines in the Antelope Valley area for foundation design for soils with the indicated degree of expansiveness. These recommendations are minimum and comply with normally accepted geotechnical engineering practices. **However, actual foundation and slab-on-grade construction reinforcement should be determined by the structural engineer based upon site specific conditions such as foundation loading and engineering characteristics of the subgrade soils.**

If the site soils are thoroughly mixed and/or additional fill is added during site preparation, the expansion potential may change. The expansion potential of the new subgrade soils should be determined after the site preparation has been completed, and the final foundation design adjusted accordingly.

H. Preliminary Pavement Sections

One "R"-Value test was conducted for this report. During site grading, additional sample(s) should be secured from the exposed pavement subgrade areas, tested, and evaluated for review or revision of the following preliminary pavement sections. Based upon the "R"-Value test results (design "R"-Value = 10), the following sections may be used for developing preliminary earth quantities and paving cost estimates. Pavement sections should be verified with the jurisdictional authority prior to the time of construction.

Asphalt Concrete Pavement Sections

Traffic Index 4.0 (Automobile and Light Truck Parking)

3.5" Asphalt Concrete on
4.5" Crushed Aggregate Base or equivalent

Traffic Index 5.0 (Automobile and Light Truck Drive Lanes)

3.5" Asphalt Concrete on
8.0" Crushed Aggregate Base or equivalent

Traffic Index 8.0 (East Avenue F and 90th Street East)

5.0" Asphalt Concrete on
16.0" Crushed Aggregate Base or equivalent

Unpaved Project Access or Perimeter Roads (Fire Truck Access Lanes)

10.0" Crushed Aggregate Base or equivalent on
12.0" Compacted Subgrade Soils

Asphalt concrete pavement section recommendations are based on the assumption that the pavement section is placed on a minimum 12-inch thick layer of subgrade compacted as recommended in Section A. 5. of the Recommendations of this report. Aggregate base material should be properly moisture conditioned and compacted to at least 95% of the maximum dry density as determined by ASTM D 1557 test procedures using mechanical compaction equipment. **Compaction should be verified by testing.**

Portland Cement Concrete Pavement Sections

1. It is recommended that no less than an eight-inch (8") thick Portland Cement Concrete (P.C.C) section should be considered for design of the proposed traffic bearing pavement sections for this project (Portland Cement Association - Pacific

Southwest Region, "Portland Cement Concrete Pavement Design For Light, Medium & Heavy Traffic", Third Printing, 1981). The concrete should have a minimum 28-day Modulus of Rupture of 500 psi (approximately 3,000 psi compressive strength). It is recommended that air entrainment of the concrete be provided.

2. The use of distributed steel in the pavement section is not required by the above structural pavement design, however, steel reinforcement, a minimum of #4 bars on 24-inch centers, is recommended to help control the effects of shrinkage and temperature cracking. **Reinforcement should be placed at mid-depth of the slab.** Steel reinforcement should not be carried across longitudinal or transverse joints.

3. Transverse contraction joints should be spaced no further than 12 feet apart. Transverse joints should be cut to a depth of 1/4 of the thickness of the concrete slab plus ¼-inch by sawing or impressed plastic ribbons.

4. Longitudinal joints should be spaced no further than 12 feet apart. Longitudinal joints should be constructed full depth, or by weakening the concrete to a depth described above with a concrete saw or an impressed plastic ribbon.

5. All Portland Cement Concrete pavement sections should be placed on a minimum 12-inch thick subgrade compacted to at least 95% of maximum dry density as determined by ASTM D 1557 test procedures as recommended in Section A 5 of the Recommendations of this report. **Compaction should be verified by testing.**

I. Soil Chemical Testing

1. The results of soil chemistry tests performed on a sample of the near surface soils are included in Appendix B of this report. This information should be utilized by the design engineers for their interpretation pertaining to the reactivity of various construction materials (such as concrete and piping) with the soils.

2. It is recommended that Type II Portland Cement be used in the concrete for the proposed foundations, slab-on-grade, and drainage structures of this project.

3. Tests should be conducted during grading operations to verify the soil chemistry of the subgrade soils, especially if the soils are thoroughly mixed and additional fill is added during site preparation.

J. Soil Thermal Resistivity Testing

1. The results of a thermal resistivity test performed on an in-situ sample of the site soils (Boring #3 @ 2 feet) are also included in Appendix B of this report. This information should be utilized by the design electrical engineers for their interpretation of the thermal interaction of the site soils and electrical conduits, and the need from any special electrical trench bedding requirements.

2. Tests should be conducted during grading operations to verify the soil thermal resistivity of the backfill soils, especially if the soils are thoroughly mixed and additional fill is added during site preparation.

K. Slope Stability

Slope stability calculations were not performed because of anticipated minimal slope heights. If slope heights exceed five feet, engineering calculations should be performed to substantiate the stability of cut or fill slopes. Fill slopes should be constructed to a gradient not exceeding 2 horizontal to 1 vertical and should be overfilled and trimmed back to compacted material.

CLIENT OPTIONAL SERVICES

This report was based on the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to check conformance with the recommendations of this report. Maintaining Earth Systems as the geotechnical engineering consultant from beginning to end of this project will help provide continuity of services. The recommended services include, but are not necessarily limited to, the following:

a. Consultation as required during the final design stages of the project.

b. Review of grading and/or building plans.

c. Observation and testing during site preparation, grading, placement of engineered fill, and backfill of utility trenches.

d. Solar array test pile driving and pile load tests.

e. Consultation as required during construction.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The conclusions and recommendations submitted in this report relative to the proposed development are based, in part, upon the data obtained from eight (8) exploratory soil borings, site observations during the field exploration operations, and past experience. The nature and extent of variations between subsurface soil conditions may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

In the event of any change in the assumed nature or design of the proposed project as planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing. This report is issued with the understanding that it is the responsibility of Antelope Valley Solar, LLC, or of their representatives, to insure that the information and recommendations contained in this report are called to the attention of the architects and engineers for the project and incorporated into the plan. It is also the responsibility of Antelope Valley Solar, LLC, or of their representatives, to insure that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

As the geotechnical engineers for this project Earth Systems strives to provide our services in accordance with generally accepted geotechnical engineering practices in this community at this time. No warranty or guarantee is expressed or implied. This report was prepared for the exclusive use of Antelope Valley Solar, LLC, or of their authorized agents.

It is recommended that Earth Systems be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design specifications. If Earth Systems is not accorded the privilege of making this recommended review, Earth Systems can assume no responsibility for misinterpretation of the recommendations contained in this report.

The scope of Earth Systems' current services for this report did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around the site.

The statements contained in this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or the broadening of knowledge. Accordingly, the conclusions of this report may be invalidated, wholly or partially, by changes outside of Earth Systems' control, and should therefore be reviewed after one year.

CLOSURE

Earth Systems Southern California trusts this report is sufficient at this time and meets your current needs and appreciates this opportunity to provide professional geotechnical engineering services for this project. If you have any questions regarding the information contained in this report, or if you require additional geotechnical engineering services, please contact us.

Respectfully submitted,

Earth Systems
Southern California

Bruce A. Hick
Geotechnical Engineer
R. G. E. #2284

REGISTERED PROFESSIONAL ENGINEER
BRUCE A. HICK
No. GE2284
Exp. 12/31/14
GEOTECHNICAL
STATE OF CALIFORNIA

6/2/2014

APPENDIX A

Project Vicinity Map

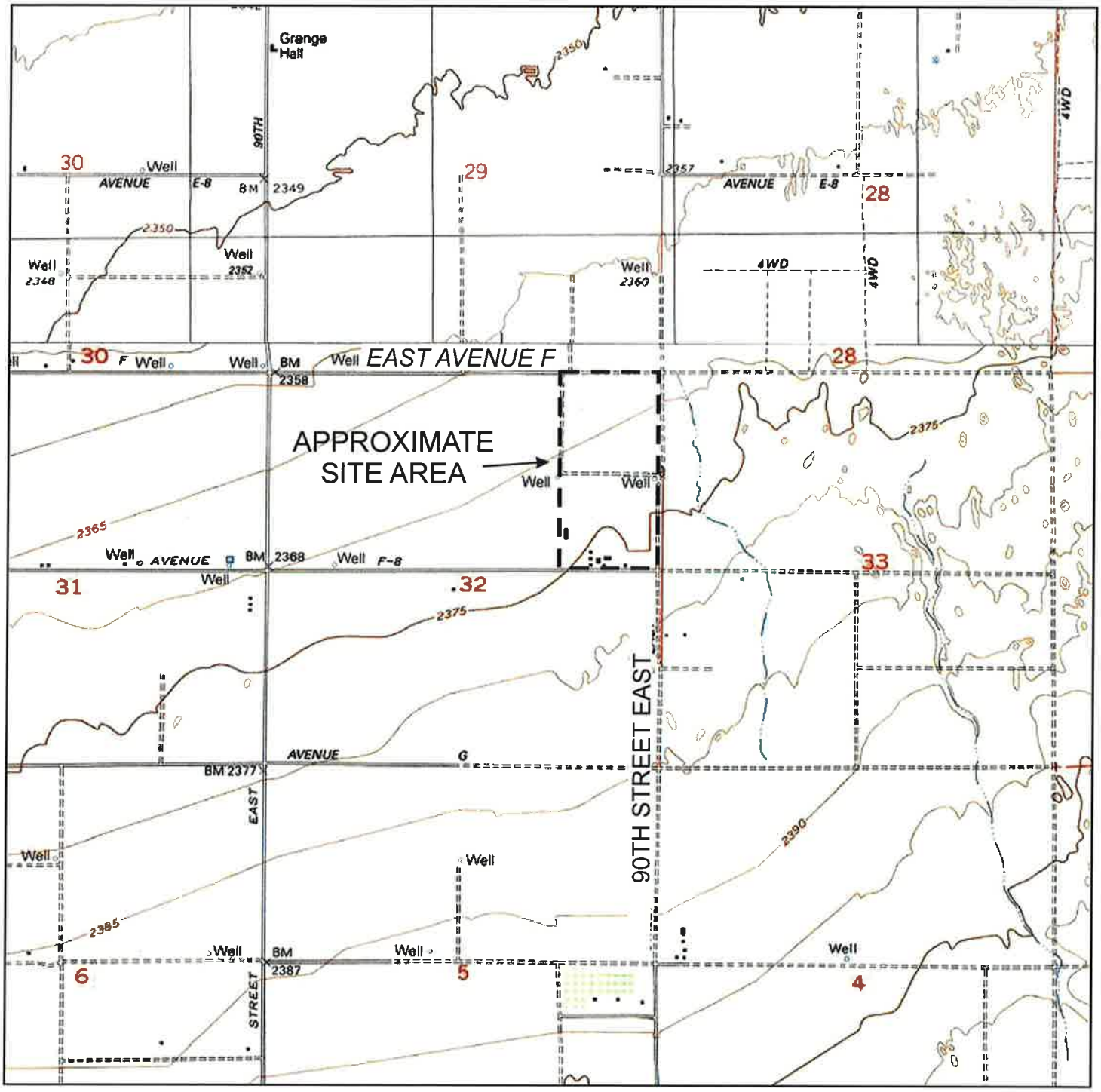
Boring Location Map

Unified Soil Classification System

Terms Describing Consistency or Condition

Symbols Commonly Used on Boring Logs

Boring Logs



BASE MAP: PORTIONS OF U.S.G.S. 7.5 MINUTE REDMAN, CA (1992), AND ALPINE BUTTE (1992) QUADRANGLES

N

1"=2,000'

PROJECT VICINITY MAP

PROPOSED SOLAR PV PROJECT
AVENUE F AND 90TH STREET EAST
LANCASTER, LOS ANGELES COUNTY, CALIFORNIA

Earth Systems
Southern California

5-30-2014	PL-07647-02

NOTES:

THIS IS A CONCEPTUAL LAYOUT AND DESIGN AND NOT RELEASED FOR CONSTRUCTION.

THIS PLOT IS BASED ON PUBLICLY AVAILABLE ASSESSOR'S PARCEL MAP INFORMATION AND PROPORTIONAL DIMENSIONS DERIVED THEREFROM. THIS PLOT IS NOT BASED UPON A SURVEY.

LEGAL DESCRIPTION

PARCEL 1: (APN: 3307-016-012)

THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 31, TOWNSHIP 8 NORTH, RANGE 10 WEST, S.B.B.M., COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND, APPROVED BY THE SURVEYOR GENERAL ON JUNE 19, 1856.

PARCEL 2: (APN: 3307-016-013)

THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 31, TOWNSHIP 8 NORTH, RANGE 10 WEST, S.B.B.M., COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND, APPROVED BY THE SURVEYOR GENERAL ON JUNE 19, 1856.

ASSESSOR'S PARCEL NUMBERS

APNs: 3307-016-012, 3307-016-013

ZONING

HEAVY AGRICULTURE (A-2-1)

LAND USE

EXISTING-VACANT LAND
PROPOSED-PHOTOVOLTAIC ENERGY PROJECT

AREA:

GROSS AREA: 76.54 ACRES
NET AREA: 74.75 ACRES

EASEMENT NOTES (ALL TO REMAIN):

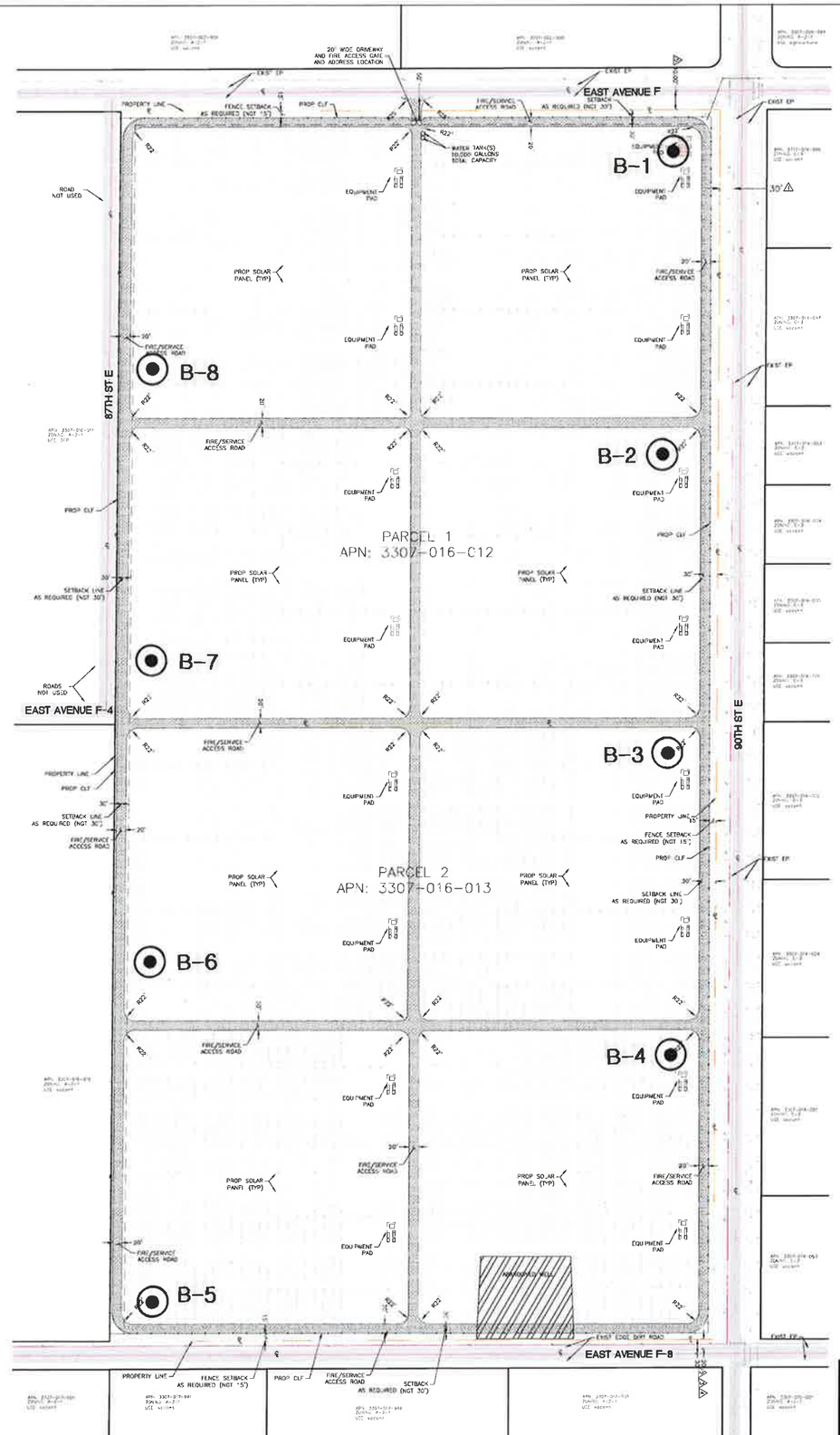
1. AN EASEMENT FOR ROAD PURPOSES RECORDED IN DEED BOOK 6604, PAGE 343. (EASTERLY 30 FEET)
2. AN EASEMENT FOR PUBLIC ROAD PURPOSES RECORDED IN DEED BOOK 7218, PAGE 345. (SOUTH 20 FEET)
3. AN EASEMENT FOR ROAD AND HIGHWAY PURPOSES RECORDED IN OFFICIAL RECORDS, BOOK 6711, PAGE 4. (SOUTH 20 FEET)
4. AN EASEMENT FOR ROAD AND HIGHWAY PURPOSES DISCLOSED BY BOARD OF SUPERVISORS OF LOS ANGELES COUNTY, BY ORDER ENTERED DECEMBER 18, 1932, IN MINUTE BOOK 184, PAGE 360 OF OFFICIAL RECORDS. (SOUTH 30 FEET)
5. AN EASEMENT FOR PUBLIC ROAD AND HIGHWAY PURPOSES RECORDED IN BOOK 40385, PAGE 412 OFFICIAL RECORDS, ON NOVEMBER 25, 1952. (NORTH 40 FEET)

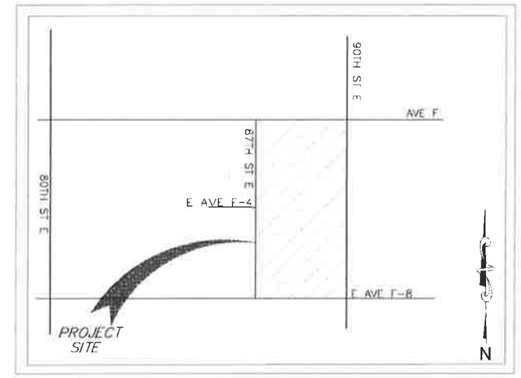
LEGEND

- PROPOSED ONSITE FIRE/SERVICE ACCESS ROADS
- EXISTING AC PAVEMENT
- PROPOSED CONCRETE PAD
- PROPOSED CHAINLINK FENCE
- EXISTING PROPERTY LINE
- EXISTING OVERHEAD POWERLINE
- EXISTING POWER POLE
- PROPOSED WATER TANK
- CENTER LINE
- PROPERTY LINE

ABBREVATION

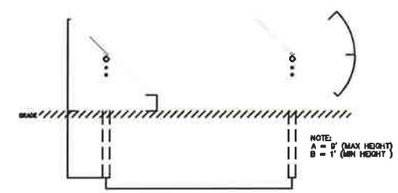
APN	ASSESSOR'S PARCEL NUMBER
PROP	PROPOSED
EXIST	EXISTING
CLF	CHAINLINK FENCE
OHE	OVERHEAD POWERLINE
NGT	NO GREATER THAN
PP	POWER POLE





VICINITY MAP

NOT TO SCALE



SOLAR ARRAY SIDE ELEVATION
VIEW LOOKING NORTH OR SOUTH
N.T.S.

LEGEND

B-8 ⊙ DENOTES NUMBER AND APPROXIMATE LOCATION OF EXPLORATORY BORING.

BORING LOCATION MAP

Proposed Solar PV Project
Avenue F and 90th Street East
Lancaster, Los Angeles County, California

Earth Systems Southern California

DATE: 5-30-2014	JOB NO: PL-07647-02

ANTELOPE VALLEY SOLAR, LLC
1633 9TH ST, SUITE D
SANTA MONICA, CA 90403
PHONE: (310) 828-5715
DRAWING NAME: 8760
DRAWING NAME: E_VAS_PVSYC_001
REV: 2010 8/18/2010/13

Antelope Valley Solar

REVISION BLOCK

REV	APP	DATE	REVISION DESCRIPTION
A			

SITE PLAN

ANTELOPE VALLEY SOLAR, LLC
7.45 MW SOLAR PV ELECTRIC FACILITY
LOS ANGELES COUNTY, CA
SEC. 31, T.8N., R.10W., COUNTY OF LOS ANGELES

SHEET 1 OF 1

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNTOF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

UNIFIED SOIL CLASSIFICATION SYSTEM

Proposed Solar Farm
Lancaster, California

Earth Systems
Southern California

5/30/14	PL-07647-02

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS

(Major Portion Retained on Number 200 Sieve)

Includes clean gravels and sands described as fine, medium or coarse, depending on distribution of grain sizes, and silty or clayey gravels and sands, condition is rated according to laboratory tests or estimated from resistance to sampler penetration.

Penetration Resistance* California Split Spoon (CSS) Blows/Ft		Penetration Resistance* Standard Pentrometer (SPT) Blows/Ft
0-5	Very Loose	0-4
5-15	Loose	5-10
15-40	Medium Dense	11-30
40-70	Dense	31-50
>70	Very Dense	>50

Fine Grained Soils

(Major Portion Passing the Number 200 Sieve)

Includes inorganic and organic silts and clays, gravelly, sandy or silty clays, and clayey silts. Consistency is rated according to laboratory tests or estimated from resistance to sampler penetration.

Penetration Resistance* California Split Spoon (CSS) Blows/Ft		Penetration Resistance* Standard Pentrometer (SPT) Blows/Ft
0-2	Very Soft	0-2
2-5	Soft	2-4
6-10	Medium Stiff	5-8
11-18	Stiff	9-15
19-36	Very Stiff	16-30
>36	Hard	>30

* Penetration resistance based on a 140 pound hammer falling approximately 30 inches.

Apparent Density/Consistency of Soil

Proposed Solar Farm

Lancaster, California

Earth Systems Southern California

5/30/14	PL-07647-02

SYMBOLS COMMONLY USED ON BORING LOGS

Modified California Split Barrel Sampler

Modified California Split Barrel Sampler - No Recovery

Standard Penetration Test (SPT) Sampler

Standard Penetration Test (SPT) Sampler - No Recovery

Perched Water Level

Water Level First Encountered

Water Level After Drilling

Pocket Penetrometer (tsf)

Vane Shear (ksf)

1. The location of borings were approximately determined by pacing and/or siting from visible features. Elevations of borings are approximately determined by interpolating between plan contours. The location and elevation of the borings should be considered

2. The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. This data has been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tides, temperature, and other factors at the time measurements were made.

BORING LOG SYMBOLS	
Proposed Solar Farm Lancaster, California	
Earth Systems Southern California	
5/30/2014	PL-07647-02

Earth Systems
Southern California

1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-1
Project Name: Solar Farm
Project Number: PL-07647-02
Boring Location: Per Plan

Drilling Date: 3-26-14
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobil B-61
Logged By: Robert Ferguson

DESCRIPTION OF UNITS

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0	Bulk	6, 14		SC	102.0	2.7	ALLUVIUM Light Brown Clayey Fine Sand, Dry, Medium Dense.
	Bulk	26, 34		SC	109.9	4.6	ALLUVIUM Light Brown Clayey Fine Sand with Silt, Calcic Stringers, Slightly Moist, Dense.
5		13, 18		SM	108.3	15.0	ALLUVIUM Light Brown Silty Fine Sand with Clay, Calcic Stringers, Moist, Medium Dense.
		17, 20		SC	110.7	4.8	ALLUVIUM Light Brown Clayey Fine Sand with Silt, Calcic Pods, Slightly Moist, Medium Dense.
10		7, 13		SP	98.8	1.2	ALLUVIUM Light Brown Slightly Silty Fine Sand, Dry, Medium Dense.
15		7, 20		SM	112.7	2.4	ALLUVIUM Light Brown, Mottled Coloration, Silty Fine Sand, Slightly Moist, Medium Dense.
20		10, 18		CL	114.6	15.9	ALLUVIUM Light Olive Brown Fine Sandy Clay with Silt, Moist, Very Stiff.
25				SM			ALLUVIUM Light Brown Silty Fine Sand with Slight Clay, Moist, Medium Dense.
30		7, 13			116.1	7.7	
35				SM			ALLUVIUM Light Brown Silty Fine to Medium Sand, Moist, Medium Dense.
40		18, 18			117.9	5.9	
45				SM			ALLUVIUM Brown Silty Fine Sand with Clay, Abundant Hard Calcic Nodules to 1/2", Moist, Medium Dense.
50		17, 21			114.6	10.1	
55							Total depth = 51'. No free groundwater was encountered at time of drilling. No Bedrock Encountered Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California

1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-2	Drilling Date: 3-26-14
Project Name: Solar Farm	Drilling Method: 8" Hollow Stem Auger
Project Number: PL-07647-02	Drill Type: Mobil B-61
Boring Location: Per Plan	Logged By: Robert Ferguson

Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0						SM			ALLUVIUM Light Brown Silty Fine Sand, Slightly Moist, Medium Dense.
			■	12, 23			109.5	3.9	
						SM			ALLUVIUM Light Brown Silty Fine Sand, Slightly Moist, Medium Dense.
5			■	16, 21			108.5	3.2	
						CL			ALLUVIUM Light Brown Silty Clay, Calcic Nodules and Stringers, Slightly Moist, Hard.
			■	21, 37			117.1	6.2	
						SC			ALLUVIUM Light Brown Slightly Clayey Fine Sand with Silt, Moist, Medium Dense.
10			■	18, 19			107.6	13.2	
						SM			ALLUVIUM Light Brown Light Brown Silty Fine Sand, Moist, Medium Dense.
15			■	15, 22			112.2	5.7	
20									Total depth = 16'. No free groundwater was encountered at time of drilling. No bedrock encountered. Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California

1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-3
Project Name: Solar Farm
Project Number: PL-07647-02
Boring Location: Per Plan

Drilling Date: 3-26-14
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobil B-61
Logged By: Robert Ferguson

DESCRIPTION OF UNITS

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0	Bulk			CL			ALLUVIUM Pale Brown Fine Sandy Clay with Silt, Slightly Moist, Hard.
	MOD Calif.	15, 24					
5				SM			ALLUVIUM Light Brown Silty Fine Sand with Slight Clay, Slightly Moist, Dense.
	MOD Calif.	23, 37			110.9	3.5	
				CL			ALLUVIUM Light Brown Silty Clay with Fine Sand, Hard Calcic Nodules to 1/2", Slightly Moist, Hard.
	MOD Calif.	20, 38			114.7	5.5	
				SM			ALLUVIUM Light Brown Mottled Coloration, Very Silty Fine Sand, Slightly Moist, Dense.
10	MOD Calif.	16, 29			107.5	4.8	
				SP			ALLUVIUM Light Brown Slightly Silty Fine Sand, Dry, Medium Dense.
15	MOD Calif.	7, 18			101.5	0.5	
20							Total depth = 16'. No free groundwater was encountered at time of drilling. No bedrock encountered. Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California
1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-4
Project Name: Solar Farm
Project Number: PL-07647-02
Boring Location: Per Plan

Drilling Date: 3-26-14
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobil B-61
Logged By: Robert Ferguson

DESCRIPTION OF UNITS

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0	MOD Calif.	13, 20		CL	91.4	7.1	ALLUVIUM Pale Brown Silty Clay with Fine Sand, Slightly Moist, Very Stiff.
5	MOD Calif.	22, 36		CL	92.8	9.8	ALLUVIUM Pale Brown Silty Clay with Fine Sand, Slightly Moist, Very Stiff.
	MOD Calif.	15, 23		ML	102.2	1.5	ALLUVIUM Light Brown Fine Sandy Silt, with Hard Calcic Nodules to 3/4", Dry, Hard.
10	MOD Calif.	13, 19		SM	109.0	3.8	ALLUVIUM Light Brown Very Silty Fine Sand, Calcic Stringers, Slightly Moist, Medium Dense.
15	MOD Calif.	10, 19		SP	107.4	0.7	ALLUVIUM Light Brown Slightly Silty Fine Sand, Dry, Medium Dense.
20							Total depth = 16'.

No free groundwater was encountered at time of drilling.

No bedrock encountered.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California

1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-5	Drilling Date: 3-26-14
Project Name: Solar Farm	Drilling Method: 8" Hollow Stem Auger
Project Number: PL-07647-02	Drill Type: Mobil B-61
Boring Location: Per Plan	Logged By: Robert Ferguson

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0						CL			ALLUVIUM Pale Brown Silty Clay with Fine Sand, Slightly Moist, Very Stiff.
				12, 20			80.4	7.7	
				20, 35		SC	108.1	5.1	ALLUVIUM Pale Brown Clayey Fine Sand with Silt, Hard Calcic Nodules to 3/8", Slightly Moist, Dense.
5									
				31, 36		SM	111.7	3.5	ALLUVIUM Pale Brown Silty Fine Sand with Clay, Hard Calcic Nodules to 1/2", Slightly Moist, Dense.
						SP			ALLUVIUM Light Brown Slightly Silty Fine Sand, Dry, Medium Dense.
10				10, 13			100.1	0.9	
						SM			ALLUVIUM Brown Mottled Color, Silty Fine Sand, Slightly Moist, Medium Dense.
15				10, 10			117.6	3.0	
						ML			ALLUVIUM Brown Clayey Silt with Fine Sand, Moist, Very Stiff.
20				9, 13			112.6	14.9	
25									Total depth = 21'. No free groundwater was encountered at time of drilling. No bedrock encountered. Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California

1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-6	Drilling Date: 3-26-14
Project Name: Solar Farm	Drilling Method: 8" Hollow Stem Auger
Project Number: PL-07647-02	Drill Type: Mobil B-61
Boring Location: Per Plan	Logged By: Robert Ferguson

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS (Page 1 of 1)
0	MOD Calif.	13, 17		SM	102.8	3.6	ALLUVIUM Light Brown Silty Fine Sand, Slightly Moist, Medium Dense.
5	MOD Calif.	22, 40		SM	116.9	3.4	ALLUVIUM Light Brown Silty Fine Sand, Hard Calcic Nodules to 3/4", Slightly Moist, Medium Dense.
	MOD Calif.	19, 26		ML	102.6	8.3	ALLUVIUM Light Brown Fine Sandy Silt, Moist, Hard.
10	MOD Calif.	18, 29		SM	122.2	5.5	ALLUVIUM Light Brown Mottled Color Very Silty Fine Sand, Slightly Moist, Dense.
15	MOD Calif.	9, 9		SC	100.1	23.5	ALLUVIUM Light Brown Fine Sandy Clay, Moist, Stiff.
20							Total depth = 16'. No free groundwater was encountered at time of drilling. No bedrock encountered. Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California

1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-7	Drilling Date: 3-26-14
Project Name: Solar Farm	Drilling Method: 8" Hollow Stem Auger
Project Number: PL-07647-02	Drill Type: Mobil B-61
Boring Location: Per Plan	Logged By: Robert Ferguson

Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0						SM			ALLUVIUM Light Brown Very Silty Fine Sand, Calcic Pods and Stringers, Dry, Dense.
			■	31, 29			101.8	2.5	
						SP			ALLUVIUM Light Brown Slightly Silty Fine Sand, Dry, Medium Dense.
5			■	9, 16			104.5	1.7	
						ML			ALLUVIUM Light Brown Fine Sandy Silt, Slightly Moist, Very Stiff.
			■	16, 19			111.1	5.9	
						CL			ALLUVIUM Brown Fine Sandy Clay with Silt, Hard Calcic Nodules to 3/8", Moist.
10			■	7, 13			112.0	14.7	
						ML			ALLUVIUM Brown Clayey Silt with Fine Sand, Moist, Stiff.
15			■	8, 10			104.0	16.3	
									Total depth = 16'.
									No free groundwater was encountered at time of drilling.
20									No bedrock encountered.
									Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California

1024 West Avenue M-4, Palmdale CA. 93551
(661) 948-7538/ (661) 948-7963 fax

Boring No: B-8
Project Name: Solar Farm
Project Number: PL-07647-02
Boring Location: Per Plan

Drilling Date: 3-26-14
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobil B-61
Logged By: Robert Ferguson

DESCRIPTION OF UNITS

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0	MOD Calif.	16, 20		SM	109.4	3.3	ALLUVIUM Pale Brown Silty Fine Sand, Calcic Pods and Stringers, Dry, Medium Dense.
5	MOD Calif.	112, 25		SM	100.2	2.4	ALLUVIUM Light Brown Silty Fine Sand, Dry, Medium Dense.
	MOD Calif.	16, 23		SM	116.6	8.0	ALLUVIUM Light Brown Silty Fine Sand with Slight Clay, Moist, Medium Dense.
10	MOD Calif.	7, 11		SP	****	0.6	ALLUVIUM Light Brown Slightly Silty Fine Sand, Dry, Medium Dense.
15	MOD Calif.	8, 12		SM	115.7	9.5	ALLUVIUM Brown Silty Fine Sand with Slight Clay, Moist, Medium Dense.
20							Total depth = 16'.

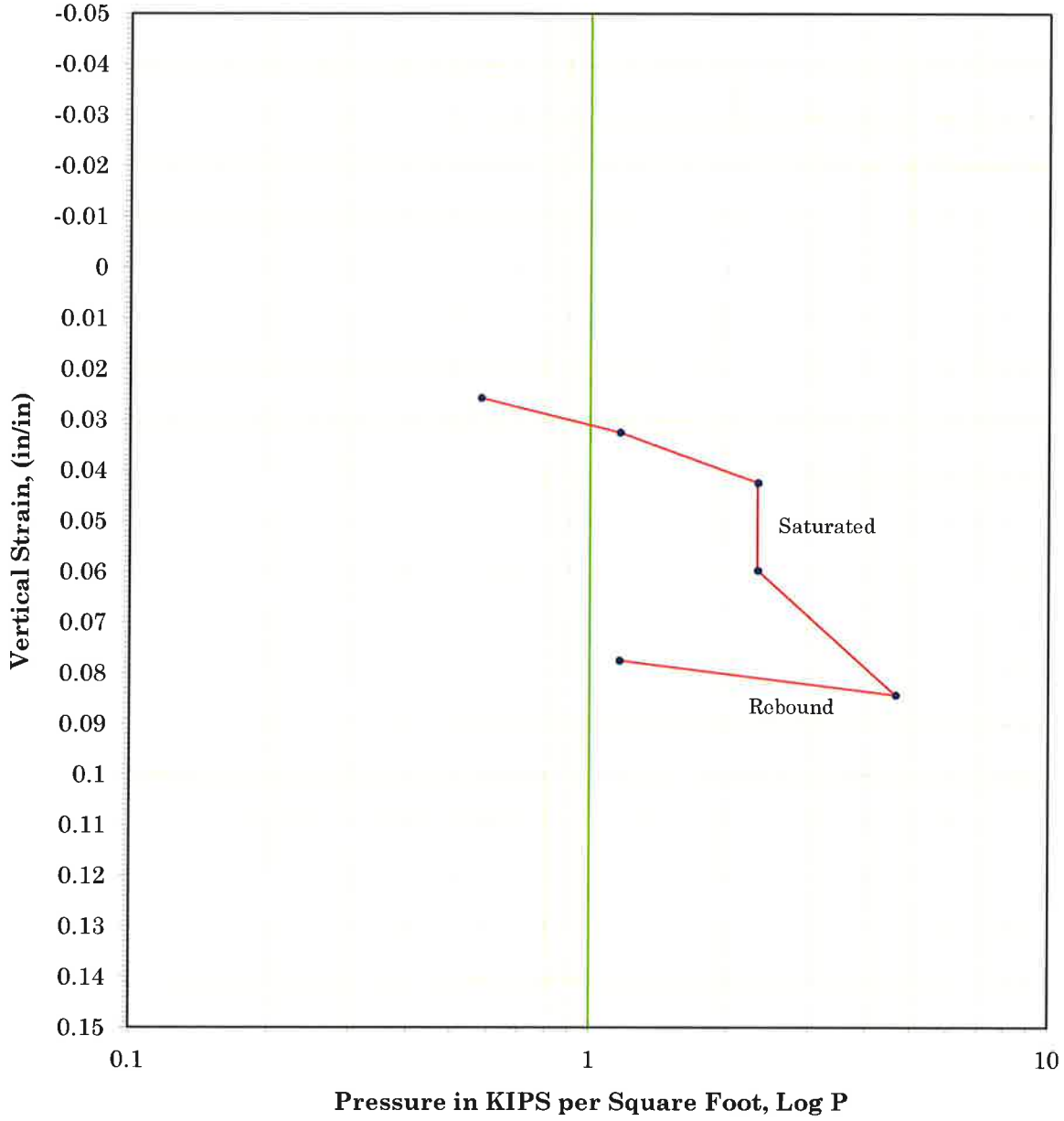
No free groundwater was encountered at time of drilling.

No bedrock encountered.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

APPENDIX B

Summary of Laboratory Test Results



Sample Location: Boring 6 @ 2 Feet

Material: Silty Fine to Coarse Sand (SM)

Initial Dry Density: 102.8 PCF

Moisture Content: 3.6%

Percent Hydroconsolidation: 1.7%

* Test Method: ASTM D-2435

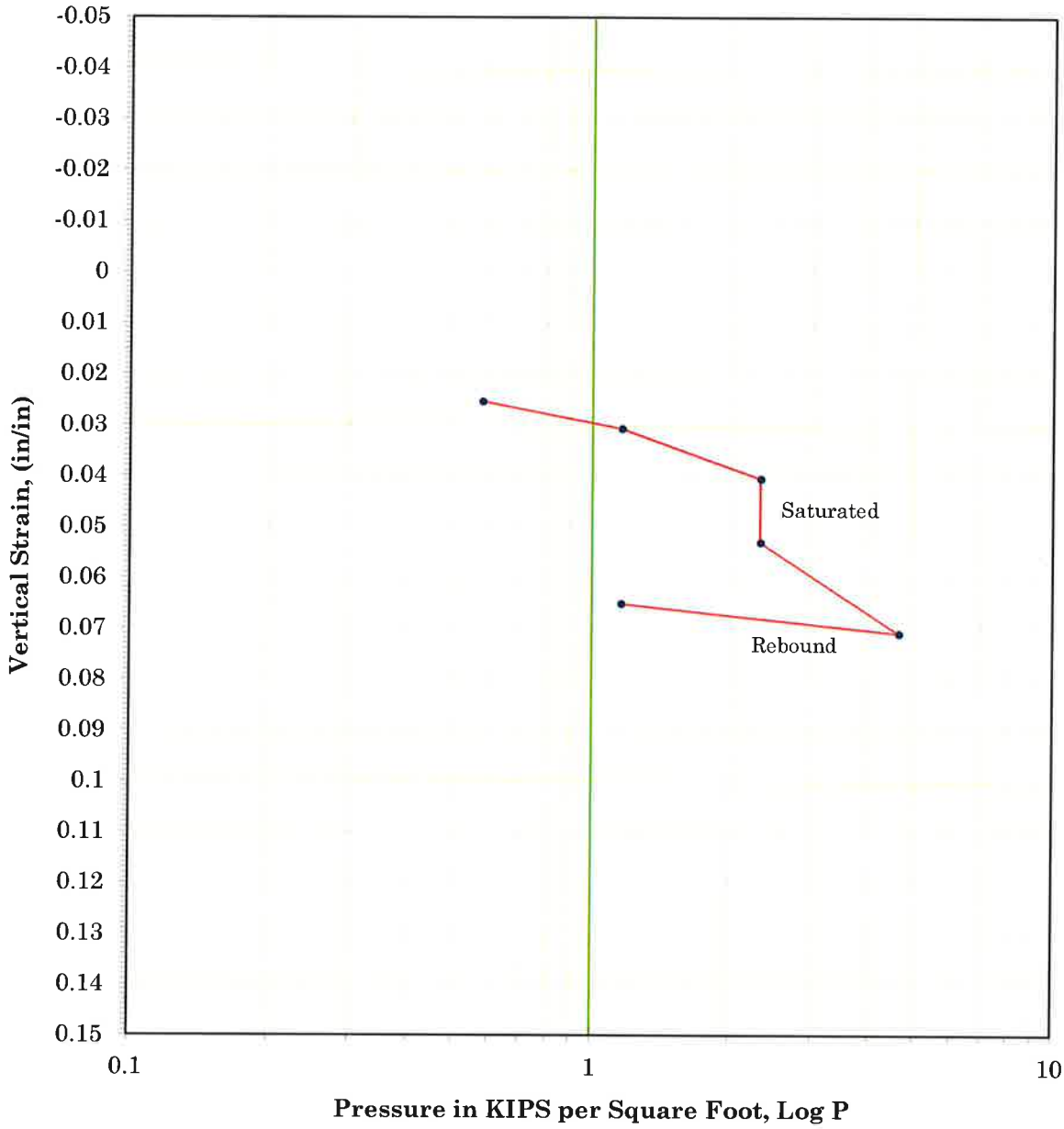
Consolidation Test

Propsoed Solar Farm

Lancaster, California

Earth Systems
Southern California

5/30/2014	PL-07647-02



Sample Location: Boring 4 @ 5 Feet

Material: Clayey Fine to Coarse Sand (SM)

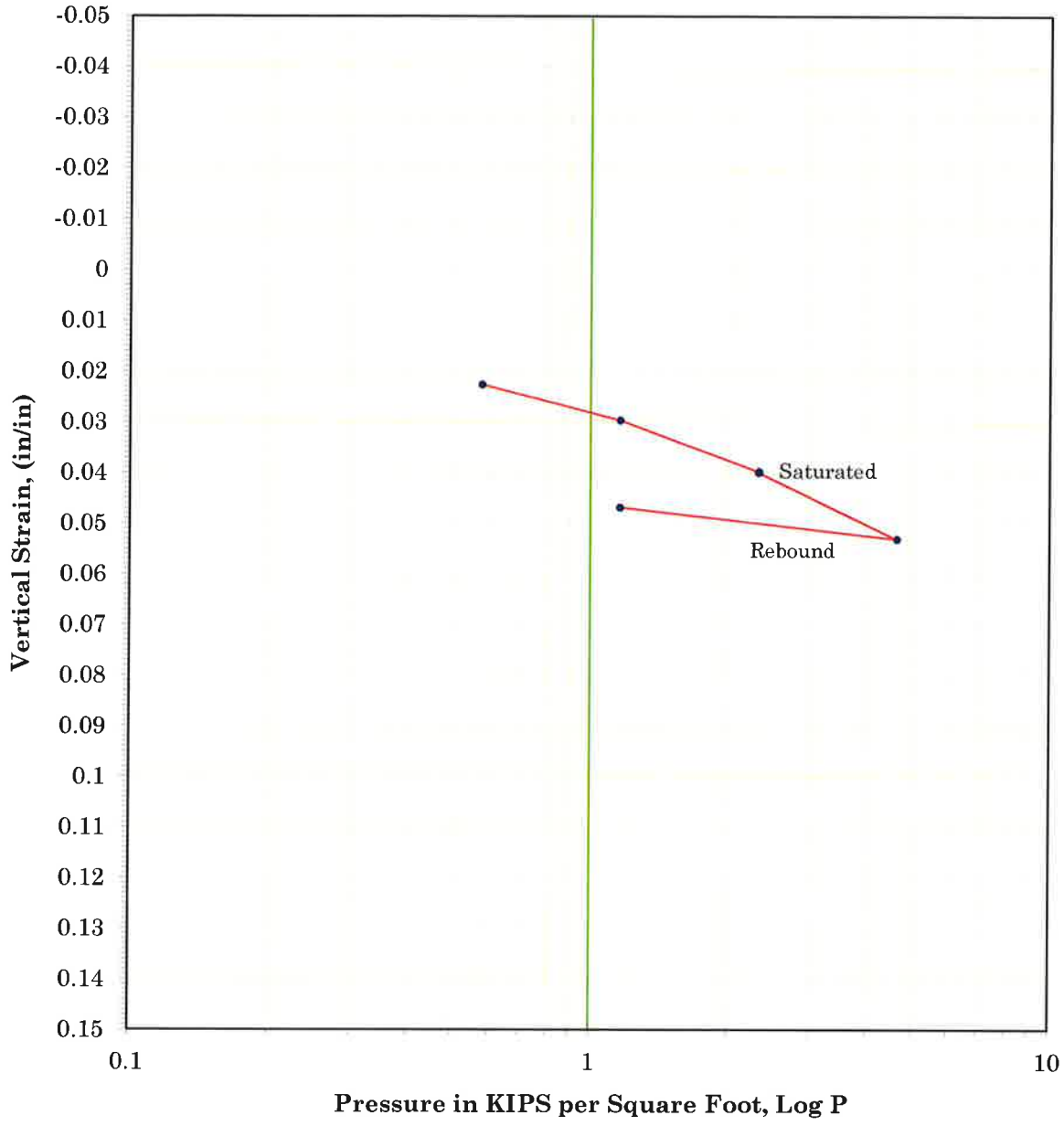
Initial Dry Density: 92.8 PCF

Moisture Content: 9.8%

Percent Hydroconsolidation: 1.3%

Consolidation Test	
Propsoed Solar Farm **Lancaster, California**	
Earth Systems Southern California	
5/30/2014	**PL-07647-02**

* Test Method: ASTM D-2435



Sample Location: Boring 8 @ 7.5 Feet

Material: Silty Fine to Coarse Sand (SM)

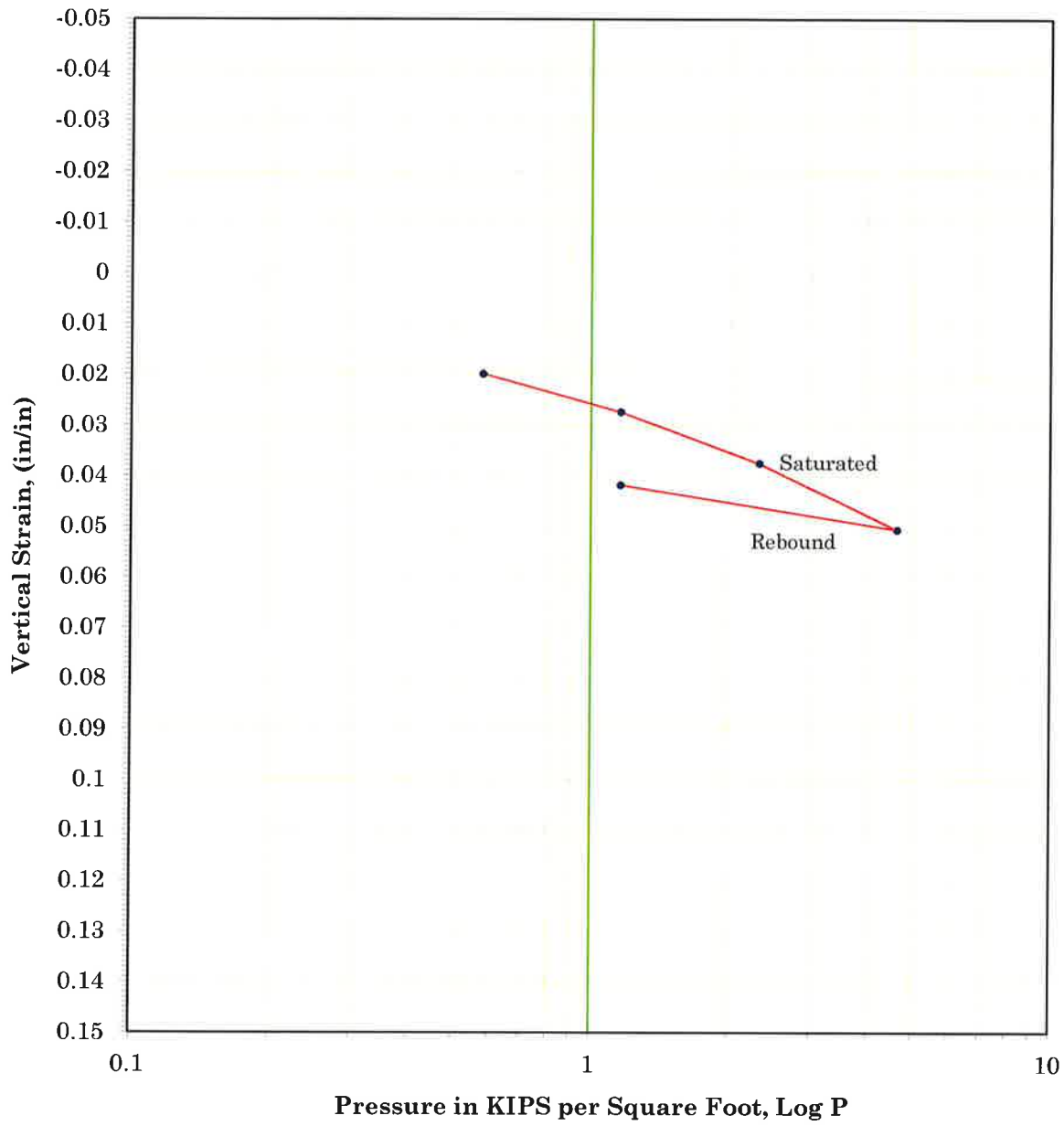
Initial Dry Density: 116.6 PCF

Moisture Content: 8.0%

Percent Hydroconsolidation: 0.0%

Consolidation Test	
Propsoed Solar Farm **Lancaster, California**	
Earth Systems Southern California	
5/30/2014	**PL-07647-02**

* Test Method: ASTM D-2435



Sample Location: Boring 2 @ 10 Feet

Material: Silty Fine to Medium Sand with Clay (SM)

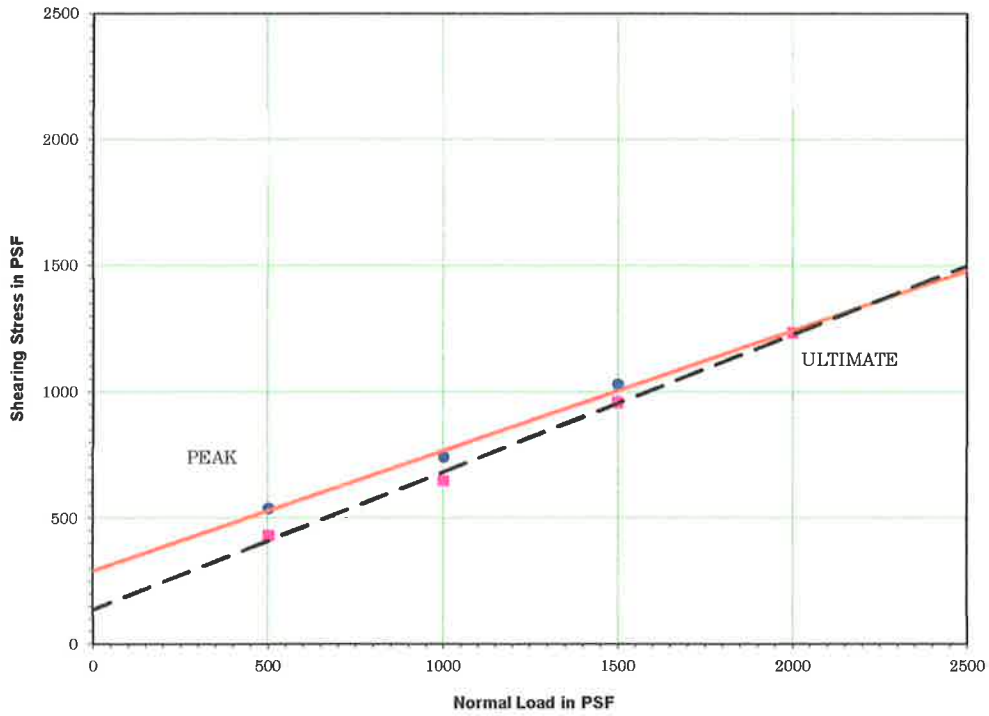
Initial Dry Density: 107.6 PCF

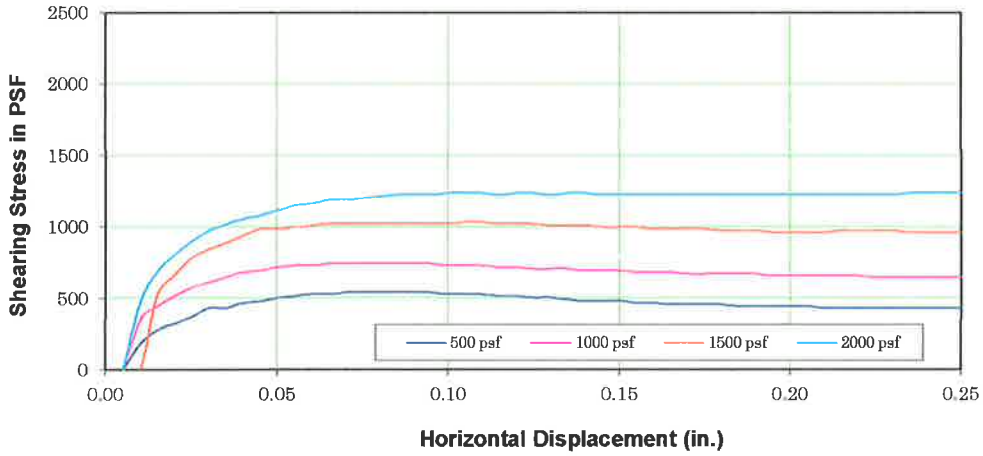
Moisture Content: 13.2%

Percent Hydroconsolidation: 0.0%

Consolidation Test	
Propsoed Solar Farm **Lancaster, California**	
Earth Systems Southern California	
5/30/2014	**PL-07647-02**

* Test Method: ASTM D-2435





DIRECT SHEAR DATA*

Sample Location: Boring B-3 @ 0-5'

Material: Clayey Fine to Coarse Sand with Silt

Dry Density (pcf): 107.1

Average Degree of Saturation: 94.9

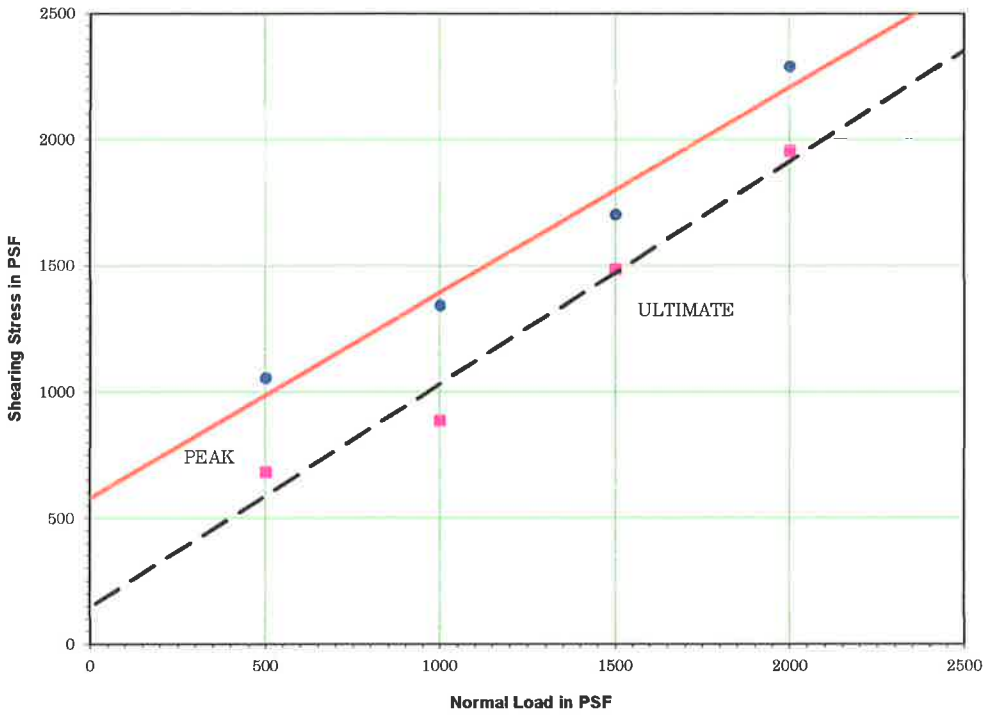
Shear Rate (in/min): 0.004

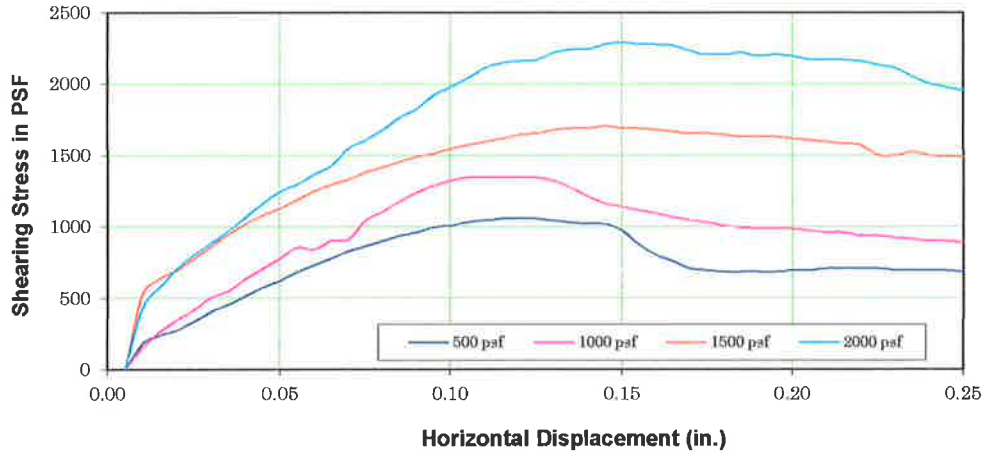
	Peak	Ultimate
ϕ Angle of Friction (degrees):	25	29
c Cohesive Strength (psf):	290	130

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

DIRECT SHEAR TEST	
Proposed Solar Farm Lancaster, California	
Earth Systems Southern California	
5/30/2014	PL-07747-02





DIRECT SHEAR DATA*

Sample Location: Boring B-1 @ 3'

Material: Clayey Fine to Coarse Sand with Silt (SC)

Dry Density (pcf): 109.9

Average Degree of Saturation: 93.4

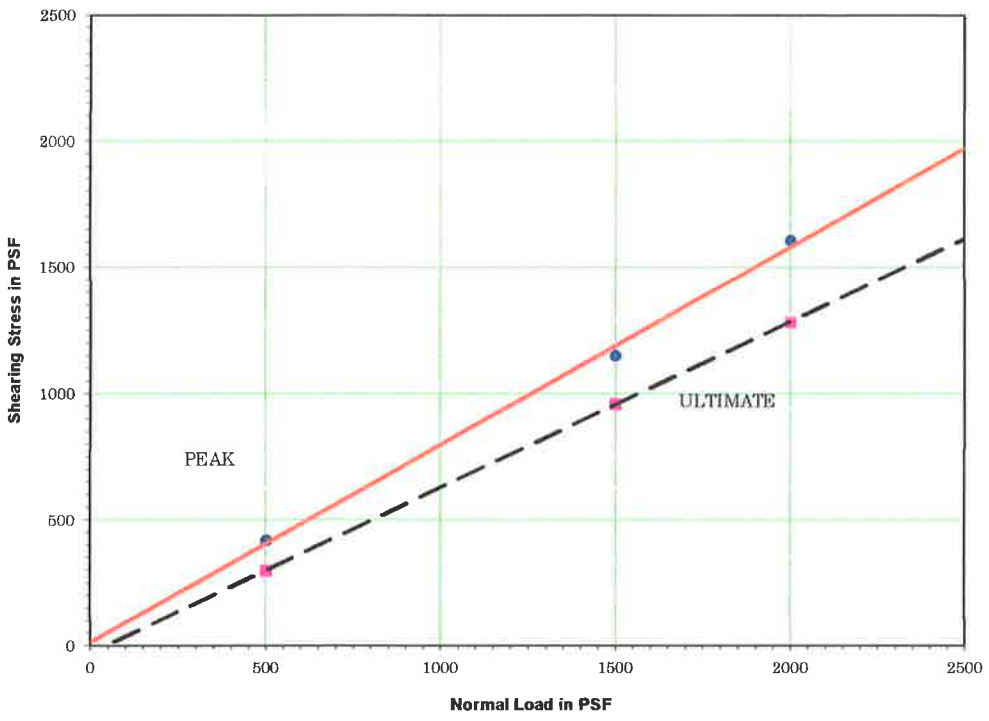
Shear Rate (in/min): 0.004

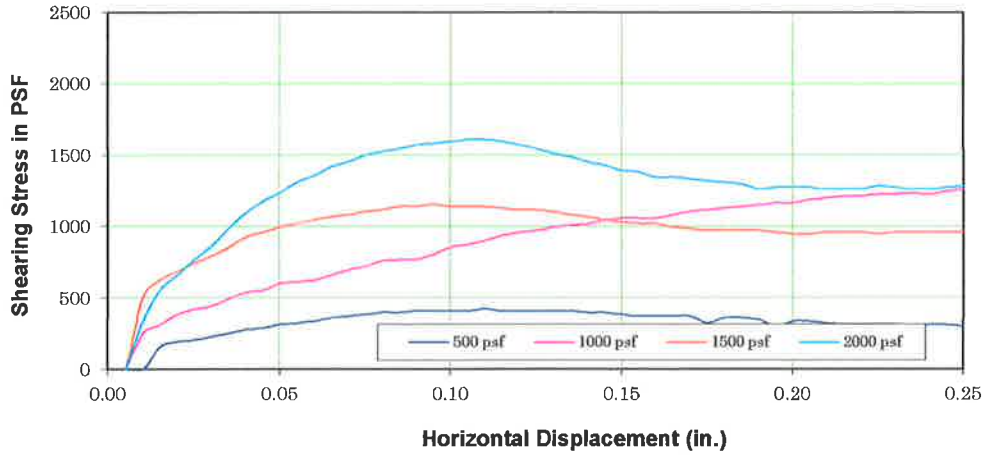
	Peak	Ultimate
ϕ Angle of Friction (degrees):	39	41
c Cohesive Strength (psf):	580	150

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

DIRECT SHEAR TEST	
Proposed Solar Farm **Lancaster, California**	
Earth Systems **Southern California**	
5/30/2014	PL-07747-02





DIRECT SHEAR DATA*

Sample Location: Boring B-7 @ 3'

Material: Slightly Silty Fine to Coarse Sand (SP)

Dry Density (pcf): 104.5

Average Degree of Saturation: 97.2

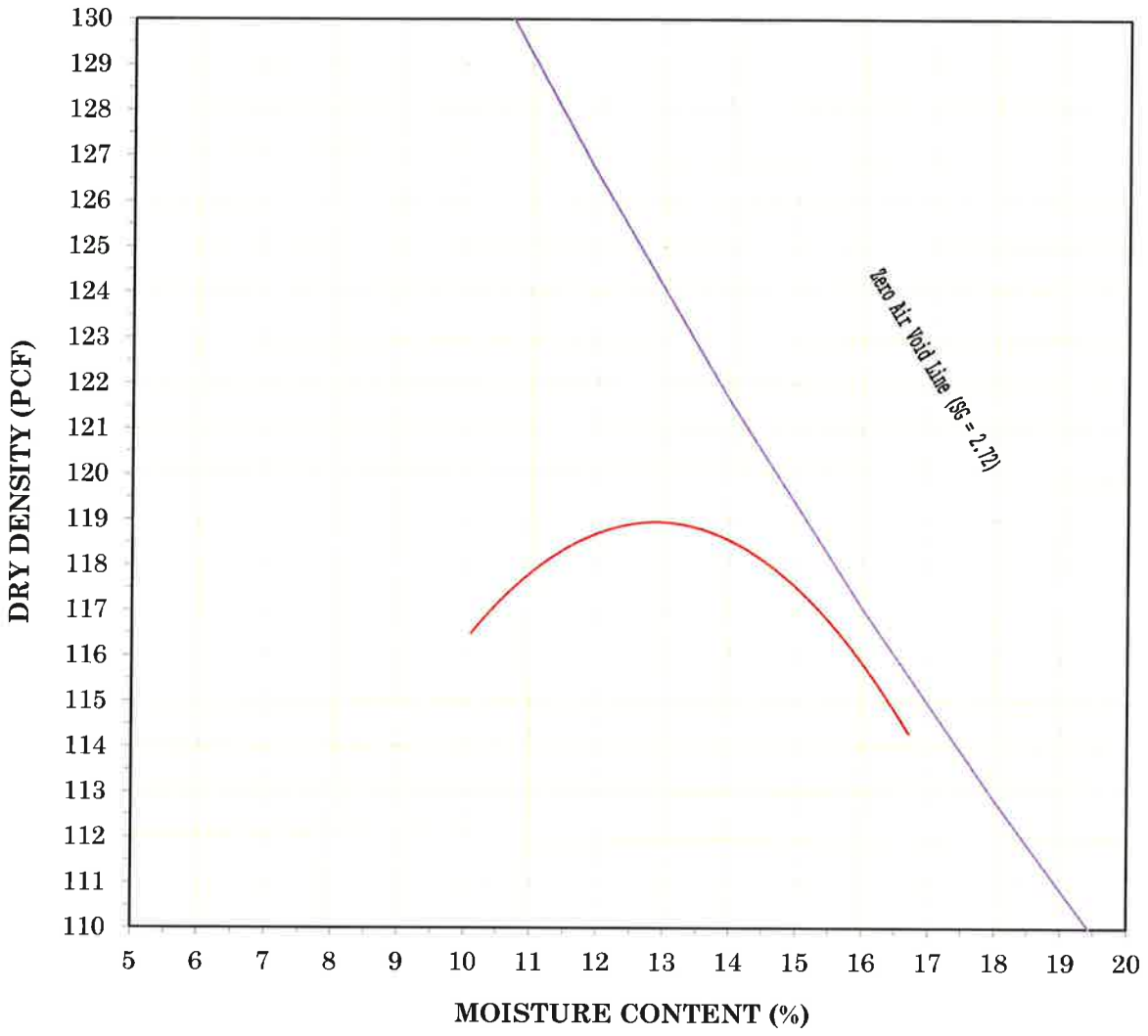
Shear Rate (in/min): 0.004

	Peak	Ultimate
ϕ Angle of Friction (degrees):	38	28
c Cohesive Strength (psf):	10	280

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

DIRECT SHEAR TEST	
Proposed Solar Farm **Lancaster, California**	
Earth Systems Southern California	
5/30/2014	PL-07747-02



Maximum Density - Optimum Moisture Characteristics*

Sample Location: Boring 3 @ 0-5 Ft

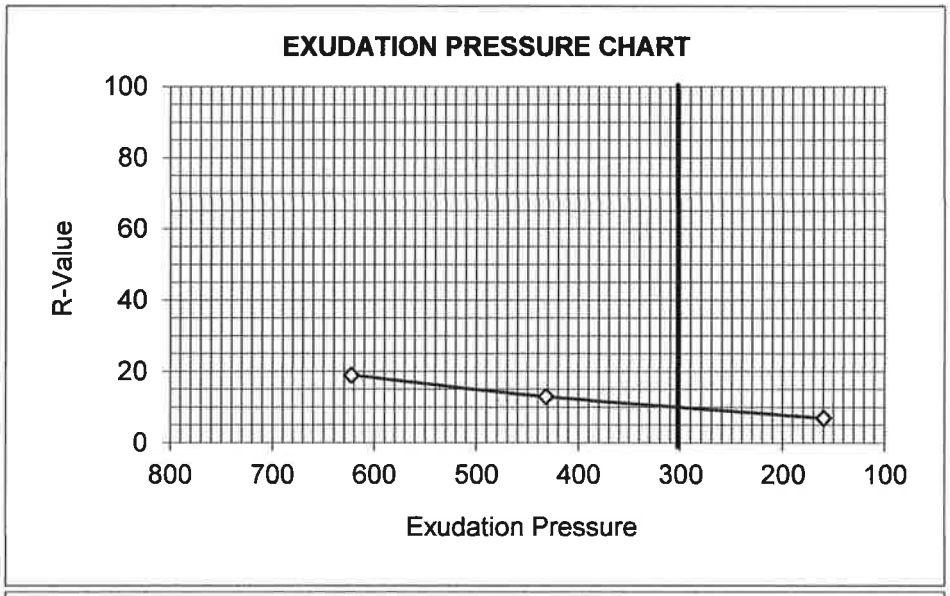
Material: Clayey Fine to Coarse Sand with Silt (SC)

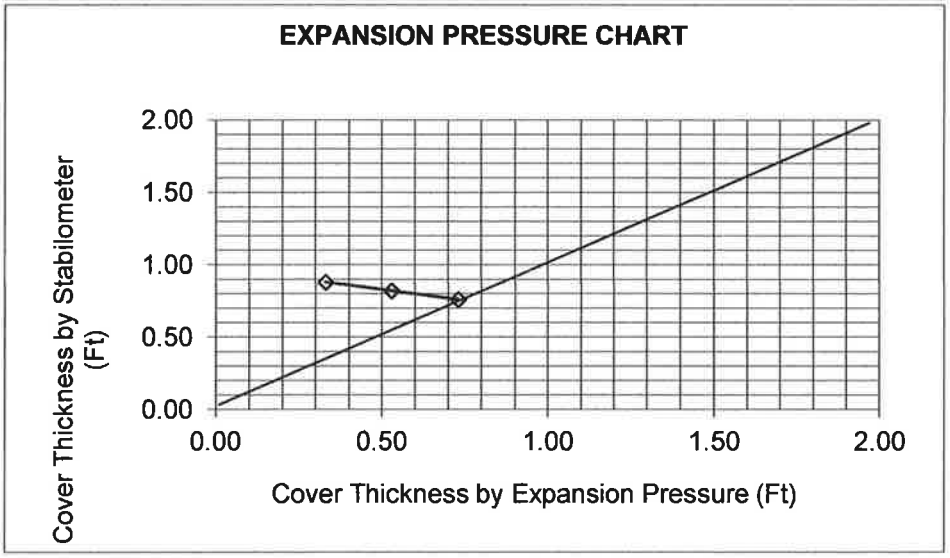
Maximum Density (pcf): 119.0

Optimum Moisture: 13.0%

* Test Method: ASTM D-1557

MAXIMUM DENSITY - OPTIMUM MOISTURE	
Proposed Solar Farm **Lancaster, California**	
Earth Systems Southern California	
5/30/2014	PL-07647-02



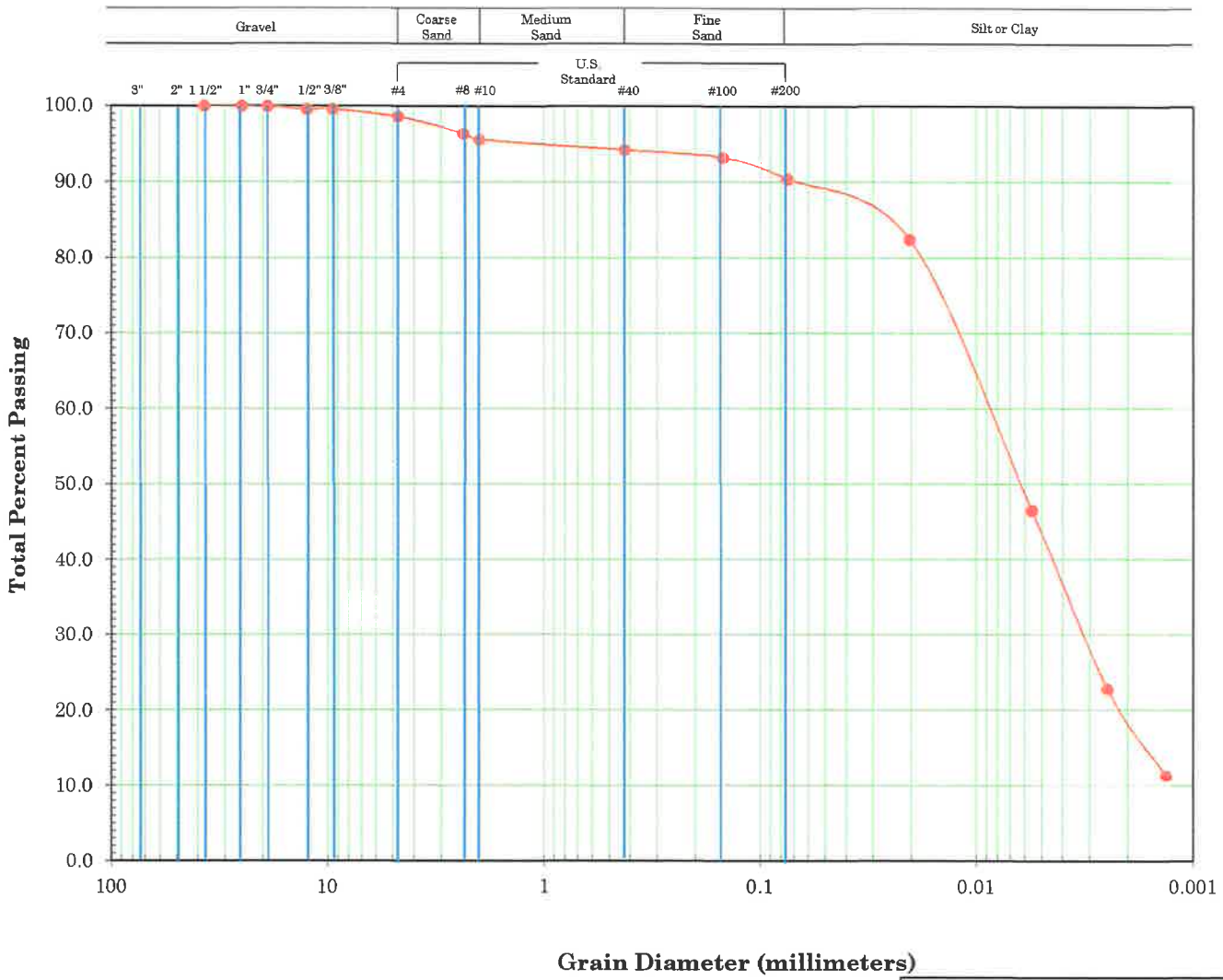


JOB NAME: Proposed Solar Farm
SAMPLE I. D.: Boring 1 @ 0-5'
SOIL DESCRIPTION: Clayey Fine Sand with Silt (SC)

SPECIMEN NUMBER	A	B	C
EXUDATION PRESSURE	623	432	160
RESISTANCE VALUE	19	13	7
EXPANSION DIAL(0.0001")	22	16	10
EXPANSION PRESSURE (PSF)	95.3	69.3	43.3
% MOISTURE AT TEST	12.3	13.1	13.1
DRY DENSITY AT TEST	122.5	121.6	121.3

R-VALUE @ 300 PSI EXUDATION	10
R-VALUE by Expansion Pressure*	22

**Based on a Traffic Index of 5.0 and a Gravel Factor of 1.70*



Sample Location: Boring B5 @ 2'

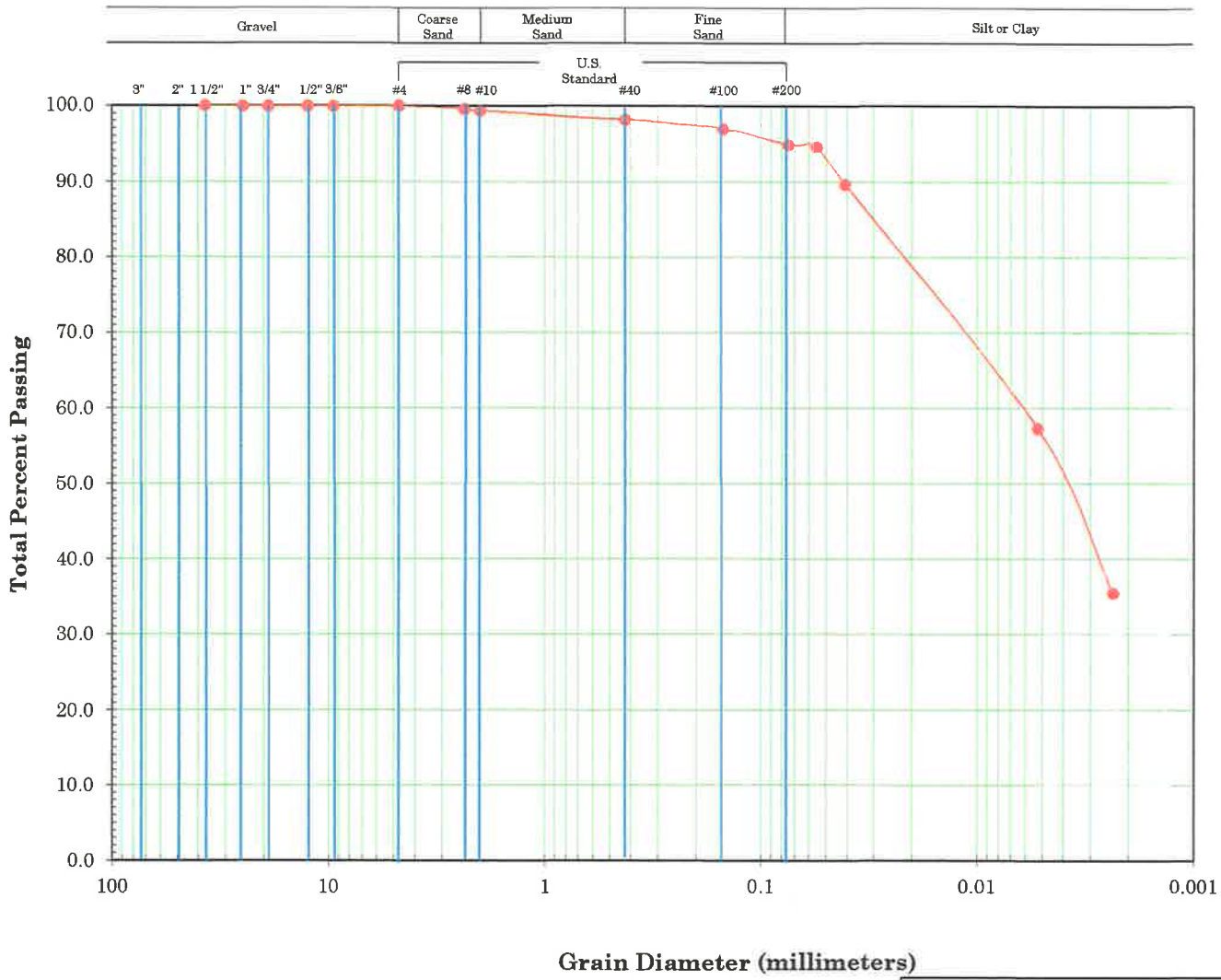
Sieve Analysis

Solar Farm

Lancaster, California

Earth Systems Southern California

5/30/2014	PL-07647-02



Sample Location: Boring B4 @ 2'

Sieve Analysis

Solar Farm

Lancaster, California

Earth Systems Southern California

5/30/2014	PL-07647-02

Table 1 - Laboratory Tests on Soil Samples

Earth Sytems Southern California
Proposed Solar Farm
Your #PL-07647-02, HDR|Schiff #14-0194LAB
31-Mar-14

Sample ID			#5 @ 0-5' SM
Resistivity		**Units**	
as-received		ohm-cm	200,000
saturated		ohm-cm	1,480
pH			7.6
Electrical Conductivity		mS/cm	0.27
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	114
magnesium	Mg^{2+}	mg/kg	26
sodium	Na^{1+}	mg/kg	104
potassium	K^{1+}	mg/kg	33
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	287
fluoride	F^{1-}	mg/kg	13
chloride	Cl^{1-}	mg/kg	9.1
sulfate	SO_4^{2-}	mg/kg	246
phosphate	PO_4^{3-}	mg/kg	ND
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	151
sulfide	S^{2-}	qual	na
Redox		mV	na

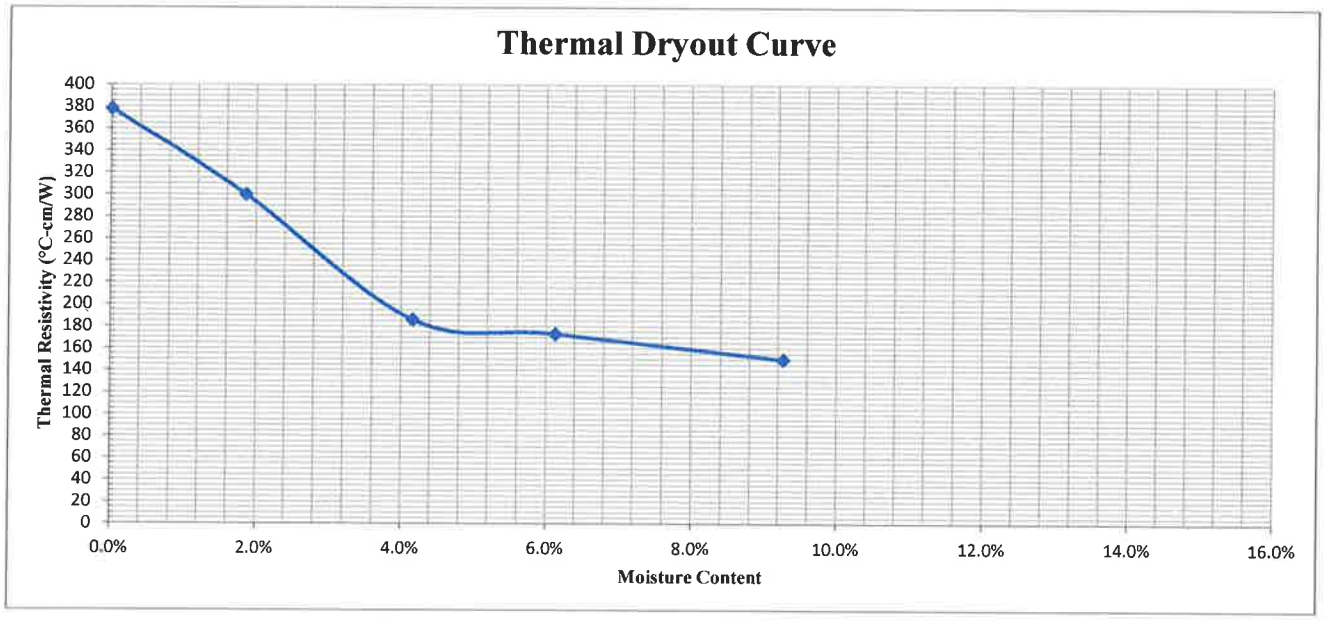
Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

File No.: PL-07647-02
Report No.: 14-142
THERMAL RESISTIVITY

May 30, 2014

ASTM D5334-08 & IEEE Std 442-2003

Project: Solar Farm
Specimen Area: B3 @ 2 feet



Sample Description	Specimen	Dry Density (pcf)	Moisture Content	Thermal Resistivity (°C-cm/W)
Silty Sand (SM)	Insitu	94.9	9.3%	150
Silty Sand (SM)	Insitu	94.9	6.1%	173
Silty Sand (SM)	Insitu	94.9	4.2%	186
Silty Sand (SM)	Insitu	94.9	1.8%	300
Silty Sand (SM)	Insitu	94.9	0.0%	378

Earth Systems
Southwest

TABLE B-I

SUMMARY OF EXPANSION INDEX* TESTING

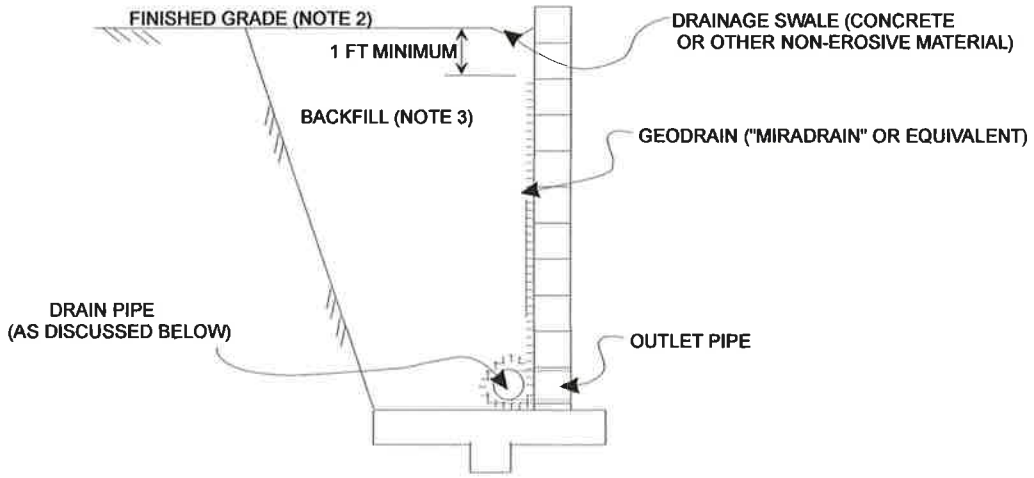
Sample Location	Material Description	Expansion Index	Expansion Potential
Boring #3 @ 0-5 feet	Clayey Sand (SC)	17	Very Low

*ASTM D 4829 Test Method

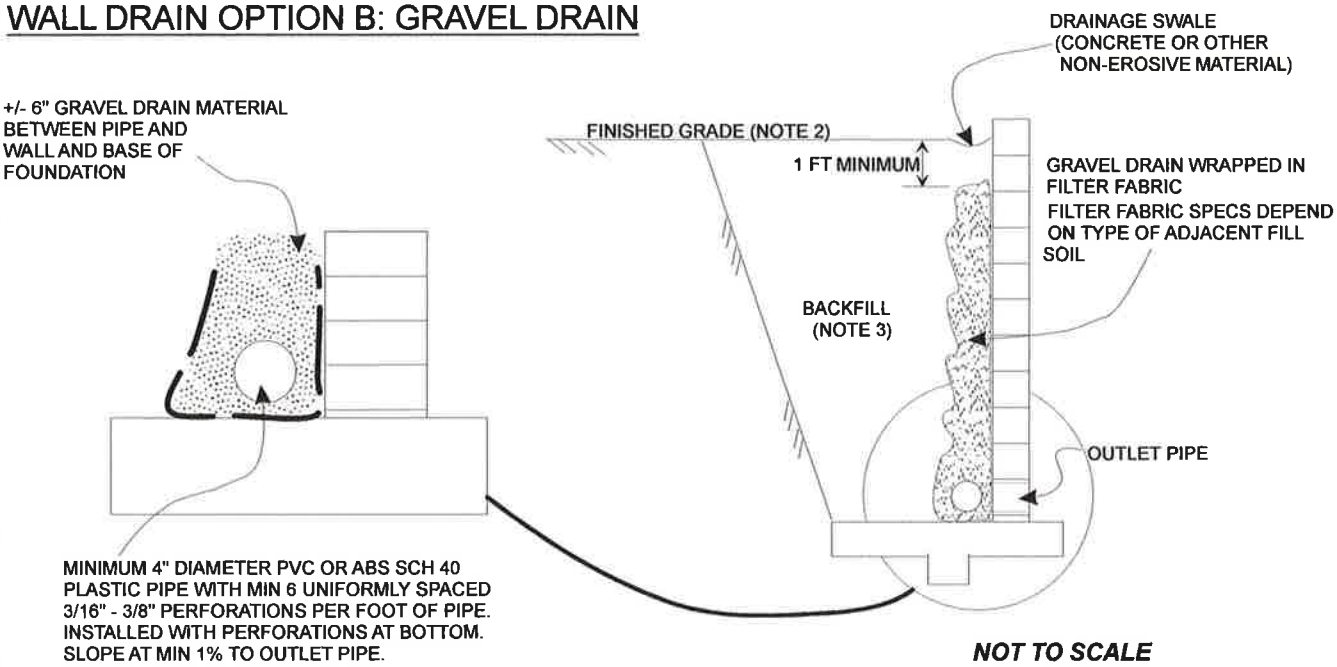
APPENDIX C

Design Plates

WALL DRAIN OPTION A: SYNTHETIC GEODRAIN



WALL DRAIN OPTION B: GRAVEL DRAIN



NOT TO SCALE

NOTE 1)

GRAVEL DRAIN MATERIAL SHALL CONSIST OF CLEAN PEA GRAVEL OR $^3/_8$" GRAVEL WRAPPED IN APPROPRIATE FILTER FABRIC* OR CALIFORNIA CLASS II PERMEABLE MATERIAL

NOTE 2)

USE DRAINAGE SWALE OR GRADE TO DRAIN AWAY FROM WALL.

NOTE 3)

ENGINEERED BACKFILL COMPACTED AS RECOMMENDED IN GEOTECHNICAL REPORT. SPECIAL PROVISIONS WILL APPLY TO MODERATELY OR HIGHLY EXPANSIVE BACKFILL.

NOTE 4)

WEEP HOLES IN BASE BLOCK COURSE ARE RECOMMENDED. CARE SHOULD BE TAKEN THAT WEEPHOLES ARE NOT COVERED BY EXTERIOR GRADE OR PAVING..

BACKDRAIN DETAILS - EXTERIOR WALLS

Proposed Solar Farm
Lancaster, California

Earth Systems Southern California

5/30/14	PL-07647-01

PHASE I
ENVIRONMENTAL SITE ASSESSMENT

APNS 3307-016-012 and -013
Avenue F and 90th Street East
Lancaster, Los Angeles County, California
PL-07647-01

Prepared For

ANTELOPE VALLEY SOLAR, LLC

April 3, 2014

Prepared by
Earth Systems
Southern California
1024 West Avenue M-4
Palmdale, California 93551

(661) 948-7538
FAX (661) 948-7963

Earth Systems
Southern California

1024 West Avenue M-4
Palmdale, CA 93551
(661) 948-7538
Fax (661) 948-7963

April 3, 2014

PL-07647-01

Antelope Valley Solar, LLC
837 9th Street, Suite D
Santa Monica, California 90403

Attention: Mr. David Revelt

Subject: **Phase I Environmental Site Assessment**
APNS 3307-016-012 and -013
Avenue F and 90th Street East
Lancaster, Los Angeles County, California

Presented herewith is Earth Systems Southern California's Phase I Environmental Site Assessment Report prepared, as authorized, for the approximate 80-acre site located at the southwest corner of Avenue F and 90th Street East in Lancaster, Los Angeles County, California. The property currently consists of vacant land. Earth Systems Southern California appreciates this opportunity to be of service. If you need clarification of the information contained in this report, or if we can be of additional service, please contact the undersigned.

Respectfully submitted,

Earth Systems
Southern California

Bruce A. Hick
Project Manager

Distribution: 3 – Antelope Valley Solar, LLC

TABLE OF CONTENTS

SUMMARY 1

INTRODUCTION 2

SCOPE OF SERVICES 3

SITE DESCRIPTION 3
- Hydrology 4

SITE RECONNAISSANCE 5

SURROUNDING PROPERTIES 6

INTERVIEWS AND USER PROVIDED INFORMATION 6

RECORDS REVIEW 7
- Aerial Photographs 7
- Historical Topographic Maps 9
- Sanborn Fire Insurance Maps 11
- City Directories 11
- Building Permits 12
- Munger Oil and Gas Maps 12
- Los Angeles County Department of Public Works 12
- Environmental Liens 12

REGULATORY AGENCY DATABASE REVIEW 13

FINDINGS AND OPINION 13

CONCLUSIONS 15

CERTIFICATION 16

LIMITATIONS 18

REFERENCES 19

Plate I Vicinity Map
Plate II Site Sketch
Plate III Aerial Photograph

Appendix A Site Photographs
Appendix B User Provided Information Questionnaire
Appendix C Qualifications Statement

PHASE I
ENVIRONMENTAL SITE ASSESSMENT
APNS 3307-016-012 AND -013
AVENUE F AND 90TH STREET EAST
LANCASTER, LOS ANGELES COUNTY, CALIFORNIA

SUMMARY

Earth Systems Southern California (Earth Systems) has performed a Phase I Environmental Site Assessment (ESA) in general conformance with the scope and limitations of ASTM Standard E 1527-05 of the approximate 80-acre site located at the southwest corner of Avenue F and 90th Street East in Lancaster, Los Angeles County, California. The property currently consists of vacant land. No obvious current recognized environmental conditions were revealed during the course of this assessment for the subject property.

This assessment has revealed the following evidence of a historic recognized environmental condition in connection with the subject property:

1. Historical research conducted for this study indicates that all or part of the subject property consisted of agricultural fields from at least 1948 to 1968. It is possible that agricultural chemicals (insecticides, pesticides, and/or herbicides) were once applied to the property. It is not known if any residual chemicals remain in the soil. These compounds tend to biodegrade over time, and it is Earth Systems' experience that residual concentrations of these chemicals found at similar sites are rarely discovered at levels requiring regulatory action. If this is a concern, soil sampling and laboratory analysis can be conducted to determine the actual presence or absence of agricultural chemicals in the soils on the property.

INTRODUCTION

This report presents the findings of Earth Systems' ESA conducted for the above referenced approximate 80-acre site located at the southwest corner of Avenue F and 90th Street East in Lancaster, Los Angeles County, California. The property currently consists of vacant land.

The purpose of this assessment is to permit the client to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations on CERCLA liability. This assessment is intended to constitute "all appropriate inquiry (AAI) into the previous ownership and uses of the property consistent with good commercial or customary practice". AAI is only the first step to establishing the ability to qualify for CERCLA liability protection – "continuing obligations" apply after purchase.

This evaluation has been performed at your request to identify, to the extent feasible pursuant to the processes prescribed in ASTM Standard E 1527-05, recognized environmental conditions in connection with the subject property. The term "recognized environmental conditions" means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.

Earth Systems performed this ESA for Antelope Valley Solar, LLC, in accordance with ASTM Standard E 1527-05, *Standard Practice for Environmental Site Assessments*. This report is prepared for the sole use and benefit of Antelope Valley Solar, LLC, and is based in part upon data provided by Antelope Valley Solar, LLC and their representatives. Neither this report, nor any of the information contained herein, shall be used or relied upon for any other purpose by any person or entity other than Antelope Valley Solar, LLC.

SCOPE OF SERVICES

Earth Systems' services were performed in accordance with the proposal dated March 13, 2014 and in general conformance to the guidelines presented in ASTM Standard E 1527-05, *Standard Practice for Environmental Site Assessments*. Earth Systems performed the following tasks in order to identify recognized environmental conditions on and in the immediate vicinity of the subject site:

- Conducted a current visual survey of the property to evaluate on-site hazardous materials use, storage, and disposal activities.
- Conducted a visual reconnaissance of the immediately adjacent sites.
- Interviewed the client and owner representative "user" regarding specialized knowledge, purchase price, and commonly known information via a User Provided Information Questionnaire.
- Reviewed readily available literature and historic documentation for the property to determine historic site usage from the time of the property's first development. Historical documents prior to 1940 were reviewed when available. Documents reviewed include historic USGS topographic maps, historic city directories, local building department records, Sanborn fire insurance maps, and historic aerial photographs.
- Reviewed 109 reasonably ascertainable regulatory agency databases concerning chemical use, storage, and disposal for the subject property and surrounding sites.
- Searched for environmental cleanup liens.
- Prepared this report presenting the findings, conclusions and recommendations.

SITE DESCRIPTION

The subject property consists of approximately 80 acres of land located at the southwest corner of Avenue F and 90th Street East in Lancaster, Los Angeles County, California. The subject property is identified as Assessor's Parcel Numbers (APNs) 3307-016-012 and -013. The

property currently consists of vacant land. The owner of the property is identified as Antelope Valley Solar, LLC. Access to the property is made from Avenue F and 90th Street East (paved roads), and Avenue F-8 and 87th Street East (unpaved roads). The surrounding land uses in the immediate vicinity of the property are a mix of residential, commercial, agriculture, and vacant land (see Plates I, II, and III: Vicinity Map, Site Sketch, and Aerial Photograph, respectively).

The property is identified as the east half of the northeast quarter of Section 31, Township 8 North, Range 10 West, San Bernardino Base Meridian. The elevation of the property is approximately 2,365 feet above sea level. The property is relatively flat, with an overall downward gradient towards the northwest (U.S.G.S. Topographic Map, Alpine Butte Quadrangle, 1992).

Hydrology

Specific depth to groundwater information was not available for the property. One well was observed on the southern end of the property during the recent site reconnaissance. According to the U.S.G.S. database this well was drilled to a depth of 302 feet below the ground surface (bgs). No groundwater measurements were available for this well.

Depth to groundwater was measured at 152.0 feet bgs on March 29, 2004 in a well located just north of the property (EDR Inquiry Number 3883537.2s). The regional groundwater aquifer in the Lancaster area, which supplies water to the Antelope Valley, is estimated to be between 200 and 300 feet bgs. In the absence of reported groundwater flow direction information, it is assumed that groundwater follows surface topography, and flows towards the northwest.

The eastern portion of the property is located within the bounds of a 100-year flood zone. The property is not identified as a wetland area on the National Wetland Inventory (EDR Inquiry Number 3883537.2s).

SITE RECONNAISSANCE

A field reconnaissance of the site was conducted by Robert Ferguson, Staff Geologist, on March 17, 2014. Mr. Ferguson is an Environmental Professional with a Bachelor of Science degree in geology, who has over fourteen (14) years experience conducting site reconnaissances for ESAs. The property was visually and/or physically observed by driving along the perimeter and walking through the property. Photographs of the subject property are included in Appendix A. The following observations were made:

The subject site consists of approximately 80 acres of vacant undeveloped land bordered by Avenue F (paved) to the north, Avenue F-8 (unpaved) to the south, 87th Street East (unpaved) to the west, and 90th Street East (paved) to the east. The surrounding land uses in the vicinity of the property are a mix of residential, commercial, agriculture, and vacant land.

Regulated quantities of hazardous materials including aboveground storage tanks (ASTs), underground storage tanks (USTs), and 55-gallon drums were not observed to be used, stored, or disposed of on the property. Waste management activities were not observed on the property.

The property consists of vacant land, and therefore electric, gas, water, sewage disposal, and refuse collection services are not provided to the property. One well is located on the southern end of the property next to a dry reservoir. No floor drains, storm drains, transformers, basements, elevators, sumps, hoists, or hydraulic lifts were observed on the property. Pole-mounted utility lines are located along the southern and eastern property boundaries.

Neither discolored water, stained soils, distressed vegetation, nor the presence of an obvious wastewater discharge were noticeable on the subject property. Strong, pungent, or noxious odors were not noticeable during the site reconnaissance. Storm water flows onto adjacent parcels and streets.

No current uses likely to involve the use, treatment, storage, disposal, or generation of hazardous substances or petroleum products were identified during the site reconnaissance. No obvious recognized environmental conditions were observed for the property during the site reconnaissance.

SURROUNDING PROPERTIES

Adjacent to the north – Avenue F (paved) followed by agricultural land.

Adjacent to the south – Avenue F-8 (unpaved), followed by vacant land.

Adjacent to the west – 87th Street East (unpaved), followed by two residences and vacant land.

Adjacent to the east – 90th Street East (paved), followed by vacant land and Paramount Drilling & Pump Company, located at 9031 East Avenue F-8.

INTERVIEWS AND USER PROVIDED INFORMATION

All interviews were conducted by Amy E. Lee, an Environmental Assessor with over nineteen (19) years experience conducting ESAs. Earth Systems conducted an interview with the client and owner representative, Mr. David Revelt of Antelope Valley Solar, LLC, via a User Provided Information Questionnaire. A copy of the completed questionnaire is included in Appendix B.

Mr. Revelt is not aware of any recognized environmental conditions for the property, including environmental cleanup liens, engineering controls, land use restrictions, or institutional controls. Mr. Revelt does not have any specialized knowledge or experience related to the property, nor is he aware of any obvious indicators that point to the presence or likely presence of contamination at the property. The past use of the property is vacant land since at least 1979; and the prior use was agriculture. According to Mr. Revelt, the purchase price

being paid for this property reasonably reflects the fair market value of the property. This Phase I ESA is being performed to qualify for landowner liability protections to CERCLA liability.

A title report prepared for the property by Commonwealth Land Title Company dated November 1, 2013 was provided to Earth Systems for review. The owner of the property was identified as Antelope Valley Solar, LLC, a Delaware limited liability company. No recognized environmental conditions were identified for the property from the title report review.

The property currently consists of vacant land, and therefore operators and occupants of the property were not interviewed during the recent site reconnaissance.

RECORDS REVIEW

In order to obtain information regarding current and past recognized environmental conditions at the site, information from several sources was researched. The results of this research are outlined below.

Aerial Photographs

In an attempt to identify the likelihood of past property uses having led to recognized environmental conditions in connection with the property or surrounding areas, select aerial photographs of the subject property and surrounding areas were reviewed. Aerial photographs taken between 1948 and 2012 were available for review.

1948 – (Source: U.S.G.S.)

A residence and a water reservoir are located on the southeast portion of the property. An unimproved road (Avenue F-4) crosses through the center of the property. The remainder of the southern half of the property consists of agricultural fields. The northern half of the property consists of vacant undeveloped land. Avenue F is unpaved along the northern property boundary, followed by vacant land. Avenue F-8 is unpaved along the southern property boundary, followed by vacant land. Vacant land

and agricultural land adjoin the property to the west. 90th Street East is paved along the eastern property boundary, followed by a residence, barns, and agricultural land.

1953 – (Source: EDR)

Coverage is only available for the southern half of the property in this photograph. The southern half of the property remains agricultural fields. A residence and reservoir remain located on the southeast portion of the property. The adjoining parcels appear similar to the previous photograph.

1968 – (Source: Teledyne)

A residence and a water reservoir remain located on the southeast portion of the property. The previously observed unimproved road (Avenue F-4) no longer crosses through the center of the property. The remainder of the property consists of agricultural fields. Avenue F is now paved along the northern property boundary, followed by a residence, barns, and agricultural land. Avenue F-8 remains unpaved along the southern property boundary, followed by vacant land and residences. Vacant land and a residence adjoin the property to the west. 90th Street East is paved along the eastern property boundary, followed by vacant land.

1974 – (Source: U.S.G.S.)

The previously observed residence is no longer located on southeast portion of the property. Aside from a water reservoir on the south end of the property, the entire property now consists of vacant land. Avenue F adjoins the property to the north, followed by a residence, barns, and agricultural land. Avenue F-8 remains unpaved along the southern property boundary, followed by vacant land and residences. Vacant land and a residence adjoin the property to the west. 90th Street East adjoins the property to the east, followed by vacant land.

1989 – (Source: U.S.G.S.)

The property and adjoining parcels appear similar to the previous photograph, with the exception that an additional residence is now located to the west of the property.

1994 – (Source: EDR)

The property and adjoining parcels appear similar to the previous photograph.

2005 – (Source: EDR)

A blank stripe is located on this photograph on the southern portion of the property. However, what remains visible of the property and adjoining parcels appears similar to the previous photograph.

2009, 2010, and 2012 – (Source: EDR)

Aside from a water reservoir on the south end of the property, the entire property remains vacant land. Avenue F adjoins the property to the north, followed by agricultural land. The previously observed residence and barns are no longer located to the north of the property. Avenue F-8 remains unpaved along the southern property boundary, followed by vacant land. The previously observed residences are no longer located to the south of the property. Vacant land and two residences adjoin the property to the west. 90th Street East adjoins the property to the east, followed by vacant land and a commercial property at 9031 East Avenue F-8.

All or part of the subject property was utilized for agricultural purposes from at least 1948 to 1968. It is possible that agricultural chemicals were applied to the property during this time period. No other obvious recognized environmental conditions for the property were noted from the aerial photographs reviewed.

Historical Topographic Maps

In an attempt to assess past property uses, which may have had an environmental impact on the property or surrounding areas, select historical topographic maps depicting the subject property and surrounding areas were reviewed. The following features relative to land use history were identified:

1933 – (U.S.G.S. 6-minute Casa Desierta, California Quadrangle):

A residence is located on the southeast corner of the property. An unimproved road (Avenue F-4) crosses through the center of the property. The remainder of the property consists of vacant land. Avenue F is unimproved along the northern property boundary, followed by vacant land. Avenue F-8 consists of a light duty road along the southern property boundary, followed by vacant land. Vacant land adjoins the property to the west. 90th Street East is paved along the eastern property boundary, followed by a residence and vacant land.

1947 – (U.S.G.S. 15-minute Alpine Butte, California Quadrangle):

A residence and a well are located on the southeast portion of the property. Avenue F-4 is no longer shown crossing the center of the property. The remainder of the property consists of vacant land. Avenue F remains unimproved along the northern property boundary, followed by vacant land. Avenue F-8 is now shown as an unimproved road along the southern property boundary, followed by vacant land. Vacant land adjoins the property to the west. 90th Street East remains paved along the eastern property boundary, followed by a residence, a well, and vacant land.

1957 – (U.S.G.S. 7.5-minute Alpine Butte, California Quadrangle):

A residence and water reservoir are located on the southeast portion of the property. The remainder of the property consists of vacant land. Avenue F is now paved along the northern property boundary, followed by a residence, two barns or sheds, a water tank, and vacant land. Avenue F-8 is once again shown as a light duty road along the southern property boundary, followed by vacant land. A well and vacant land adjoin the property to the west. 90th Street East remains paved along the eastern property boundary, followed by a residence and vacant land.

1974 – (U.S.G.S. 7.5-minute Alpine Butte, California Quadrangle):

The property and adjoining parcels appear similar to the previous map, with the exception that residences are now located to the south and west of the property.

1989 – (U.S.G.S. 15-minute Hi Vista, California Quadrangle):

Two residences are shown on the southeast portion of the property (aerial photographs from this time frame do not show these residences). The remainder of the property consists of vacant land. Avenue F adjoins the property to the north, followed by a residence, a water tank, and vacant land. Avenue F-8 adjoins the property to the south, followed by residences and vacant land. Two residences and vacant land adjoin the property to the west. 90th Street East adjoins the property to the east, followed by a residence and vacant land.

1992 – (U.S.G.S. 7.5-minute Alpine Butte, California Quadrangle):

The previously noted residences are no longer shown on the southeast portion of the property (residences are shown on the topographic maps from 1974 and 1989, however aerial photographs from the same years show that the residences were no longer located on the property). A well and a water reservoir are located on the southern end of the property. The remainder of the property consists of vacant land. Avenue F adjoins the property to the north, followed by two wells and vacant land. Avenue F-8 adjoins the property to the south, followed by residences and vacant land. A residence, a well, and vacant land adjoin the property to the west. 90th Street East adjoins the property to the east, followed by vacant land.

No obvious recognized environmental conditions for the property were noted from the topographic maps reviewed.

Sanborn Fire Insurance Maps

Sanborn fire insurance maps for Lancaster were reviewed. Coverage of the property was not available (EDR Inquiry Number 3883537.3).

City Directories

Business directories including city, cross reference, and telephone directories were reviewed, if available, at approximate five-year intervals for the years spanning from 1971 through 2010.

During the course of this study, Earth Systems utilized Environmental Data Resources, Inc. (EDR) as an information source for historic city directories. No listings were found for the subject property (EDR Inquiry Number 3883537.5).

Building Permits

During the course of this study, Earth Systems utilized EDR as an information source for local building department records. No building permits were found for the subject property (EDR Inquiry Number 3883537.8).

Munger Oil and Gas Maps

Locations of oil and gas wells were reviewed in the Munger Map Book of California and Alaska Oil and Gas Fields. According to page W-58, no oil or gas wells have been drilled on the subject property.

Los Angeles County Department of Public Works

Earth Systems personnel contacted the Los Angeles County Department of Public Works, Environmental Programs Division to determine if any permits for installation and/or removal of underground storage tanks (USTs) exist for the subject property. No records are on file for the subject property.

Environmental Liens

During the course of this assessment, Earth Systems utilized EDR as an information source for environmental cleanup liens. A search was made for the existence of environmental cleanup liens against the subject property that are filed or recorded under federal, tribal, state, or local law. The owner of the property was identified as Antelope Valley Solar, LLC. No environmental liens or activity and use limitations (AULs) were identified for the property (EDR Inquiry Number 3883537.7).

REGULATORY AGENCY DATABASE REVIEW

To ascertain reported areas of possible environmental impairment on or in the vicinity of the subject property, one hundred and nine (109) federal, state, local, tribal, and proprietary records databases were reviewed. During the course of this study, Earth Systems utilized EDR as an information source for environmental records. Records were also reviewed on the California Regional Water Quality Control Board's GeoTracker website. A complete copy of EDR's Radius Map Report is available upon request.

The subject property and adjoining parcels were not identified as hazardous materials use, storage, disposal, or release sites. Institutional controls and engineering controls were not identified for the subject property. Oil and gas wells were not identified on the subject property.

One (1) hazardous materials use, storage, disposal, or release site was identified within a one-mile radius of the subject property. The one identified hazardous materials release site involved soil contaminated with gasoline, and was located approximately 0.5-mile east of the subject property. This site received regulatory agency closure in 1997, and is therefore not considered a recognized environmental condition for the subject property. No open hazardous materials release sites were identified within the ASTM-specified search distances of the subject property.

No obvious potential off-site sources of contamination were identified within the ASTM-specified search distances (up to one-mile) of the subject property. No obvious recognized environmental conditions for the property were noted from the 109 government databases reviewed.

FINDINGS AND OPINION

Historical research conducted for this assessment indicates that a residence was located on the southeast corner of the property from at least 1933 to 1968. The residence was removed from

the property by 1974. Avenue F-4, an unimproved dirt road, was located on the center of the property from at least 1933 to 1948. By 1953 Avenue F-4 was no longer located on the property. A well and water reservoir were located on the southern end of the property by 1948, and were observed on the property during the recent site reconnaissance. The southern half of the property consisted of agricultural fields from at least 1948 to 1953, and by 1968 the entire property consisted of agricultural fields (except for the residence and water reservoir). From approximately 1974 to the present the property has consisted of vacant undeveloped land. No significant data gaps or data failures were encountered during the course of this assessment.

The property currently consists of vacant land. A well and a dry water reservoir were observed on the southern end of the property during the recent site reconnaissance. Regulated quantities of hazardous materials including ASTs, USTs, and 55-gallon drums were not observed to be used, stored, or disposed of on the property. No obvious recognized environmental conditions were observed for the property during the site reconnaissance.

The subject property was not identified as a hazardous materials use, storage, disposal, or release site on any of the 109 government databases reviewed for this assessment. No oil or gas wells have been drilled on the subject property. Institutional controls and engineering controls were not identified for the subject property. The search of regulatory lists for hazardous materials sites in the vicinity of the property did not identify any obvious potential off-site sources of contamination within the ASTM-specified search distances (up to one-mile) of the subject property. No obvious recognized environmental conditions for the property or adjacent parcels were noted from the 109 databases reviewed.

Based on the research conducted for this assessment, it is Earth Systems' opinion that no obvious current recognized environmental conditions were identified for the property during the course of this assessment. Aside from the past agricultural use of the property, no current or past uses likely to involve the use, treatment, storage, disposal, or generation of hazardous substances or petroleum products were identified during the course of this assessment.

This assessment has revealed the following evidence of a historic recognized environmental condition in connection with the subject property:

1. Historical research conducted for this study indicates that all or part of the subject property consisted of agricultural fields from at least 1948 to 1968. It is possible that agricultural chemicals (insecticides, pesticides, and/or herbicides) were once applied to the property. It is not known if any residual chemicals remain in the soil. These compounds tend to biodegrade over time, and it is Earth Systems' experience that residual concentrations of these chemicals found at similar sites are rarely discovered at levels requiring regulatory action. If this is a concern, soil sampling and laboratory analysis can be conducted to determine the actual presence or absence of agricultural chemicals in the soils on the property.

This opinion is based on the information provided to Earth Systems during the course of this assessment. Any data that is missing or was withheld from Earth Systems could alter Earth Systems' opinion.

CONCLUSIONS

Earth Systems has performed a Phase I ESA in general conformance with the scope and limitations of ASTM Standard E 1527-05 of the approximate 80-acre site located at the southwest corner of Avenue F and 90th Street East in Lancaster, Los Angeles County, California. The property currently consists of vacant land. No obvious current recognized environmental conditions were revealed during the course of this assessment for the subject property.

This assessment has revealed the following evidence of a historic recognized environmental condition in connection with the subject property:

1. Historical research conducted for this study indicates that all or part of the subject property consisted of agricultural fields from at least 1948 to 1968. It is possible that agricultural chemicals (insecticides, pesticides, and/or herbicides) were once applied to the property. It is not known if any residual chemicals remain in the soil. These compounds tend to biodegrade over time, and it is Earth Systems' experience that residual concentrations of these chemicals found at similar sites are rarely discovered at levels requiring regulatory action. If this is a concern, soil sampling and laboratory analysis can be conducted to determine the actual presence or absence of agricultural chemicals in the soils on the property.

CERTIFICATION

This ESA Report has been prepared by Earth Systems at the request of Antelope Valley Solar, LLC, and has been reviewed and approved by the undersigned. The research, interviews, and field work conducted for this assessment were completed by Amy E. Lee, Registered Environmental Property Assessor, and Robert Ferguson, Staff Geologist. Mrs. Lee is an Environmental Professional with over nineteen (19) years experience conducting ESAs. Mr. Ferguson is an Environmental Professional with a Bachelor of Science degree in geology, who has over fourteen (14) years experience conducting site reconnaissances for ESAs.

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in Section 312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the "all appropriate inquiries" in conformance with the standards and practices set forth in 40 CFR Part 312.

The scope of effort upon which this report is based is intended to provide a reasonable assessment of environmental risk for the client. This effort was not absolutely exhaustive and the quality of the assessment is necessarily dependent on the quality of the information

supplied to Earth Systems by all sources cited. Inspection and data collection were carried out by Earth Systems staff according to accepted standards. However, inspection was mainly surficial and the identification of possible environmental risks or contamination was limited accordingly. No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of this assessment is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with a property. Therefore, this report does not carry with it any express or implied warranty that environmental risks associated with the subject site have been totally excluded or precisely characterized.

Earth Systems trusts this report is sufficient at this time and meets your current needs. Earth Systems appreciates the opportunity to provide professional environmental services for this project. If you have any questions regarding this information or require additional studies, please contact this office at your convenience.

Reviewed and Approved by:

Earth Systems
Southern California

Amy E. Lee, REPA #157732
Environmental Assessor

Bruce A. Hick, C.E. #45784
Project Manager

REGISTERED PROFESSIONAL ENGINEER
BRUCE A. HICK
No. C045784
Exp. 12/31/14
CIVIL
STATE OF CALIFORNIA

4/3/2014

LIMITATIONS

This report has been prepared for the exclusive use of Antelope Valley Solar, LLC, as it pertains to the property described herein. The conclusions in this report are opinions, based on readily available information obtained to date, within the scope of work authorized by Antelope Valley Solar, LLC. Use of, or reliance on the information and opinions contained in this report by other parties without first consulting this office is at those parties' own risk.

The results contained in this report are based upon the information acquired during this assessment. It is possible that variations could exist beyond or between points observed during the course of this assessment. Also, changes in observed conditions could occur at some time in the future due to contamination migration, variations in rainfall, temperature, and/or other factors not apparent at the time of the field evaluation.

It should be noted that any level of environmental assessment cannot ascertain that a property is completely free of chemical or toxic substances; therefore, Earth Systems cannot offer the certification of a "clean" site. Earth Systems believes that the scope of work performed has been appropriate to allow the client to make informed business decisions.

Earth Systems has strived to prepare this report in accordance with generally accepted geologic/environmental practices in this community. No warranty or guarantee is expressed or implied.

REFERENCES

Averill H. Munger, 1994, Munger Map Book of California and Alaska Oil and Gas Fields.

Commonwealth Land Title Company, ALTA Standard Owners Policy of Title Insurance, APNS 3307-016-012 and -013, November 1, 2013.

Environmental Data Resources, Inc., The EDR Radius Map Report with GeoCheck, Inquiry Number: 3883537.2s, March 18, 2014.

Environmental Data Resources, Inc., The EDR Certified Sanborn Map Report, Inquiry Number: 3883537.3, March 17, 2014.

Environmental Data Resources, Inc., The EDR-City Directory Image Report, Inquiry Number: 3883537.5, March 18, 2014.

Environmental Data Resources, Inc., EDR Environmental Lien and AUL Search, Project Number: 3883537.7, March 19, 2014.

Environmental Data Resources, Inc., EDR Building Permit Report, Project Number: 3883537.8, March 17, 2014.

Environmental Data Resources, Inc., The EDR Aerial Photo Decade Package, Inquiry Number: 3883537.12, March 18, 2014.

Los Angeles County Department of Public Works, Environmental Programs Division, Personal Communication, March 27, 2014.

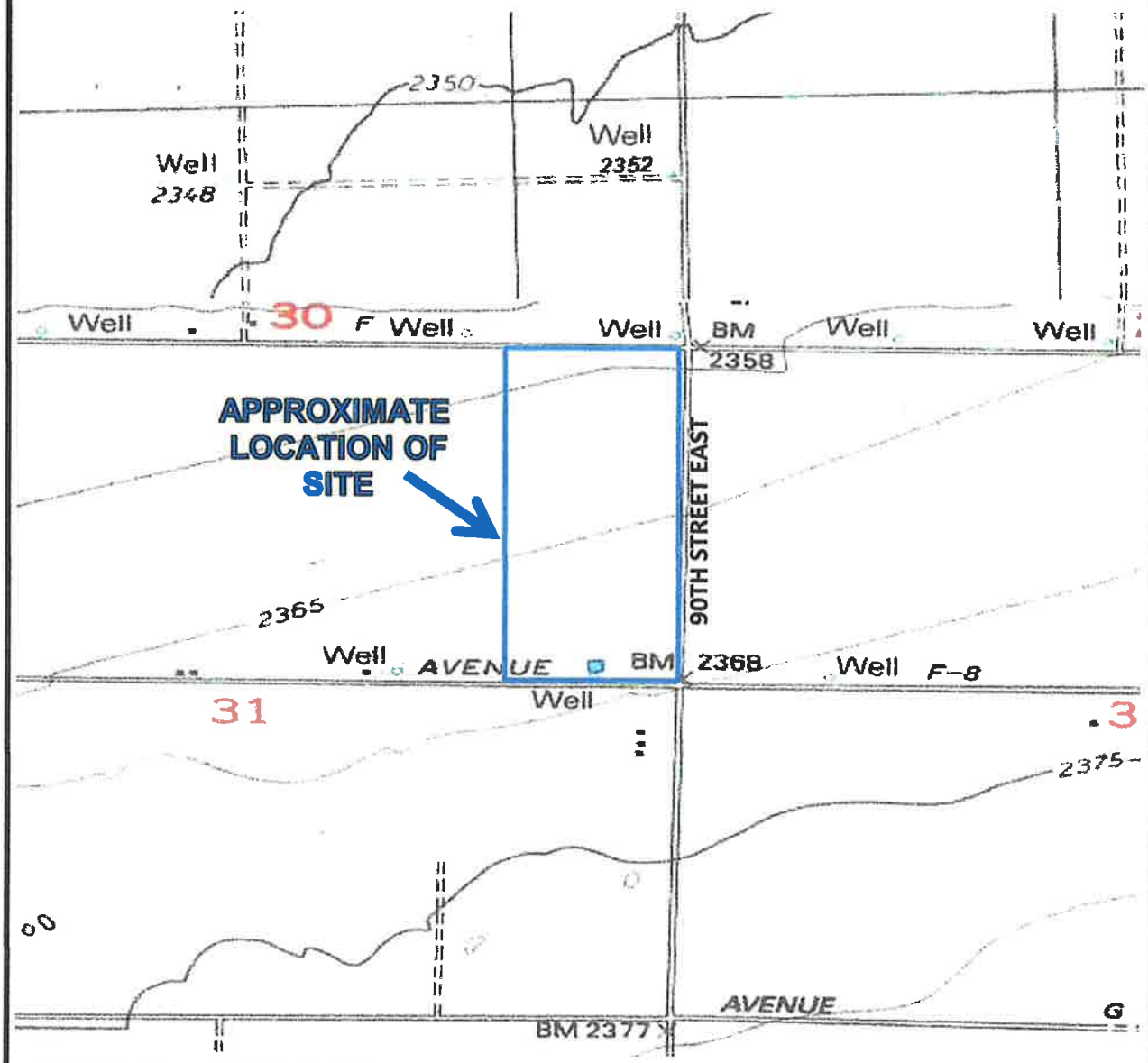
Regional Water Quality Control Board, GeoTracker website, April 1, 2014.

U.S.G.S. Topographic Map, 6-minute Casa Desierta Quadrangle, 1933.

U.S.G.S. Topographic Map, 15-minute Alpine Butte Quadrangle, 1947.

U.S.G.S. Topographic Map, 15-minute Hi Vista Quadrangle, 1989.

U.S.G.S. Topographic Maps, 7.5-minute Alpine Butte Quadrangle, 1957, 1974, and 1992.



SOURCE: U.S.G.S. TOPOGRAPHIC MAPS, 7.5-MINUTE ALPINE BUTTE AND REDMAN, CALIFORNIA QUADRANGLES, 1992

PLATE I

N

APPROXIMATE SCALE: 1" = 1,300'

VICINITY MAP

APNS 3307-016-012 AND -013
AVENUE F AND 90TH STREET EAST
LANCASTER, LOS ANGELES COUNTY, CALIFORNIA

EARTH SYSTEMS
SOUTHERN CALIFORNIA

APRIL 3, 2014	PL-07647-01

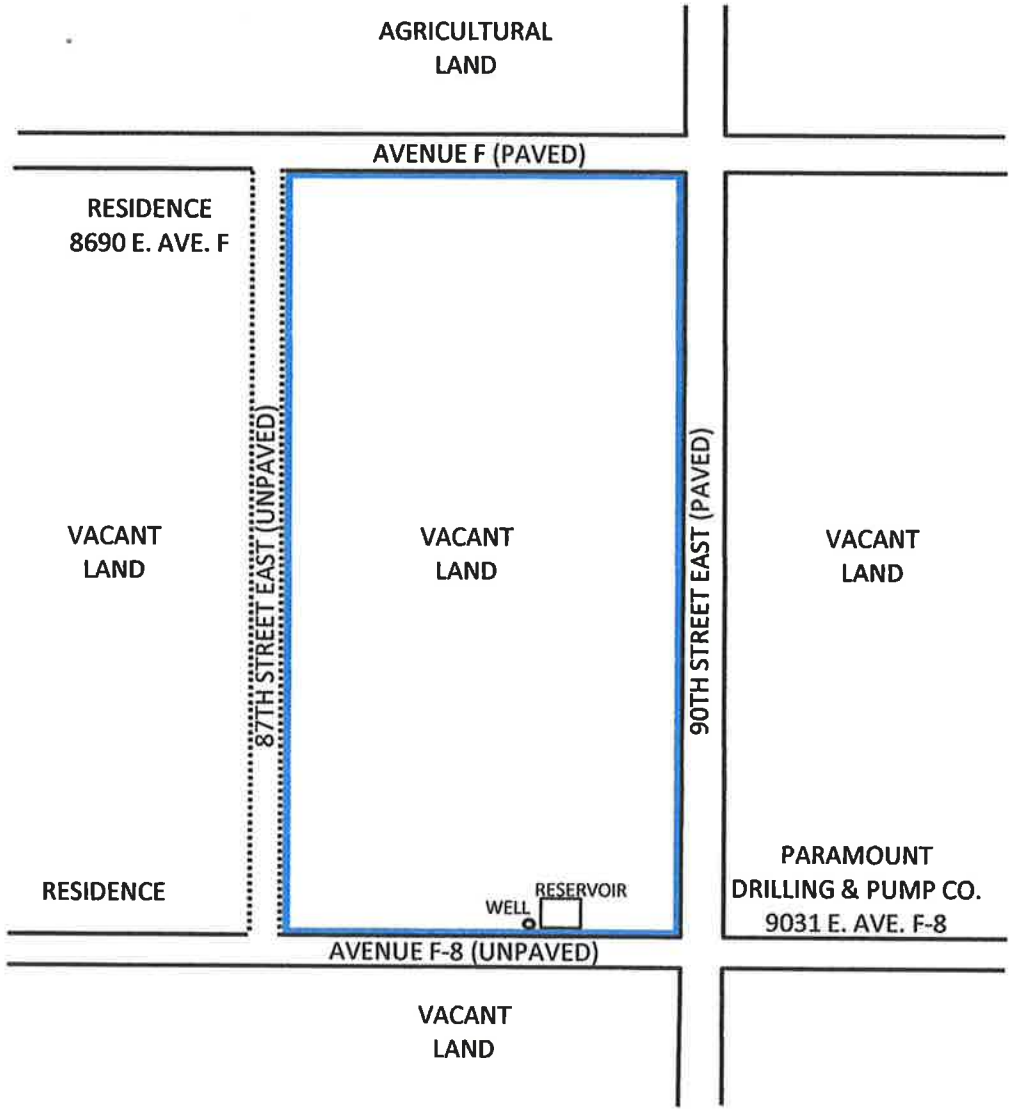


PLATE II

N

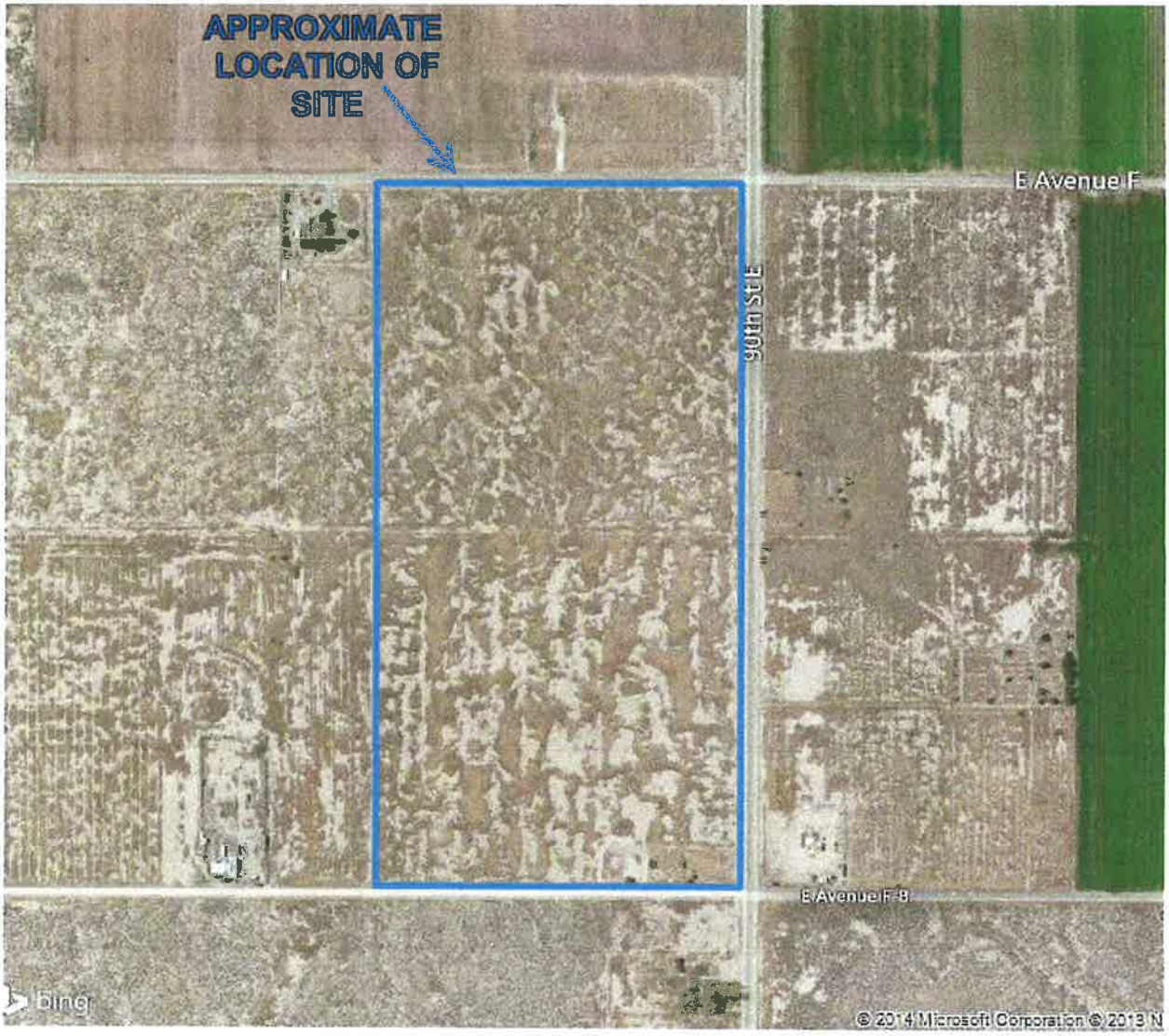
NOT TO SCALE

SITE SKETCH

APNS 3307-016-012 AND -013
AVENUE F AND 90TH STREET EAST
LANCASTER, LOS ANGELES COUNTY, CALIFORNIA

EARTH SYSTEMS
SOUTHERN CALIFORNIA

APRIL 3, 2014	PL-07647-01



SOURCE: 2014 MICROSOFT BING MAPS

PLATE III

N

APPROXIMATE SCALE: 1" = 660'

AERIAL PHOTOGRAPH

APNS 3307-016-012 AND -013
AVENUE F AND 90TH STREET EAST
LANCASTER, LOS ANGELES COUNTY, CALIFORNIA

EARTH SYSTEMS
SOUTHERN CALIFORNIA

APRIL 3, 2014	PL-07647-01

Appendix A

Site Photographs

Photo 1. Northwest-facing view from the southeast corner of the property.

Photo 2. View facing southeast from the northwest corner of the property.

Photo 3. Southwest-facing view from the northeast corner of the property.

Photo 4. View of the well and reservoir located on the southern end of the property.

Appendix B

User Provided Information Questionnaire

USER PROVIDED INFORMATION QUESTIONNAIRE

DATE: 3-15-14

CLIENT REPRESENTATIVE: Mr. David Revelt, Antelope Valley Solar, LLC

PROPERTY: Los Angeles County APNs 3307-016-012 and -013,
East Avenue F and 90th Street East, Lancaster, California.

THE FOLLOWING INFORMATION **MUST** BE PROVIDED TO EARTH SYSTEMS SOUTHERN CALIFORNIA (ESSC) IN ORDER TO MEET ASTM STANDARD 1527-05. PLEASE COMPLETE THIS FORM AND E-MAIL OR FAX IT TO **ESSC** AT **661-948-7963** AT YOUR EARLIEST CONVENIENCE. THANK YOU.

1. TITLE REPORT – PLEASE PROVIDE ESSC WITH A COPY.

2. ARE YOU AWARE OF ANY PENDING, THREATENED, OR PAST LITIGATION OR ADMINISTRATIVE PROCEEDINGS RELEVANT TO HAZARDOUS SUBSTANCES OR PETROLEUM PRODUCTS IN, ON, OR FROM THE PROPERTY?

   _____YES ___X____ NO

3. ARE YOU AWARE OF ANY NOTICES FROM ANY GOVERNMENTAL ENTITY REGARDING ANY POSSIBLE VIOLATION OR ENVIRONMENTAL LAWS OR POSSIBLE LIABILITY RELATING TO HAZARDOUS SUBSTANCES OR PETROLEUM PRODUCTS?

   _____YES ___X____ NO

4. ARE YOU AWARE OF ANY ENVIRONMENTAL CLEANUP LIENS AGAINST THE PROPERTY THAT ARE FILED OR RECORDED UNDER FEDERAL, TRIBAL, STATE, OR LOCAL LAW?

   _____YES ___X____ NO

5. ARE YOU AWARE OF ANY ACTIVITY AND LAND USE LIMITATIONS, SUCH AS ENGINEERING CONTROLS, LAND USE RESTRICTIONS, OR INSTITUTIONAL CONTROLS THAT ARE IN PLACE AT THE SITE AND/OR HAVE BEEN FILED OR RECORDED IN A REGISTRY UNDER FEDERAL, TRIBAL, STATE, OR LOCAL LAW?

   _____YES ___X____ NO

6. DO YOU HAVE ANY SPECIALIZED KNOWLEDGE OR EXPERIENCE RELATED TO THE PROPERTY OR NEARBY PROPERTIES?

   _____YES ___X____ NO

7. ARE YOU AWARE OF ANY COMMONLY KNOWN OR REASONABLY ASCERTAINABLE INFORMATION ABOUT THE PROPERTY OR NEARBY PROPERTIES THAT WOULD HELP IDENTIFY CONDITIONS INDICATIVE OF RELEASES OR THREATENED RELEASES?

   _____YES ___X____ NO

8. DO YOU KNOW THE PAST USES OF THE PROPERTY?

   ___X____ YES (PLEASE LIST) _____NO

Vacant land since at least 1979; prior use was agriculture.

9. DO YOU KNOW OF SPECIFIC CHEMICALS THAT ARE PRESENT OR ONCE WERE PRESENT AT THE PROPERTY?

   _____YES (PLEASE LIST) ___X____ NO

10. DO YOU KNOW OF SPILLS OR OTHER CHEMICAL RELEASES THAT HAVE TAKEN PLACE AT THE PROPERTY?

    _____YES (PLEASE LIST) ___X____ NO

11. DO YOU KNOW OF ANY ENVIRONMENTAL CLEANUPS THAT HAVE TAKEN PLACE AT THE PROPERTY?

    _____YES (PLEASE LIST) ___X____ NO

12. DOES THE PURCHASE PRICE BEING PAID FOR THIS PROPERTY REASONABLY REFLECT THE FAIR MARKET VALUE OF THE PROPERTY?

    ___X____ YES _____NO

    IF NO, IS THE LOWER PURCHASE PRICE DUE TO CONTAMINATION THAT IS KNOWN OR BELIEVED TO BE PRESENT AT THE PROPERTY?

    _____YES _____NO

13. BASED ON YOUR KNOWLEDGE AND EXPERIENCE RELATED TO THE PROPERTY, ARE THERE ANY OBVIOUS INDICATORS THAT POINT TO THE

PRESENCE OR LIKELY PRESENCE OF CONTAMINATION AT THE PROPERTY?

_____YES __X____ NO

14. PROPERTY OWNER NAME Antelope Valley Solar, LLC AND PHONE NUMBER 310-806-3296

15. PROPERTY MANAGER NAME _____AND PHONE NUMBER_____ (not applicable)

16. OCCUPANT NAME _____AND PHONE NUMBER_____ (not applicable)

17. REASON FOR PERFORMING PHASE I ENVIRONMENTAL SITE ASSESSMENT?

A. __X___ TO QUALIFY FOR LANDOWNER LIABILITY PROTECTIONS TO CERCLA LIABILITY

B. _____OTHER:_____

18. ARE YOU AWARE OF ANY OF THE FOLLOWING DOCUMENTS THAT MAY EXIST FOR THE PROPERTY?

A. ENVIRONMENTAL SITE ASSESSMENT REPORTS _____YES __X____ NO

B. ENVIRONMENTAL COMPLIANCE AUDIT REPORTS _____YES __X____ NO

C. ENVIRONMENTAL PERMITS (E.G. SOLID WASTE DISPOSAL PERMITS, HAZARDOUS WASTE DISPOSAL PERMITS, WASTEWATER PERMITS, NPDES PERMITS, UNDERGROUND INJECTION PERMITS)_____YES __X____ NO

D. REGISTRATIONS FOR UNDERGROUND AND ABOVEGROUND STORAGE TANKS _____YES __X____ NO

E. REGISTRATIONS FOR UNDERGROUND INJECTION SYSTEMS _____YES __X____ NO

F. MATERIAL SAFETY DATA SHEETS _____YES __X____ NO

G. COMMUNITY RIGHT-TO-KNOW PLAN _____YES __X____ NO

H. SAFETY PLANS; PREPAREDNESS AND PREVENTION PLANS; SPILL PREVENTION, COUNTERMEASURE, AND CONTROL PLANS _____YES __X____ NO

I. REPORTS REGARDING HYDROGEOLOGIC CONDITIONS ON THE PROPERTY OR SURROUNDING AREA _____YES __X____ NO

J. NOTICES OR OTHER CORRESPONDENCE FROM ANY GOVERNMENT AGENCY RELATING TO PAST OR CURRENT VIOLATIONS OF ENVIRONMENTAL LAWS WITH RESPECT TO THE PROPERTY OR RELATING TO ENVIRONMENTAL LIENS ENCUMBERING THE PROPERTY _____YES ___X____ NO

K. HAZARDOUS WASTE GENERATOR NOTICES OR REPORTS _____YES ___X____ NO

L. GEOTECHNICAL STUDIES _____YES ___X____ NO

M. RISK ASSESSMENTS _____YES ___X____ NO

N. RECORDED ACTIVITY AND USE LIMITATIONS _____YES ___X____ NO

IF YES ON (A-N) ABOVE, WILL COPIES BE PROVIDED TO ESSC FOR REVIEW?

_____YES _____NO (not applicable)

COMPLETED BY:

Antelope Valley Solar, LLC

SIGNATURE: David Revelt

PRINT NAME: David Revelt, President

DATE: 15 March 2014

Appendix C

Qualifications Statement

QUALIFICATIONS STATEMENTS

Earth Systems' multi-disciplinary professional staff has extensive experience with and education in chemistry, geology, geophysics, hydrogeology, mechanical engineering, civil engineering, mapping, soil science, drafting, and surveying. Earth Systems' senior project and staff professionals include Certified Engineering Geologists, Certified Hydrogeologists, Registered Geologists, Registered Environmental Property Assessors, and Professional Engineers. These professionals generally hold an average of two registrations and/or certifications in their area of expertise. To continue to meet Earth Systems' commitment to technical expertise, Earth Systems considers it essential to train personnel in the latest scientific advancements in assessment and mitigation techniques. This involves continuing education in the form of training seminars, literature reviews, and pertinent conferences to remain abreast of recent developments in this complex and rapidly changing field.

The following information states the credentials of the professionals who performed field, research and/or report preparation on the project.

AMY E. LEE
Environmental Assessor

Years in Field: 19
Years with Earth Systems: 19

EDUCATION:

B.S., Forestry and Natural Resources Management
California Polytechnic State University, San Luis Obispo, CA, GPA 3.5

REGISTRATIONS:

REPA – Registered Environmental Property Assessor #157732
REA - Registered Environmental Assessor I-07387 from 1999 through 2012 (program terminated on July 1, 2012)
OSHA/EPA 40-Hour Health and Safety Training for Hazardous Waste Operations and Yearly 8-Hour Refresher Course

PROFESSIONAL EXPERIENCE:

Amy Lee has more than nineteen years experience in performing all aspects of environmental site assessments, site characterizations, and remediation plans in conformance with ASTM Standards. Mrs. Lee has performed Phase I and Phase II Assessments on commercial, industrial, and residential properties throughout California. Her work includes conducting site reconnaissances, evaluating historical research, reviewing regulatory agency records and government databases, interpreting aerial photographs, sampling soil and groundwater, interpreting laboratory data, and preparing final reports that include recommendations for remediation. Mrs. Lee has authored numerous Closure Reports, Work Plans, and Health and Safety Plans for regulatory agency submittal.

Representative Experience:

- *Phase I Environmental Site Assessments*. As an Environmental Assessor, Mrs. Lee specializes in performing Phase I Environmental Site Assessments in conformance with ASTM Standard E1527-05. Phase I Environmental Site Assessments are conducted to identify recognized environmental conditions in connection with a property. The term "recognized environmental conditions" means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.

- *Environmental Audits*. Mrs. Lee has conducted Site Closure Environmental Audits for properties in southern California. Services performed include an initial site reconnaissance to identify areas of potential environmental concern; soil and

groundwater sampling and analysis; and preparation of a Site Closure Environmental Audit report.

- *Phase II Environmental Site Assessments*. Mrs. Lee has conducted numerous Phase II Environmental Site Assessments on properties located throughout the state of California. Phase II studies have been performed to determine the presence or absence of soil and groundwater contamination at a property after a recognized environmental condition has been identified during the course of a Phase I Environmental Site Assessment. Mrs. Lee has experience identifying and defining petroleum hydrocarbon, solvents, agricultural chemicals, and metals-based contamination plumes in both the soil and groundwater.

- *Soil Remediation*. Following the identification and delineation of contamination plumes, Mrs. Lee has coordinated and overseen soil remediation activities including remediation by excavation and in-situ bio-remediation.

- *Regulatory Agency Case Closure*. Mrs. Lee has authored several Closure Reports for regulatory agency submittal following successful remediation of contaminated properties. Mrs. Lee also authors Closure Reports for underground storage tank removal activities.

Robert T. Ferguson
Staff Geologist

Years in Field: 14
Years with Earth Systems: 14

EDUCATION:

B.S., Geology, California State University, Sonoma, 1998

REGISTRATION AND CERTIFICATIONS:

ACI Certified Concrete Technician, Level 1
Licensed Nuclear Gauge Operator

PROFESSIONAL AFFILIATIONS:

Geological Society of America

PROFESSIONAL EXPERIENCE:

Employed with Earth Systems in the Palmdale office since 1999, Mr. Ferguson helps to plan and conduct subsurface exploration programs related to geologic hazards analysis, geotechnical investigations, and environmental assessments.

- Conducts field exploration programs related to soils engineering investigations and geologic hazards analysis.
- Designs on-site sewage disposal systems based on field data and conforming to the design requirements of relevant regulating agencies.
- Performs preliminary environmental site assessments and environmental sampling programs.
- Prepares detailed geologic maps and cross-sections based on data gathered during field exploration programs.

SELECTED MAJOR PROJECT EXPERIENCE:

- *DeButts Terrace Landslide Repair, Malibu, California.* A landslide occurred in a canyon area adjacent to two nearby homes during a period of heavy rainfall. Mr. Ferguson conducted the initial site exploration program and the collected data was used to define the limits of the landslide mass and to provide repair recommendations. During the repair phase of the project Mr. Ferguson served as geotechnical technician performing compaction testing, grading observation, and accurately mapping the critical design components such as: keyway, sub-drains, and benching.

- *Proposed Acton Library, Acton California.* Designed the on-site sewage disposal system for the proposed library facility. Mr. Ferguson creatively designed the system taking into account limitations posed by drainage setbacks, building setbacks, and placement limitations posed by the project architect. This design incorporates the modern denitrification technology required by Los Angeles County for this type of system.

HYDROLOGY, WATER QUALITY, AND LOW IMPACT DEVELOPMENT REPORT

Antelope Valley Solar
Assessor's Parcels 3307-016-012 & 3307-016-013
Lancaster, California

PREPARED FOR:

Antelope Valley Solar, LLC
837 9th Street, Suite D
Santa Monica, CA 90403

PREPARED BY:

DJP Engineering, Inc.
100 North Barranca
Suite 860
West Covina, CA 91791
(626) 966-8200

(September 2014)

Table of Contents:

Purpose	3
Project & Site Description	3
Drainage Overview	4
Methodology	5
Conclusions & Recommendations	5
Hydrologic Analysis for 2-year, 5-year, 10-year, 25-year and 50-year Storm Event Pre- and Post-Development	7

Appendices:

A. Site Plan

B. Hydrology Map

C. FEMA – Flood Insurance Rate Map

D. 85TH Percentile Map

Purpose

The purpose of this hydrology study ("study") is to determine the 50-year, 25-year, 10-year, 5-year, and 2-year, and water quality storm runoff emanating from on-site and off-site drainage areas, respectively, for the proposed Antelope Valley Solar Energy Project. The study will compare the existing and proposed conditions to determine the increase in peak storm flows and volumes due to the proposed grading and site improvements.

This study is based on Los Angeles County Department of Public Works Rational Method Hydrology procedures for a 50-year reoccurrence interval storm. The topographic survey prepared for the development, Alpine Butte USGS 7.5 minute Quadrangle, and FEMA Flood Insurance Rate Map (FIRM Panel 0475F) will serve as references for the study.

Project & Site Description

Antelope Valley Solar, LLC ("Applicant") proposes to develop a 7.45 MWac solar photovoltaic ("PV") project (the proposed "Project") in two phases on approximately 72 (net) acres of land in north Los Angeles County (the "Site"). The Project will be developed in two (2) phases. The first phase ("Phase 1") will be located on the northerly 38 acres of the Site, and the second phase ("Phase 2") will be constructed on the southerly portion of the Site. (See Appendix A.)

The Site is located at the southwest corner of Avenue F and 90th Street East, in unincorporated Los Angeles County, approximately six (6) miles northeast of the City of Lancaster. The Site consists of two contiguous parcels identified by County Assessor Parcel Numbers: 3307-016-012 and 3307-016-013, each of which is approximately forty gross (40) acres in size. The Site is bounded on the east by 90th Street East, on the north by Avenue F, on the south by Avenue F-8, and on the west by 87th Street East. 90th Street East and Avenue F are paved County roads, Avenue F-8 is an unpaved (dirt) County road, and 87th Street East is an unpaved and unimproved dirt trail not suitable for vehicle traffic. The Site is approximately 81 acres in gross area, and approximately 72 acres in net area after offers of dedication for roadways and slope easements are made to the County on all four boundaries of the Site.

Due to the predominantly flat nature of the Site, the Project will involve minimal grading for construction of inverter/transformer pads, water tanks, and scarification and recompaction of the interior fire/access roads at existing grade. These fire/access roads will not be paved and no changes in drainage patterns or concentration of flows is proposed. The post-development runoff will continue to sheet flow in the pre-development condition in order to avoid disturbance to downstream drainage structures and wildlife. During construction, existing vegetation may be cleared (or mowed), but vegetation will return following construction. If required, infiltration areas will be provided to mitigate excess storm runoff.

Drainage Overview

The topography of the Site is flat with no major distinguishing features. Onsite vegetation consists mostly of sparse, low-growing, desert scrub. There are no trees of any kind on the Site, and there are no streambeds or other aquatic resources identified on the Site.

A review of the topographic information, including an aerial topographic map, of the Site found that storm runoff generally sheet flows in an north-northwest direction at an approximate gradient of 0.4%. Flow does not concentrate anywhere on the Site in any large naturally formed channels.

Based on tributary drainage areas identified in the Alpine Butte USGS 7.5 minute Quadrangle, the tributary area south of the Site (consisting of approximately 60 acres) will continue to pass through the Project via sheet flow during extreme storm events with no increase in rate or volume. If the property south of the Site is developed or Avenue F-8 improved the run-on will be substantially reduced or eliminated. (See Appendix B.)

The eastern border and southeast portions of the Site, as well as the areas east of 90th Street East, are within FEMA Zone A. However, due to the elevated cross section of 90th Street East, some of the easterly watershed runoff does not reach the Site, see photo below. The remainder of the Site is Flood Zone X. (See Appendix C.)

Figure 1: 90th Street East, South of Avenue F-8 (looking Southerly)

There are no signs of erosion due to the presence of vegetation and soils with high infiltration rates. Earth Systems prepared a Geotechnical Engineering Report for the Site and found that the soils on the Site consist of silty and clayey sands. The percolation test performed shows general soil infiltration rates of 1.3 inches per hour before any factor of safety is applied.

Methodology

Hydrologic calculations in this study were performed in conformance with the Los Angeles County Hydrology Manual, dated January 2006, utilizing the Modified Rational Method TC Calculator. The Modified Rational Method equation relates rainfall intensity, time of concentration, runoff coefficient, and drainage area size to the direct runoff from each drainage sub-area. Soil types, rainfall data and runoff coefficients were obtained from the LACDPW Hydrology Manual. Volumetric runoff differentials were calculated for each of the 38-acre pre- and post-development Phase 1 and Phase 2 of the Project based on the County's capital storm criteria. The construction of the solar panel arrays and other miscellaneous Site development will be accounted for by increasing the Site's impervious percentage from an existing condition of 1% to a post construction condition of approximately 12%. The 12% impervious ratio was calculated based on the county assumption of the solar fields accounting with an impervious percentage of 40%. The unpaved interior access roads were assumed to be 80% impervious and the equipment pads 100% impervious.

Conclusions & Recommendations

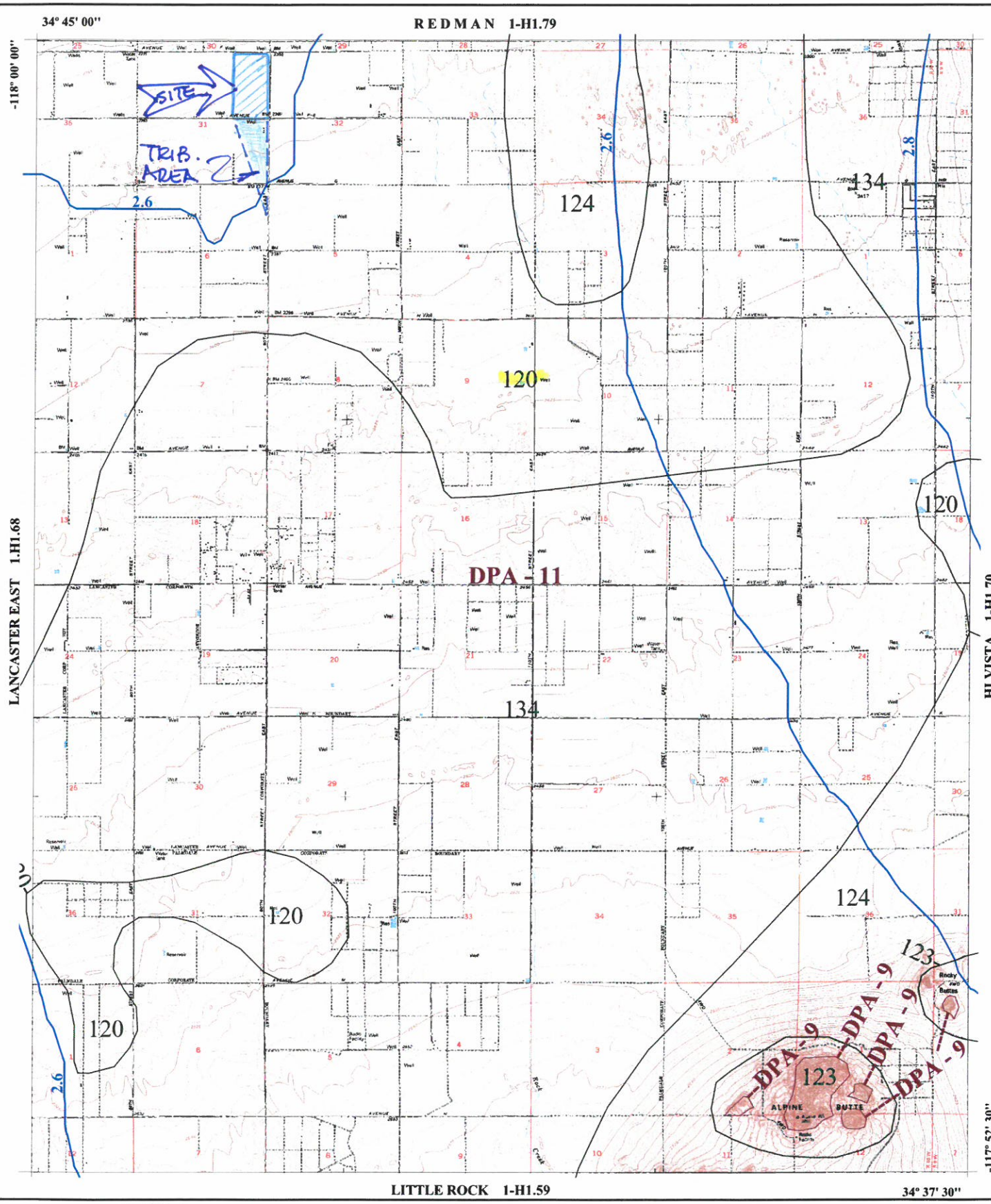
Due to the flatness of the existing and proposed terrain, and given the low rainfall intensities for this area, the default 30 minute maximum time-of-concentration for the watershed governs. The input parameters and output results for various storm frequencies can be found in Appendix C**.**

For each of the two (2) 38-acre Phases of the Project, the calculated on-site peak runoff rate for a capital storm is about 5.2 cubic feet per second (cfs). Based on an impervious percentage of 12%, this storm produces a 24-hour runoff volume of approximately 1.6 acre-feet (70,000 cubic feet / phase). By comparison, the undeveloped peak flow runoff rate was calculated to be 3.0 cfs / phase producing a 24-hour runoff volume of 38,500 cubic feet / phase. Thus, the largest differential in runoff volume between the pre- and post-development conditions on the Site is 31,368 cubic feet.

The additional runoff generated by the Project will be collected onsite with the help of twelve-foot (12') wide infiltration basins along the northerly boundary of each Phase of the Project. The basins will also provide water quality control due to their ability to intercept flows prior to leaving the site. Combined with the infiltration into the Site, these infiltration basins will ensure that the flow rate, volume, velocity, and depth corresponding to a capital storm at the Site boundary does not exceed the pre-development values.

The Site and surrounding area is in Debris Production Area 11, which generates the lowest debris production rate in the county, 1300 cubic yards per square mile. For the 80 acre project this equates to about 165 cubic yards (4,455 cubic feet). On a sheet flow basis, this is less than 0.002 feet (1/64 inch) over the entire Site and is insignificant.

HYDROLOGIC ANALYSIS



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

ALPINE BUTTE
50-YEAR 24-HOUR ISOHYET

1-H1.69

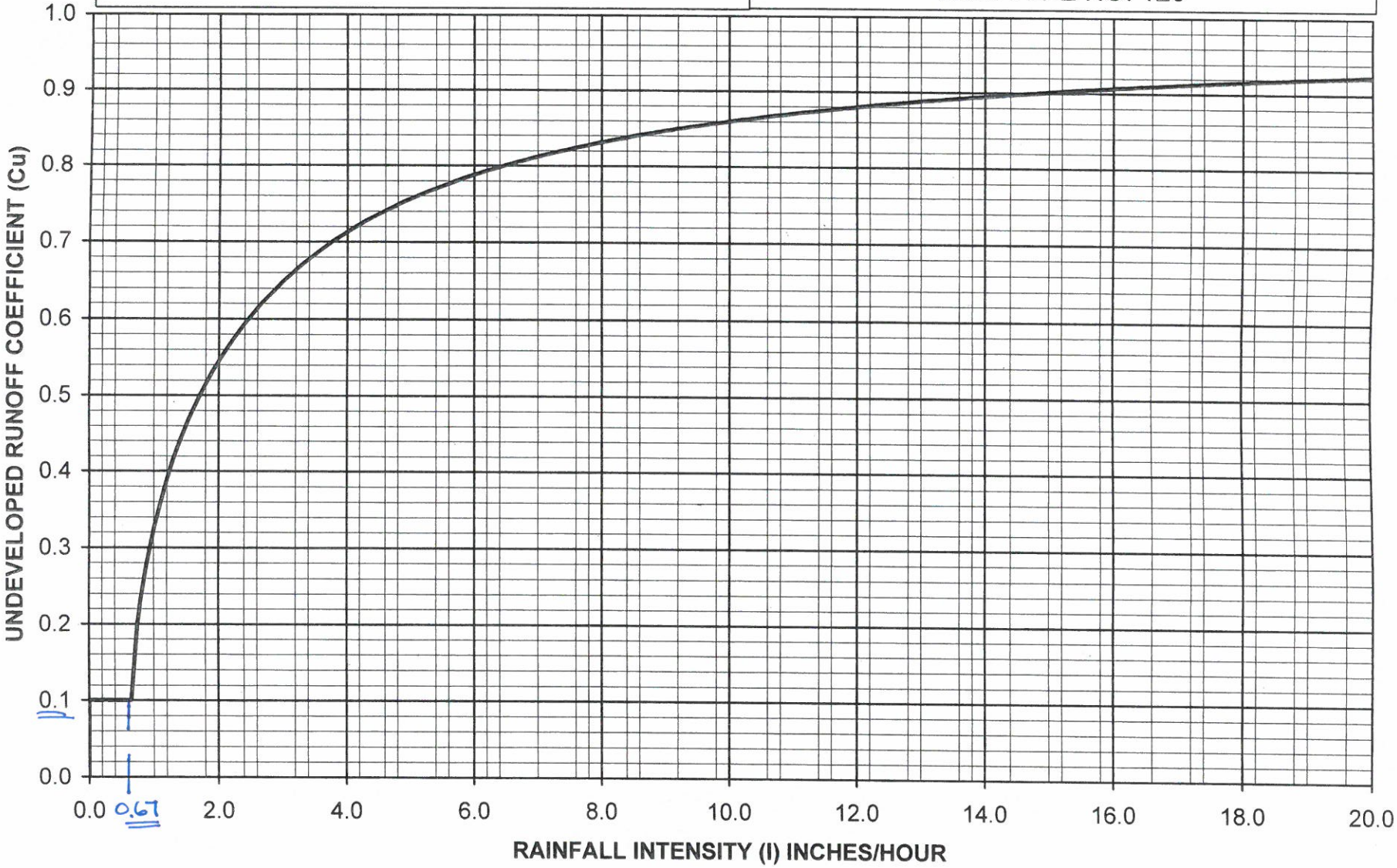
LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 120



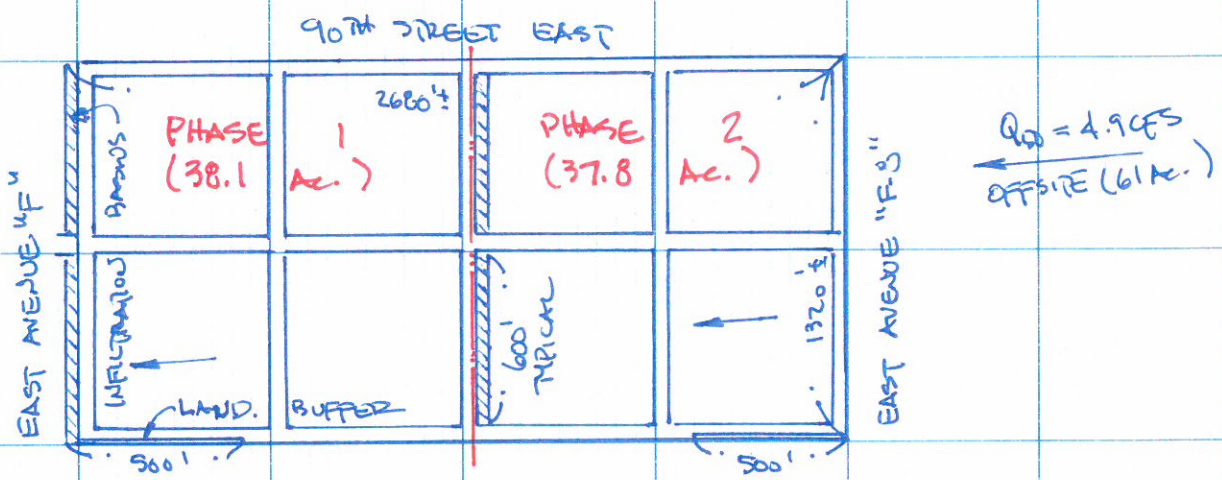
DJP ENGINEERING, INC.
100 NORTH BARRANCA
SUITE 860
WEST COVINA, CA 91791
PHONE: (626) 966-8200
FAX: (626) 966-8255
WWW.DJPENGINEERING.COM

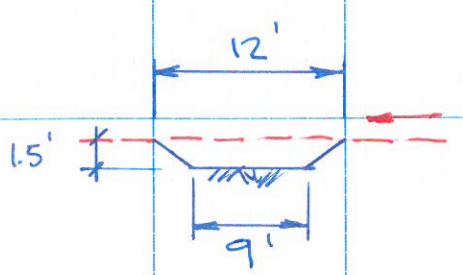
PROJECT: A.V.S.		PROJECT NO.: 14008	
BY: D.N.D.	DATE: 9/2014	BY:	DATE:

SHEET_____ OF _____

AVS INFILTRATION BASIN REQUIREMENTS

FLOW ACROSS 90TH STREET EAST PREVENTED BY ROADWAY EMBANKMENT FOR FLOW DEPTHS < 1-2'





INFILTRATION BASIN
TYPICAL SECTION

INFILTRATION RATE PER GEOTECH REPORT

1.3 IN/HR

WITH FACTOR OF SAFETY = 2 ⇒ RATE = 0.65 IN/HR

STORAGE VOLUME PROVIDED PER PHASE

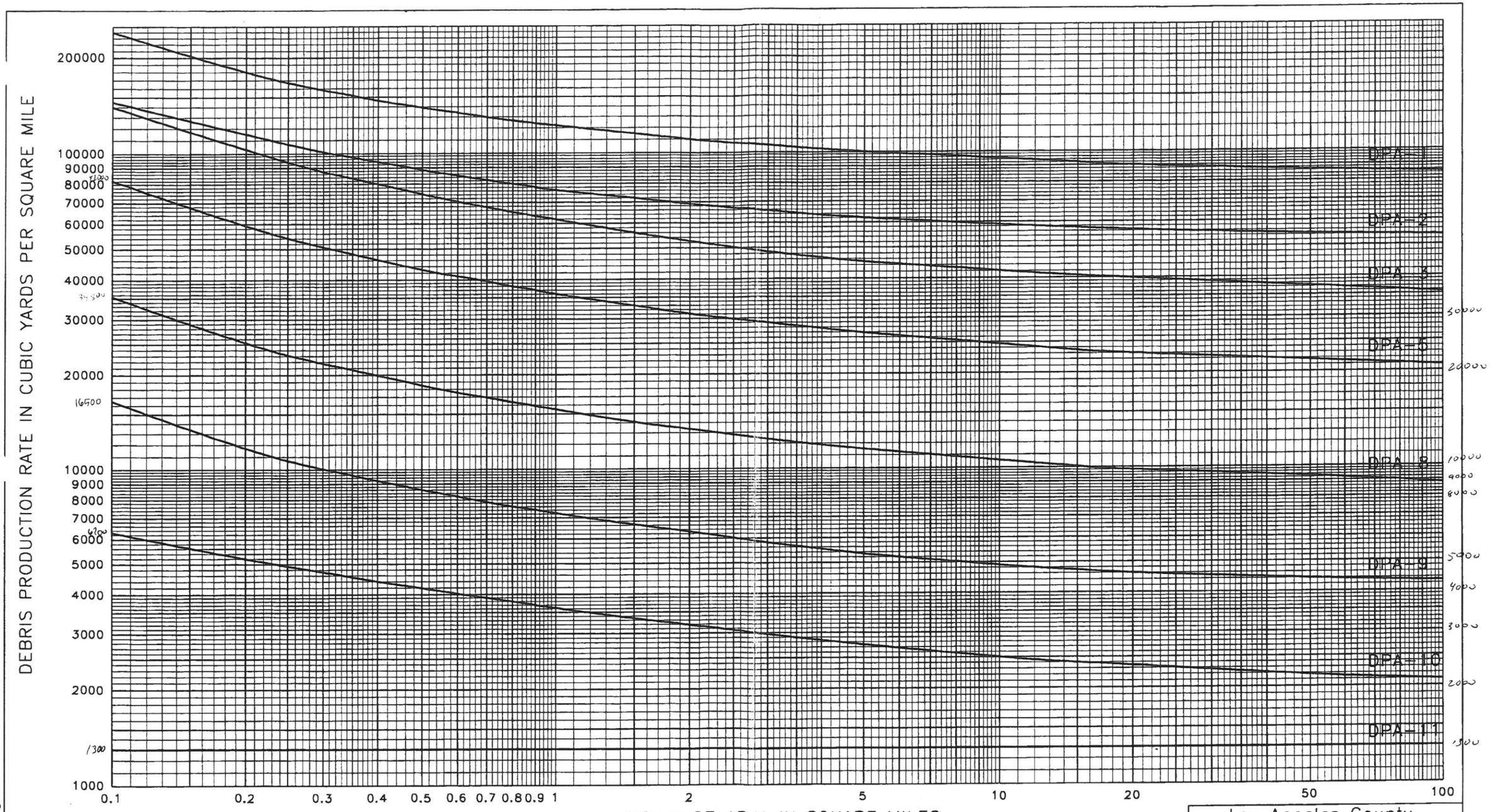
$$\text{VOL.} = (9' \times 1.5' + 1.5^2) \times 600' \times 2 + 9' \times 0.65 \times \frac{24}{12} \times 600' \times 2$$

$$= 18900\ FT^3 + 14040\ FT^3 = 32940\ FT^3$$

STORAGE VOLUME REQUIRED PHASE 1 (50-YR) = 31368 FT^3 < 32940 FT^3 O.K

STORAGE VOLUME REQUIRED PHASE 2 (50-YR) = 31121 FT^3 < 32940 FT^3 O.K.

WATER QUALITY VOLUME REQUIRED (3/4" EVENT) = 18500 FT^3

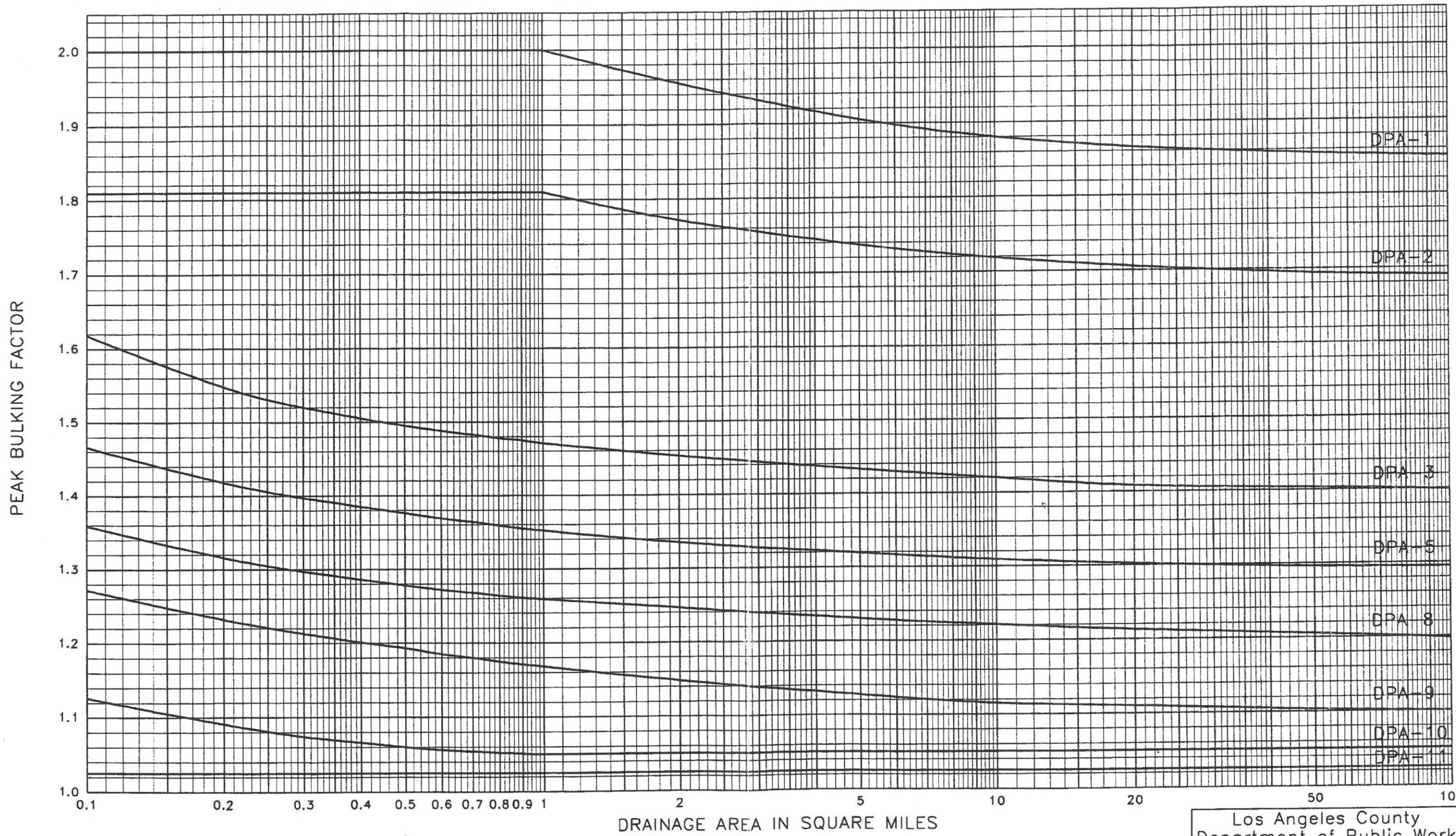


Los Angeles County
Department of Public Works

DEBRIS PRODUCTION RATES
for Antelope Valley

DPR

DP 'H5.SPG



Los Angeles County
Department of Public Works

PEAK BULKING FACTORS
for Antelope Valley

PB H4.SPG

HYDROLOGIC ANALYSIS

TABLE 1: HYDROLOGY DESIGN DATA

HYDROLOGY DESIGN DATA:	
RAINFALL DEPTH (50-YEAR)	2.6
SOIL TYPE	120
DPA ZONE	11
BURN FACTOR	0.34
BULKING FACTOR	1.02
PERCENT IMPERVIOUSNESS (PRE-DEVELOPMENT)	1%
PERCENT IMPERVIOUSNESS (POST DEVEOPMENT)	12%
AVERAGE SLOPE	0.004

TABLE 2: PHASE 1

DESIGN STORM FREQUENCY	AREA (ACRE)	PRE-DEVELOPMENT PEAK FLOW (CFS)	24-HOUR RUNOFF VOLUME (FT^3)	POST DEVELOPMENT PEAK FLOW RATE (CFS)	24-HOUR RUNOFF VOLUME (FT^3)	ΔVOLUME (ft^3)
2-YEAR	38.1	1.1	14905	1.9	27050	12145
5-YEAR	38.1	1.6	22493	2.9	40820	18327
10-YEAR	38.1	2.0	27500	3.6	49907	22407
25-YEAR	38.1	2.4	33816	4.4	61370	27554
50-YEAR	38.1	3.0	38644	5.3	70012	31368
3/4" STORM	-	-	-	1.4	20163	20163
85th %	-	-	-	0.7	9409	9409

TABLE 3: PHASE 2

DESIGN STORM FREQUENCY	NET AREA (ACRE)	PRE-DEVELOPMENT PEAK FLOW (CFS)	24-HOUR RUNOFF VOLUME (FT^3)	POST DEVELOPMENT PEAK FLOW RATE (CFS)	24-HOUR RUNOFF VOLUME (FT^3)	ΔVOLUME (ft^3)
2-YEAR	37.8	1.1	14788	1.9	26837	12049
5-YEAR	37.8	1.6	22316	2.9	40499	18183
10-YEAR	37.8	1.9	27283	3.5	49514	22231
25-YEAR	37.8	2.4	33550	4.3	60887	27337
50-YEAR	37.8	3.0	38340	5.2	69461	31121
3/4" STORM	-	-	-	1.4	20004	20004
85th %	-	-	-	0.7	9335	9335

Table 4: Phase 1 Detail Analysis

PRE DEVELOPMENT HYDROLOGY															
Subarea	Area (acres)	% IMP	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc Calculated (min)	Intensity (in/hr)	Cu	Cd	Fire Factor	Flow Rate (cfs)	Burned Flow Rate (cfs)	Volume (cu-ft)
Phase 1	38.1	0.01	2	120	1500	0.004	1.01	30	0.2586	0.10	0.108	0.34	1.1	1.7	14905
Phase 1	38.1	0.01	5	120	1500	0.004	1.52	30	0.3903	0.10	0.108	0.34	1.6	2.8	22493
Phase 1	38.1	0.01	10	120	1500	0.004	1.86	30	0.4771	0.10	0.108	0.34	2.0	3.5	27500
Phase 1	38.1	0.01	25	120	1500	0.004	2.28	30	0.5867	0.10	0.108	0.34	2.4	4.3	33816
Phase 1	38.1	0.01	50	120	1500	0.004	2.60	30	0.6683	0.11	0.120	0.34	3.0	5.3	38644

POST DEVELOPMENT HYDROLOGY															
Subarea	Area (acres)	% IMP	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc Calculated (min)	Intensity (in/hr)	Cu	Cd	Fire Factor	Flow Rate (cfs)	Burned Flow Rate (cfs)	Volume (cu-ft)
Phase 1	38.1	0.12	2	120	1500	0.004	1.01	30	0.2586	0.10	0.196	0.34	1.9	2.5	27050
Phase 1	38.1	0.12	5	120	1500	0.004	1.52	30	0.3903	0.10	0.196	0.34	2.9	4.0	40820
Phase 1	38.1	0.12	10	120	1500	0.004	1.86	30	0.4771	0.10	0.196	0.34	3.6	4.9	49907
Phase 1	38.1	0.12	25	120	1500	0.004	2.28	30	0.5867	0.10	0.196	0.34	4.4	6.1	61370
Phase 1	38.1	0.12	50	120	1500	0.004	2.60	30	0.6683	0.11	0.206	0.34	5.3	7.3	70012
Phase 1	38.1	0.12	3/4" STORM	120	1500	0.004	0.75	30	0.1928	0.10	0.196	0.34	1.4	1.8	20163
Phase 1	38.1	0.12	85TH %	120	1500	0.004	0.35	30	0.0900	0.10	0.196	0.34	0.7	0.8	9409

Table 5: Phase 2 Detail Analysis

PRE DEVELOPMENT HYDROLOGY															
Subarea	Area (acres)	% IMP	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc Calculated (min)	Intensity (in/hr)	Cu	Cd	Fire Factor	Flow Rate (cfs)	Burned Flow Rate (cfs)	Volume (cu-ft)
Phase 2	37.8	0.01	2	120	1500	0.004	1.01	30	0.2586	0.10	0.108	0.34	1.1	1.7	14788
Phase 2	37.8	0.01	5	120	1500	0.004	1.52	30	0.3903	0.10	0.108	0.34	1.6	2.7	22316
Phase 2	37.8	0.01	10	120	1500	0.004	1.86	30	0.4771	0.10	0.108	0.34	1.9	3.4	27283
Phase 2	37.8	0.01	25	120	1500	0.004	2.28	30	0.5867	0.10	0.108	0.34	2.4	4.3	33550
Phase 2	37.8	0.01	50	120	1500	0.004	2.60	30	0.6683	0.11	0.120	0.34	3.0	5.2	38340

POST DEVELOPMENT HYDROLOGY															
Subarea	Area (acres)	% IMP	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc Calculated (min)	Intensity (in/hr)	Cu	Cd	Fire Factor	Flow Rate (cfs)	Burned Flow Rate (cfs)	Volume (cu-ft)
Phase 2	37.8	0.12	2	120	1500	0.004	1.01	30	0.2586	0.10	0.196	0.34	1.9	2.5	26837
Phase 2	37.8	0.12	5	120	1500	0.004	1.52	30	0.3903	0.10	0.196	0.34	2.9	3.9	40499
Phase 2	37.8	0.12	10	120	1500	0.004	1.86	30	0.4771	0.10	0.196	0.34	3.5	4.9	49514
Phase 2	37.8	0.12	25	120	1500	0.004	2.28	30	0.5867	0.10	0.196	0.34	4.3	6.1	60887
Phase 2	37.8	0.12	50	120	1500	0.004	2.60	30	0.6683	0.11	0.206	0.34	5.2	7.2	69461
Phase 2	37.8	0.12	3/4" STORM	120	1500	0.004	0.75	30	0.1928	0.10	0.196	0.34	1.4	1.8	20004
Phase 2	37.8	0.12	85TH %	120	1500	0.004	0.35	30	0.0900	0.10	0.196	0.34	0.7	0.8	9335

Peak Flow Hydrologic Analysis

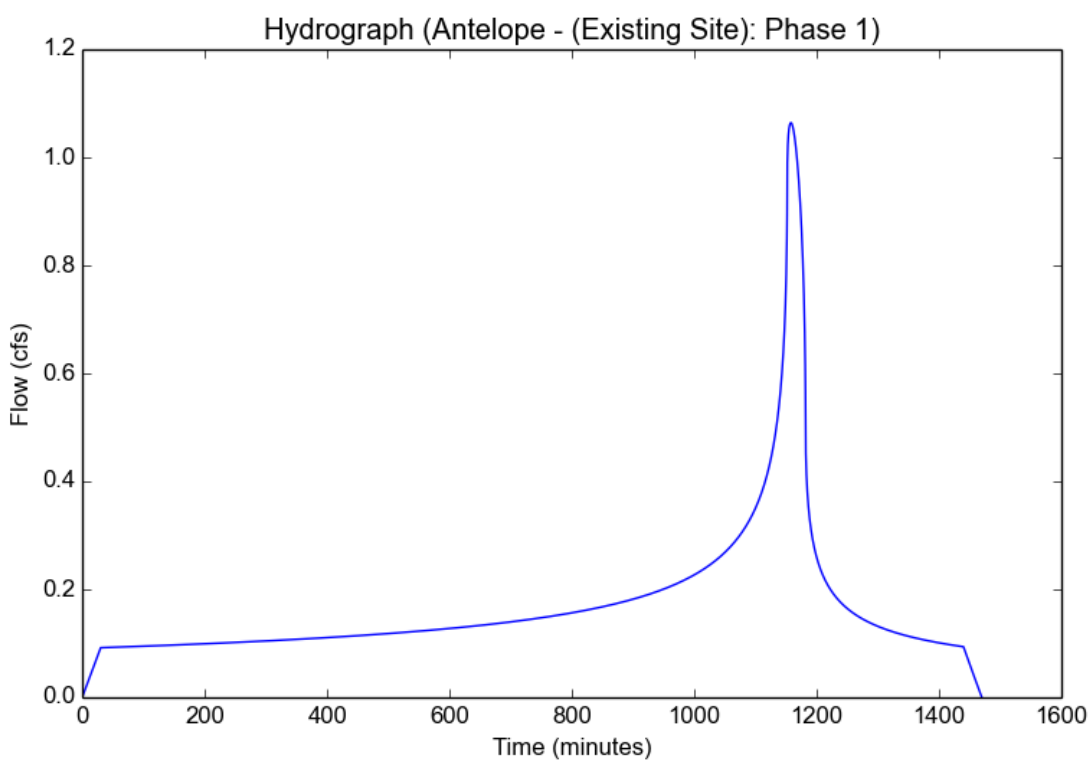
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 1-2 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	2-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	1.0062
Peak Intensity (in/hr)	0.2586
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.0642
Burned Peak Flow Rate (cfs)	1.7301
24-Hr Clear Runoff Volume (ac-ft)	0.3422
24-Hr Clear Runoff Volume (cu-ft)	14905.2935



Peak Flow Hydrologic Analysis

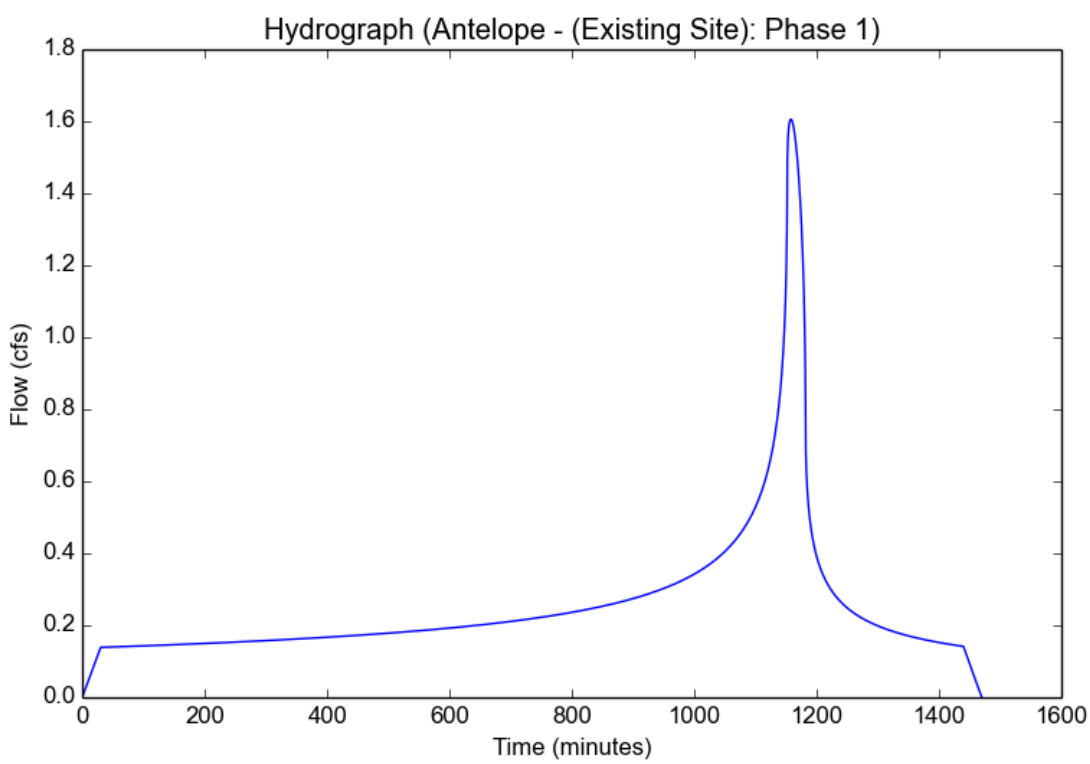
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 1-5 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	5-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	1.5184
Peak Intensity (in/hr)	0.3903
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.6059
Burned Peak Flow Rate (cfs)	2.7549
24-Hr Clear Runoff Volume (ac-ft)	0.5164
24-Hr Clear Runoff Volume (cu-ft)	22492.7426



Peak Flow Hydrologic Analysis

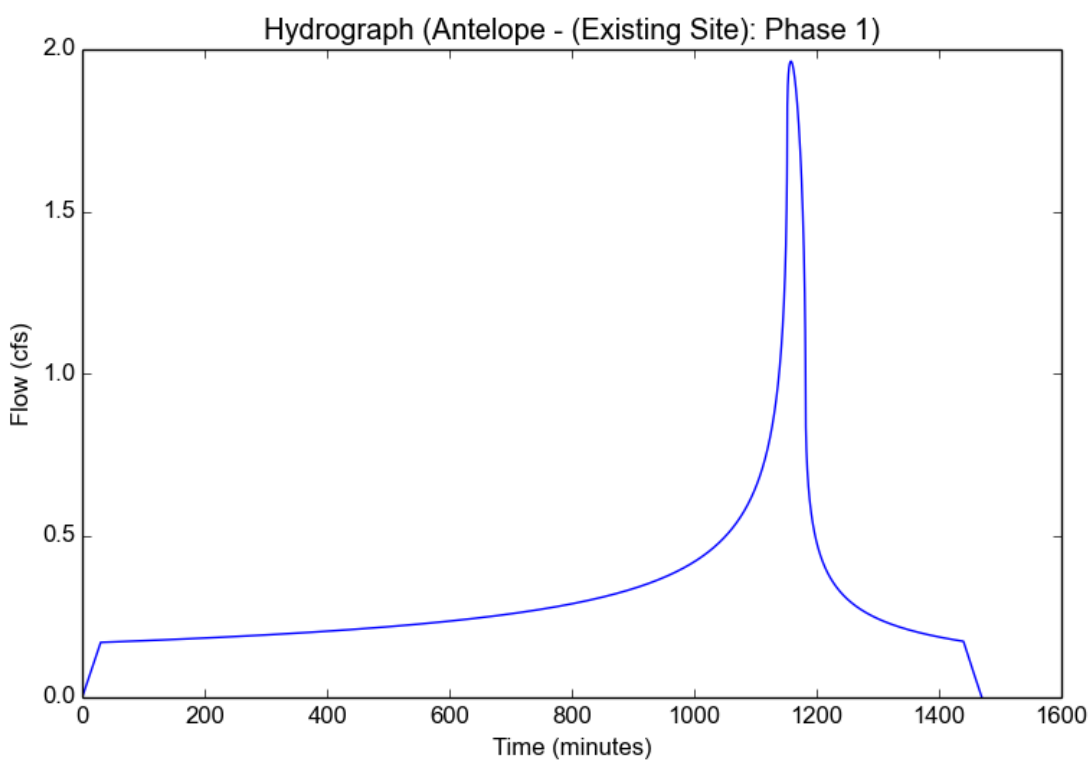
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 1-10 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	10-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	1.8564
Peak Intensity (in/hr)	0.4771
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.9633
Burned Peak Flow Rate (cfs)	3.4515
24-Hr Clear Runoff Volume (ac-ft)	0.6313
24-Hr Clear Runoff Volume (cu-ft)	27499.6887



Peak Flow Hydrologic Analysis

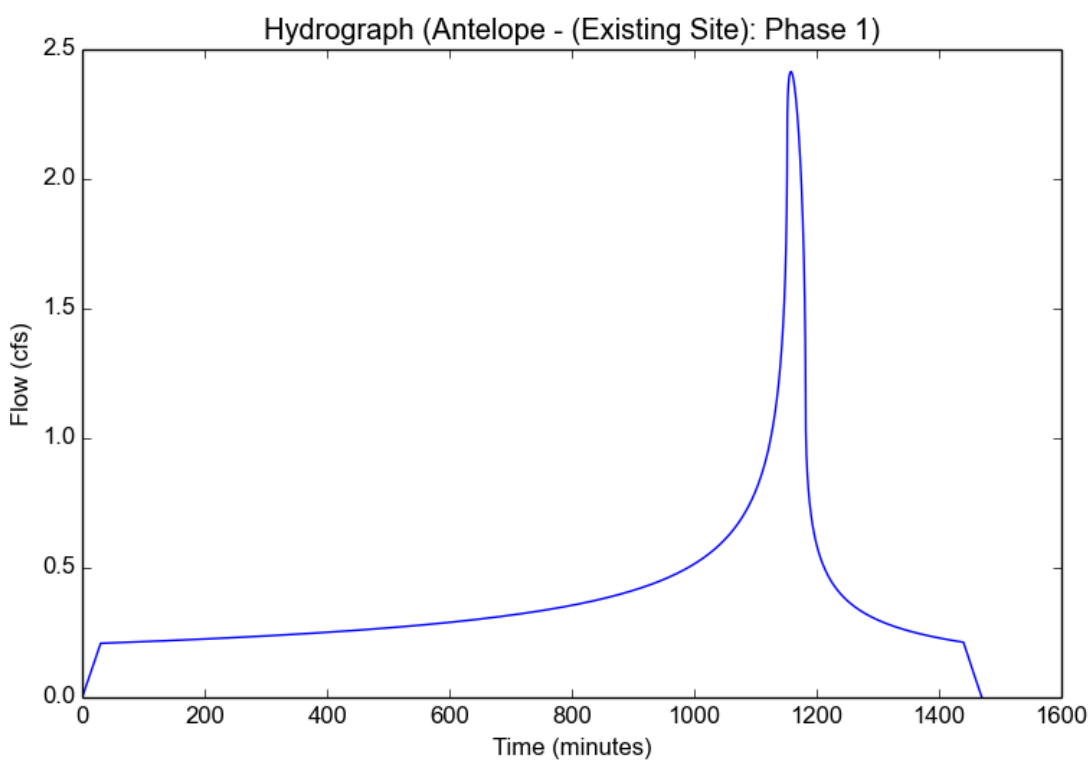
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 1-25 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	25-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.2828
Peak Intensity (in/hr)	0.5867
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.4143
Burned Peak Flow Rate (cfs)	4.3476
24-Hr Clear Runoff Volume (ac-ft)	0.7763
24-Hr Clear Runoff Volume (cu-ft)	33816.1438



Peak Flow Hydrologic Analysis

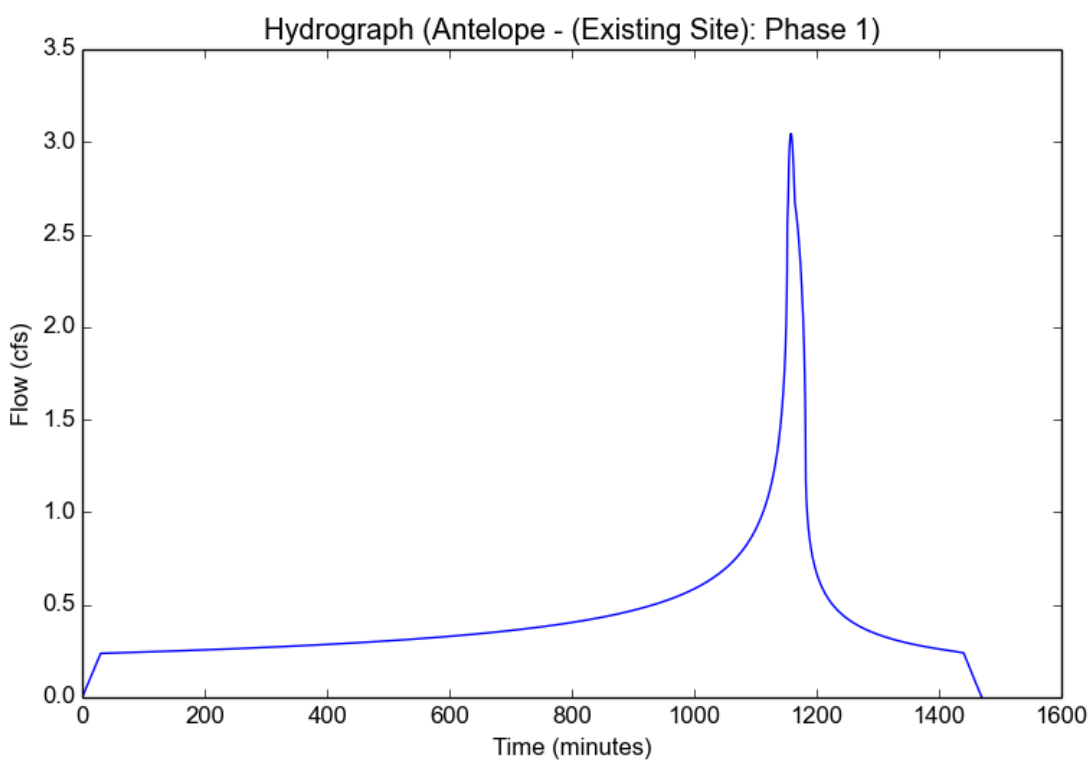
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 1-50yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.6
Peak Intensity (in/hr)	0.6683
Undeveloped Runoff Coefficient (Cu)	0.1117
Developed Runoff Coefficient (Cd)	0.1196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	3.0448
Burned Peak Flow Rate (cfs)	5.2899
24-Hr Clear Runoff Volume (ac-ft)	0.8871
24-Hr Clear Runoff Volume (cu-ft)	38644.2402



Peak Flow Hydrologic Analysis

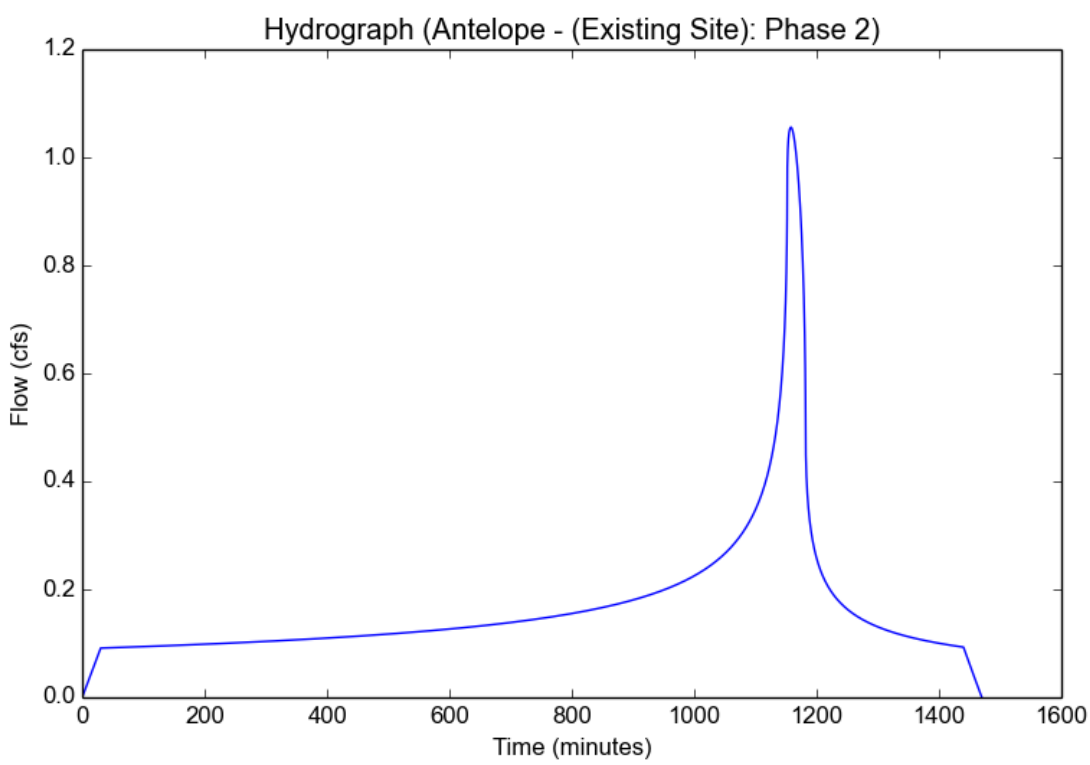
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 2-2 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	2-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	1.0062
Peak Intensity (in/hr)	0.2586
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.0558
Burned Peak Flow Rate (cfs)	1.7165
24-Hr Clear Runoff Volume (ac-ft)	0.3395
24-Hr Clear Runoff Volume (cu-ft)	14787.929



Peak Flow Hydrologic Analysis

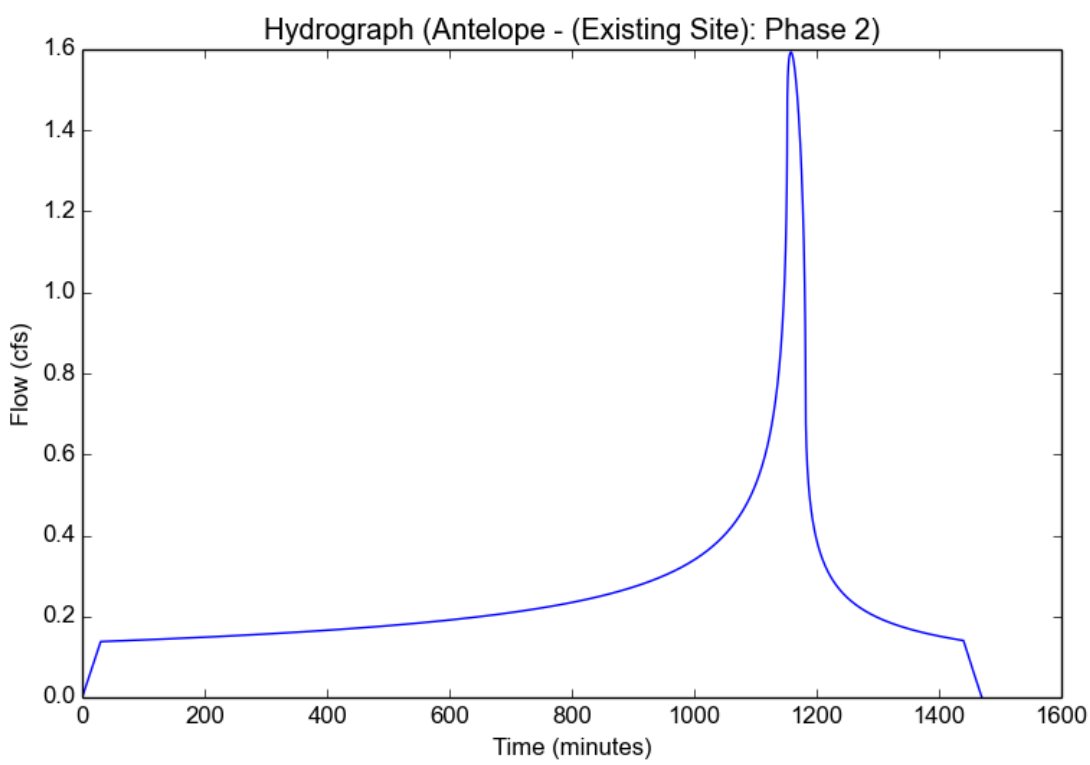
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 2-5 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	5-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	1.5184
Peak Intensity (in/hr)	0.3903
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.5932
Burned Peak Flow Rate (cfs)	2.7332
24-Hr Clear Runoff Volume (ac-ft)	0.5123
24-Hr Clear Runoff Volume (cu-ft)	22315.6344



Peak Flow Hydrologic Analysis

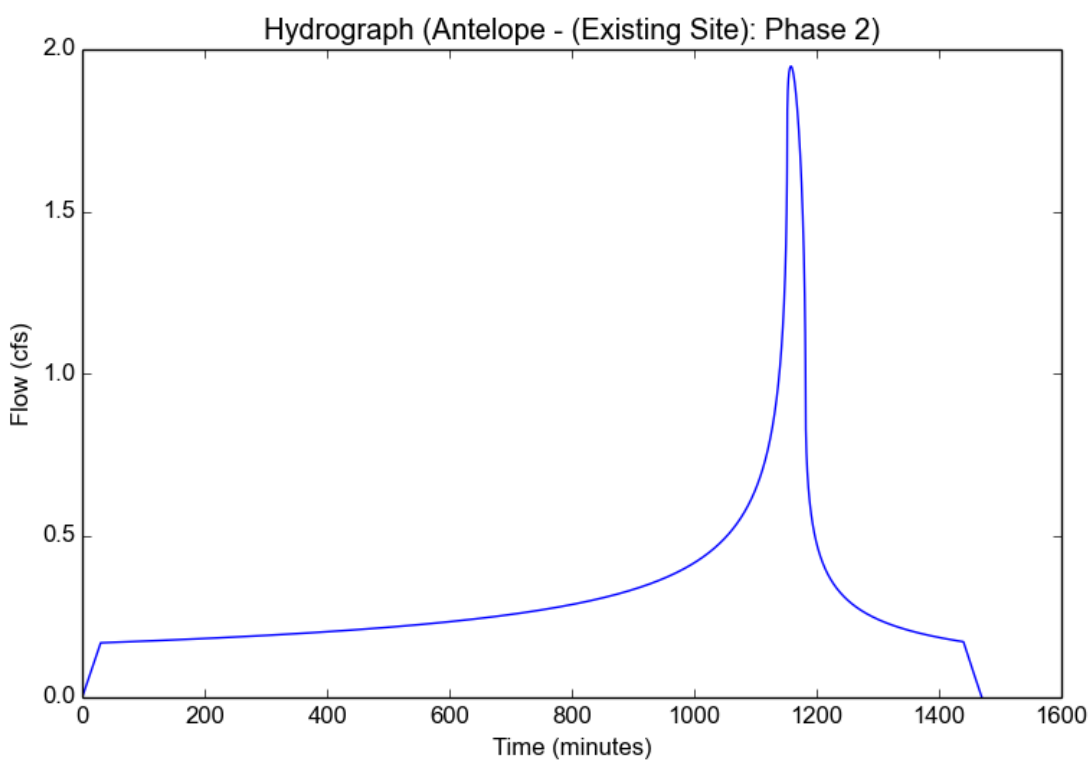
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 2-10 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	10-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	1.8564
Peak Intensity (in/hr)	0.4771
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.9479
Burned Peak Flow Rate (cfs)	3.4243
24-Hr Clear Runoff Volume (ac-ft)	0.6263
24-Hr Clear Runoff Volume (cu-ft)	27283.1557



Peak Flow Hydrologic Analysis

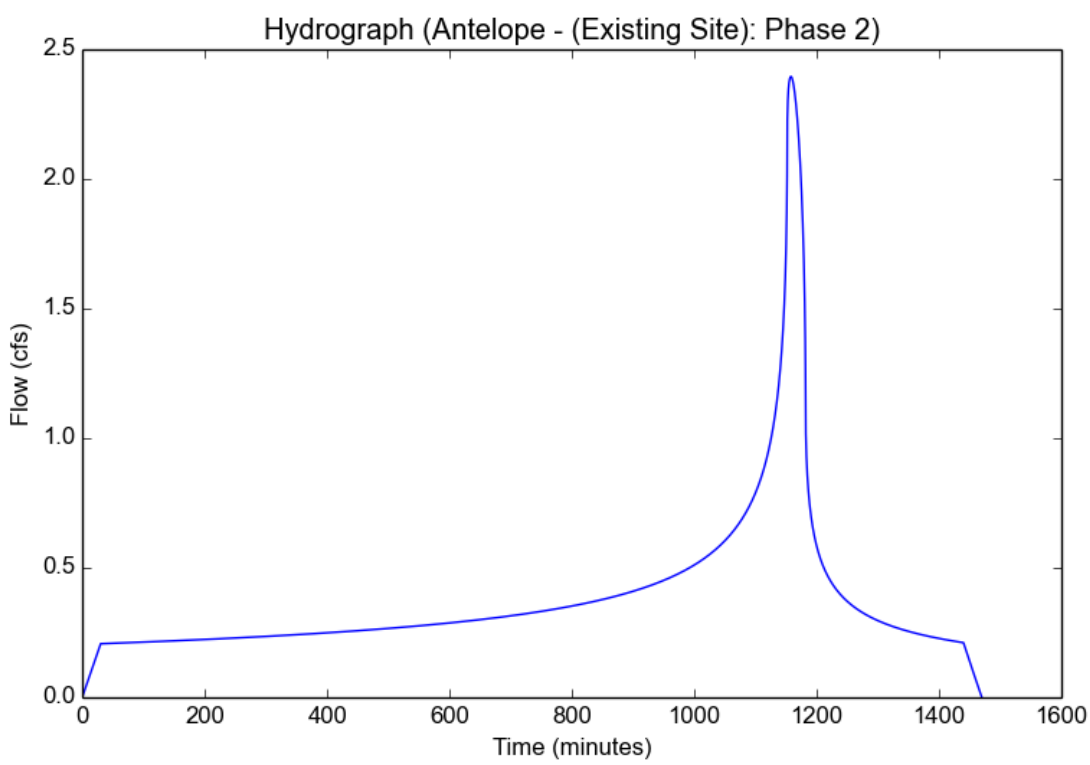
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 2-25 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	25-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.2828
Peak Intensity (in/hr)	0.5867
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.3953
Burned Peak Flow Rate (cfs)	4.3134
24-Hr Clear Runoff Volume (ac-ft)	0.7702
24-Hr Clear Runoff Volume (cu-ft)	33549.875



Peak Flow Hydrologic Analysis

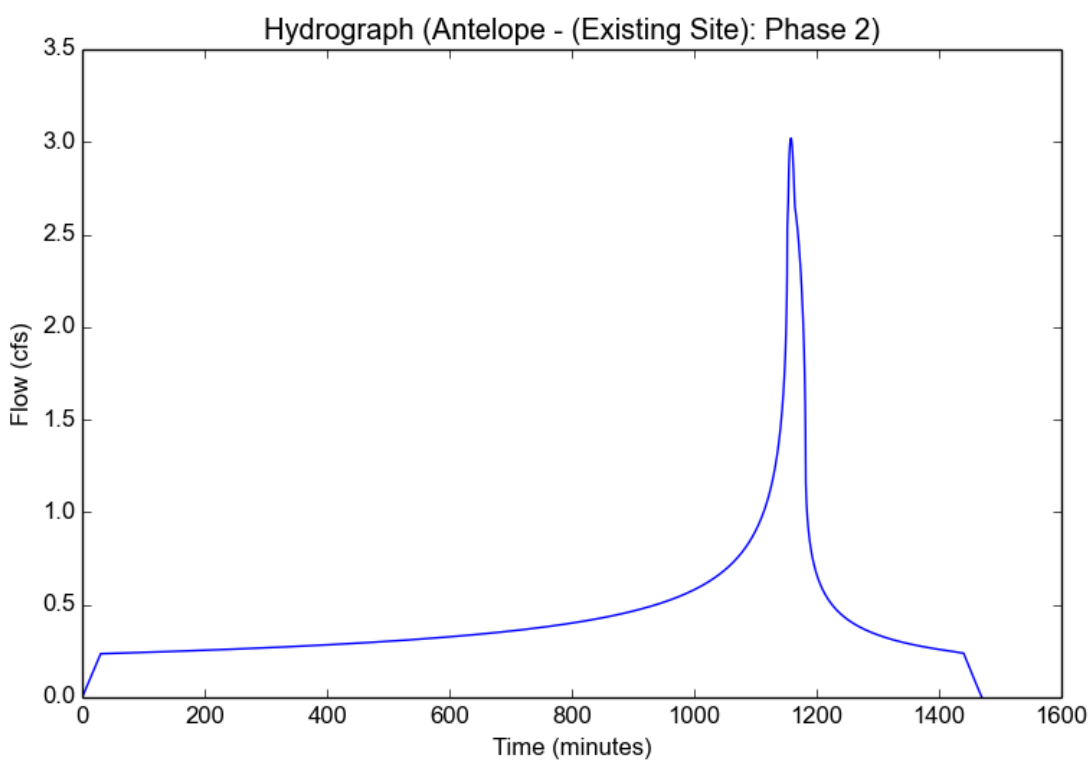
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Exisitng Site) - Phase 2-50 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Existing Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.6
Peak Intensity (in/hr)	0.6683
Undeveloped Runoff Coefficient (Cu)	0.1117
Developed Runoff Coefficient (Cd)	0.1196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	3.0208
Burned Peak Flow Rate (cfs)	5.2483
24-Hr Clear Runoff Volume (ac-ft)	0.8802
24-Hr Clear Runoff Volume (cu-ft)	38339.9549



Peak Flow Hydrologic Analysis

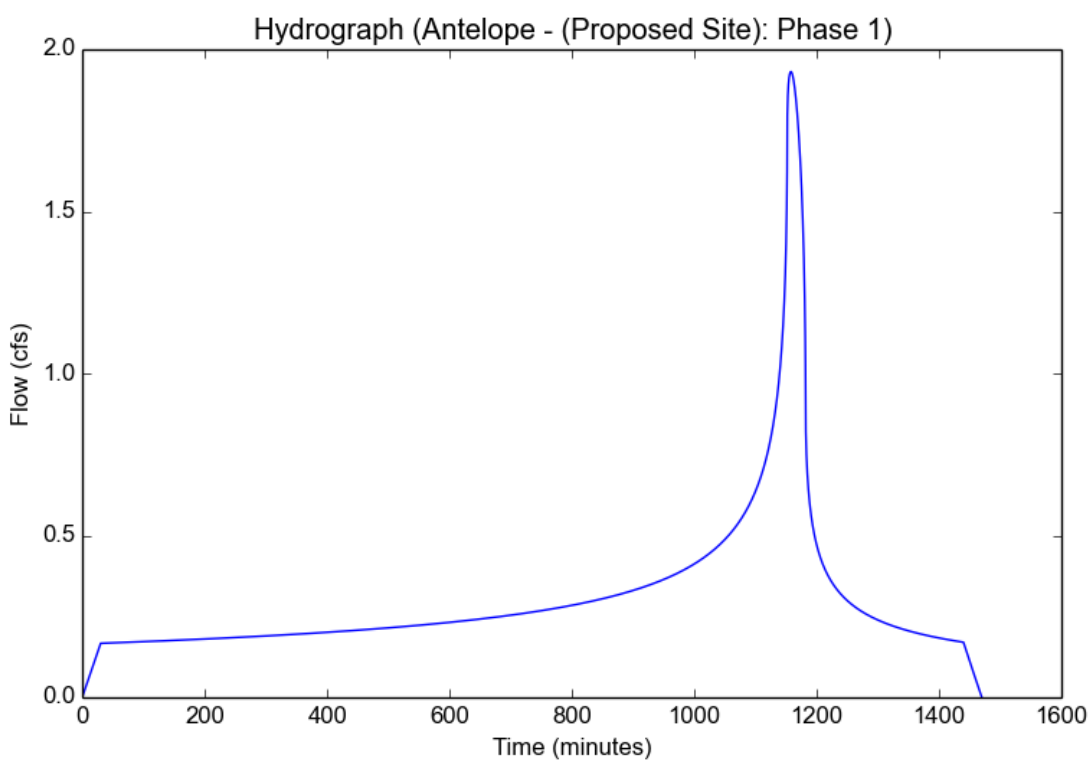
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 1- 2 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	2-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	1.0062
Peak Intensity (in/hr)	0.2586
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.9312
Burned Peak Flow Rate (cfs)	2.5315
24-Hr Clear Runoff Volume (ac-ft)	0.621
24-Hr Clear Runoff Volume (cu-ft)	27050.3474



Peak Flow Hydrologic Analysis

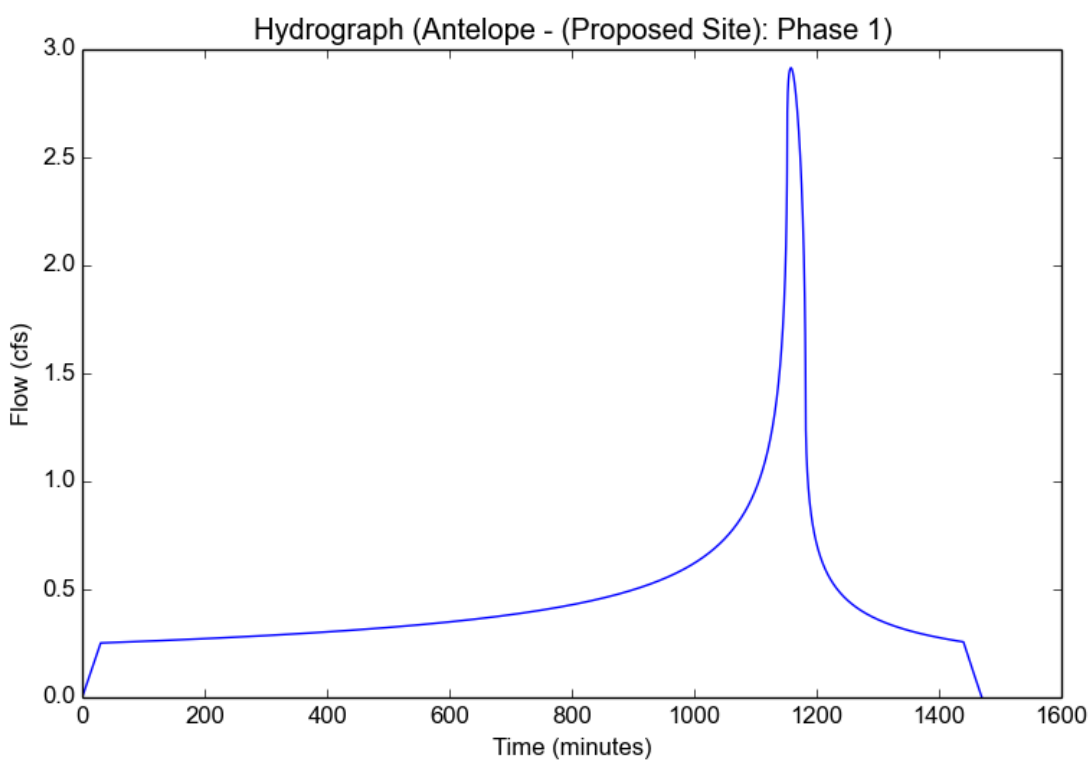
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 1- 5 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	5-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	1.5184
Peak Intensity (in/hr)	0.3903
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.9143
Burned Peak Flow Rate (cfs)	3.95
24-Hr Clear Runoff Volume (ac-ft)	0.9371
24-Hr Clear Runoff Volume (cu-ft)	40820.1625



Peak Flow Hydrologic Analysis

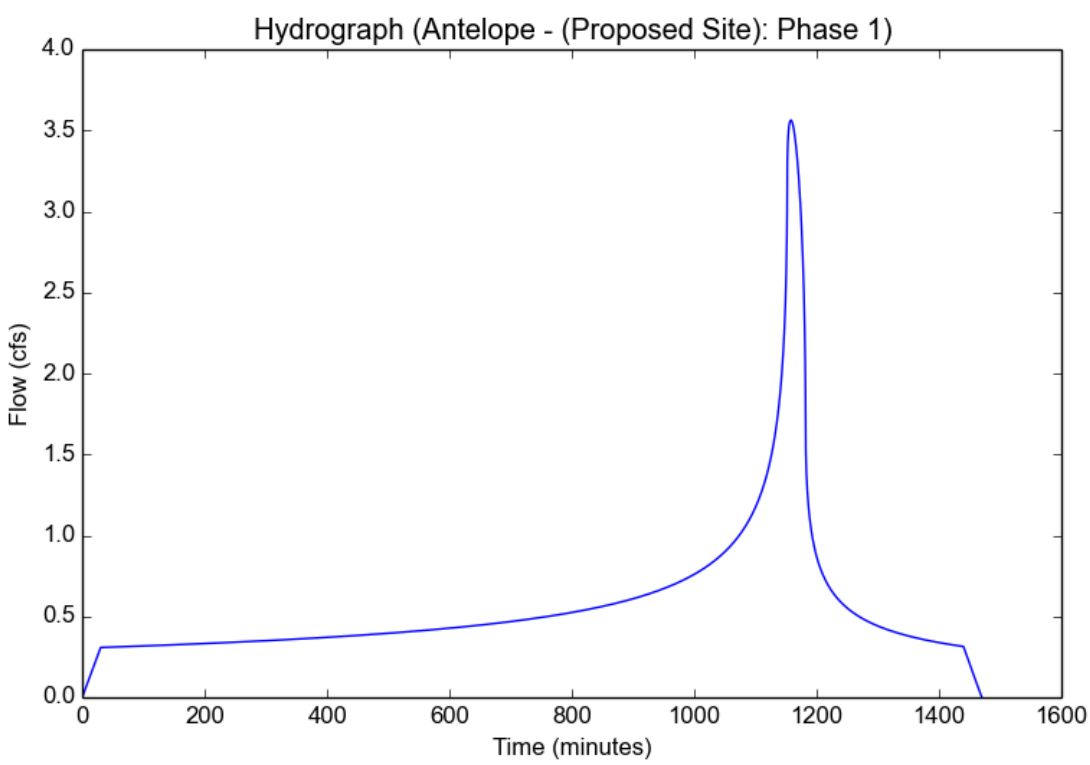
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 1- 10 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	10-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	1.8564
Peak Intensity (in/hr)	0.4771
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	3.5631
Burned Peak Flow Rate (cfs)	4.9044
24-Hr Clear Runoff Volume (ac-ft)	1.1457
24-Hr Clear Runoff Volume (cu-ft)	49906.8425



Peak Flow Hydrologic Analysis

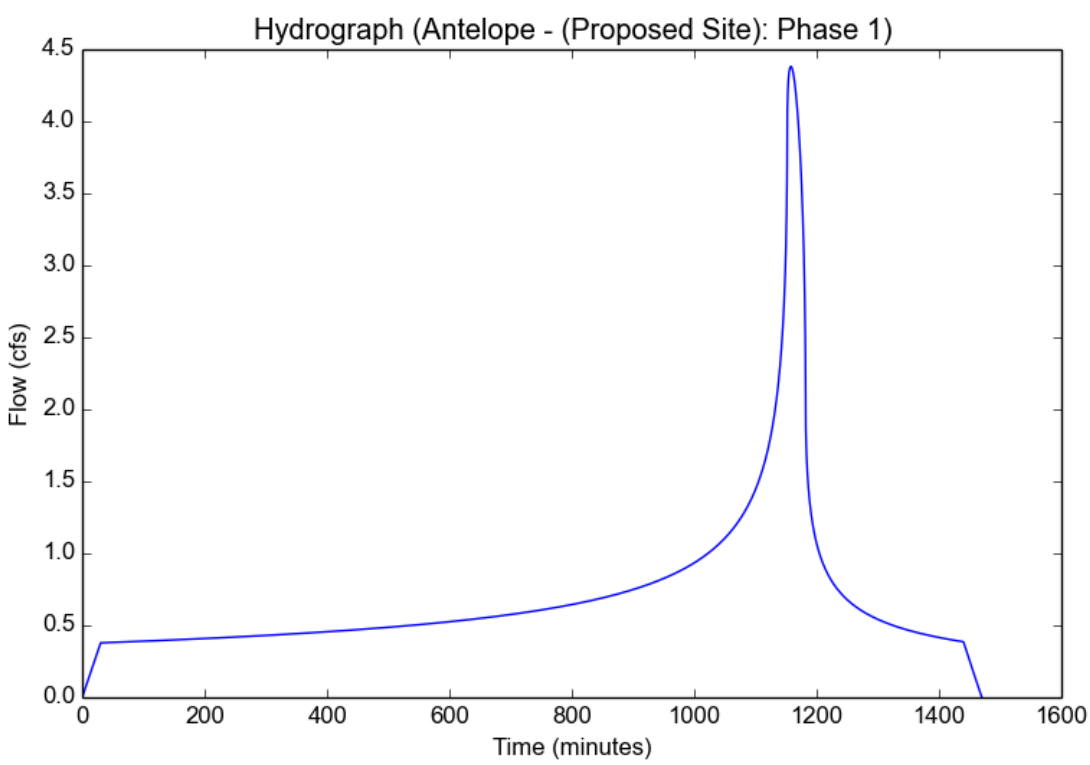
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 1- 25 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	25-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.2828
Peak Intensity (in/hr)	0.5867
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	4.3815
Burned Peak Flow Rate (cfs)	6.1241
24-Hr Clear Runoff Volume (ac-ft)	1.4089
24-Hr Clear Runoff Volume (cu-ft)	61370.0388



Peak Flow Hydrologic Analysis

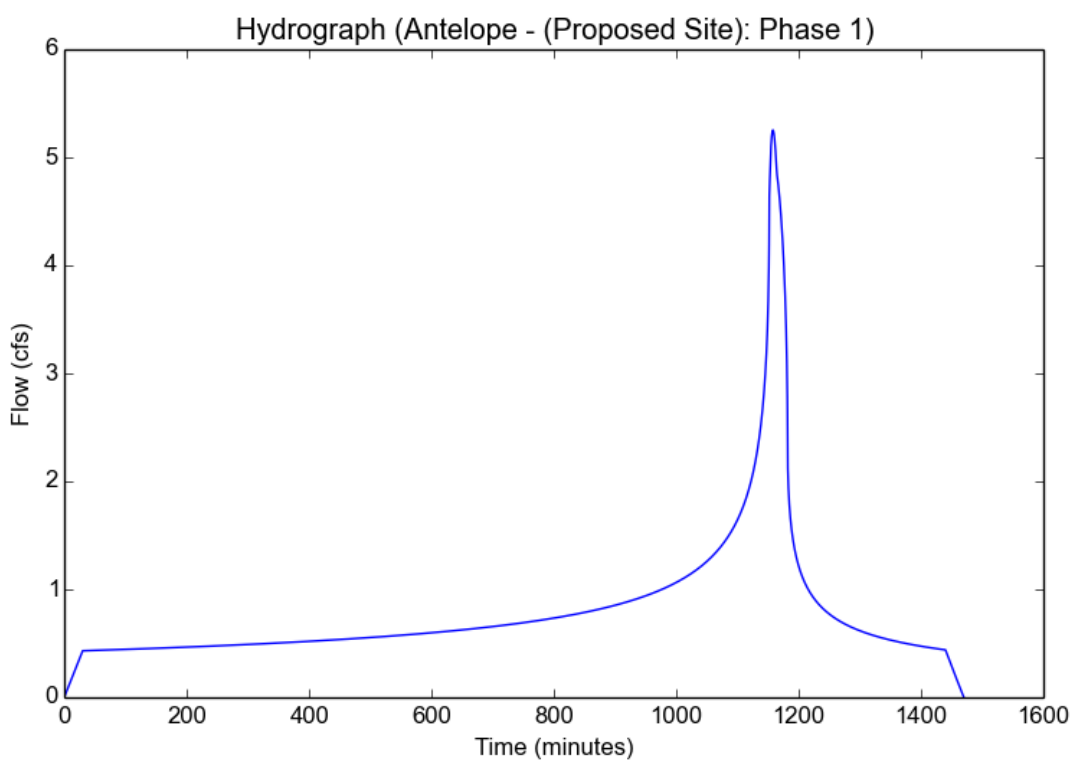
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 1- 50 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 1
Area (ac)	38.1
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.6
Peak Intensity (in/hr)	0.6683
Undeveloped Runoff Coefficient (Cu)	0.1117
Developed Runoff Coefficient (Cd)	0.2063
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	5.2525
Burned Peak Flow Rate (cfs)	7.2766
24-Hr Clear Runoff Volume (ac-ft)	1.6073
24-Hr Clear Runoff Volume (cu-ft)	70012.4452



Peak Flow Hydrologic Analysis

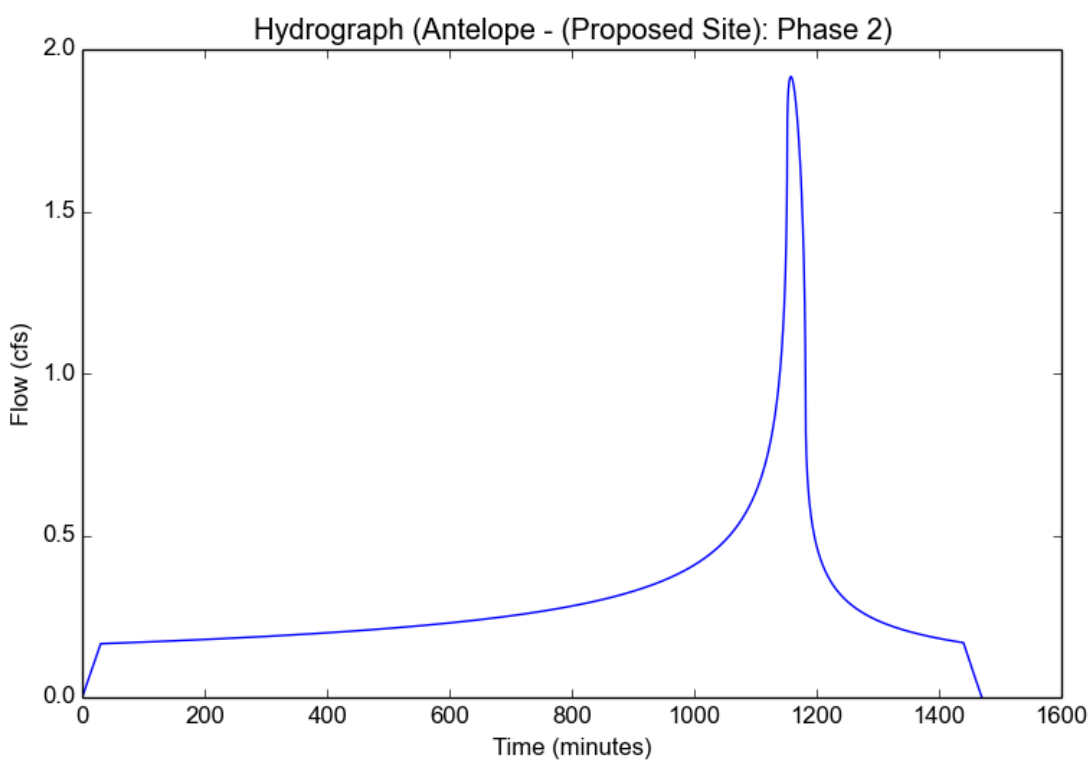
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 2- 2 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	2-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	1.0062
Peak Intensity (in/hr)	0.2586
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.916
Burned Peak Flow Rate (cfs)	2.5116
24-Hr Clear Runoff Volume (ac-ft)	0.6161
24-Hr Clear Runoff Volume (cu-ft)	26837.3525



Peak Flow Hydrologic Analysis

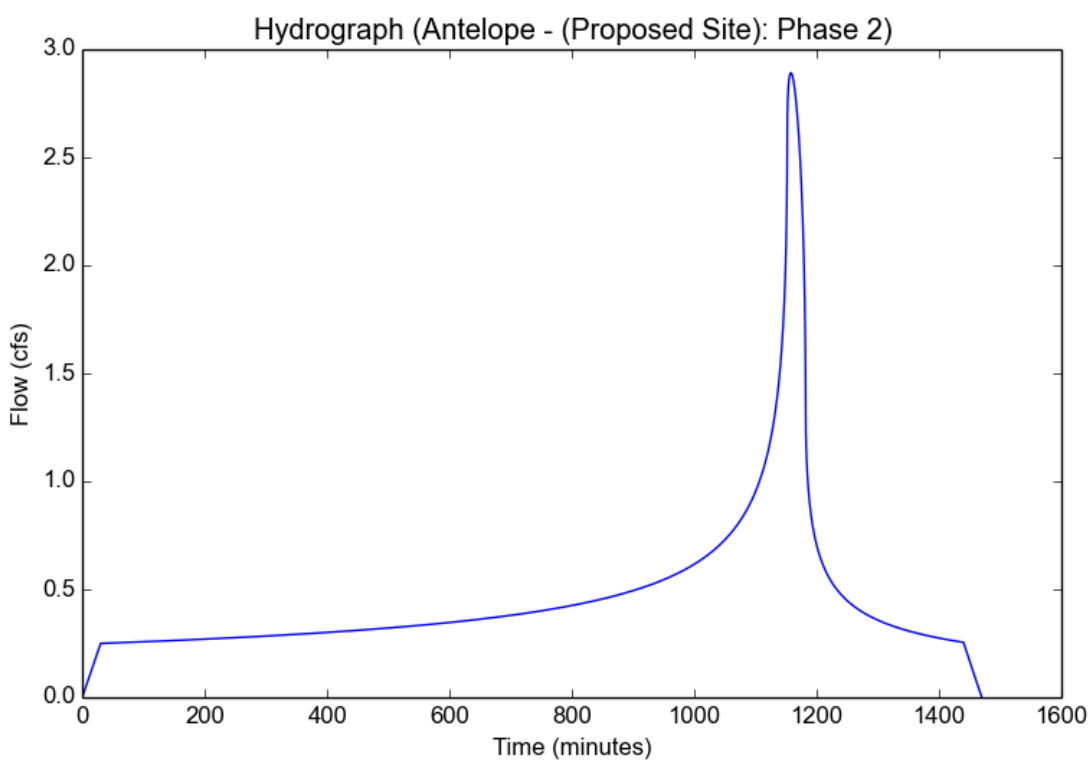
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 2- 5 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	5-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	1.5184
Peak Intensity (in/hr)	0.3903
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.8914
Burned Peak Flow Rate (cfs)	3.9189
24-Hr Clear Runoff Volume (ac-ft)	0.9297
24-Hr Clear Runoff Volume (cu-ft)	40498.7439



Peak Flow Hydrologic Analysis

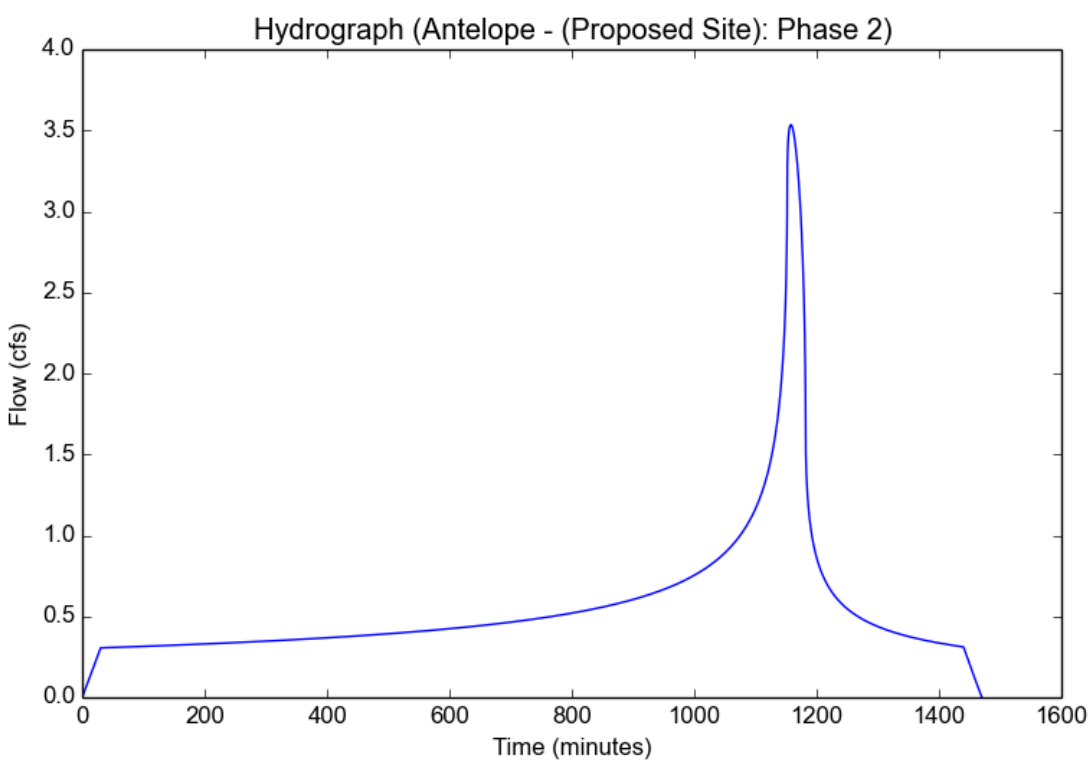
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 2- 10 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	10-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	1.8564
Peak Intensity (in/hr)	0.4771
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	3.535
Burned Peak Flow Rate (cfs)	4.8658
24-Hr Clear Runoff Volume (ac-ft)	1.1367
24-Hr Clear Runoff Volume (cu-ft)	49513.8752



Peak Flow Hydrologic Analysis

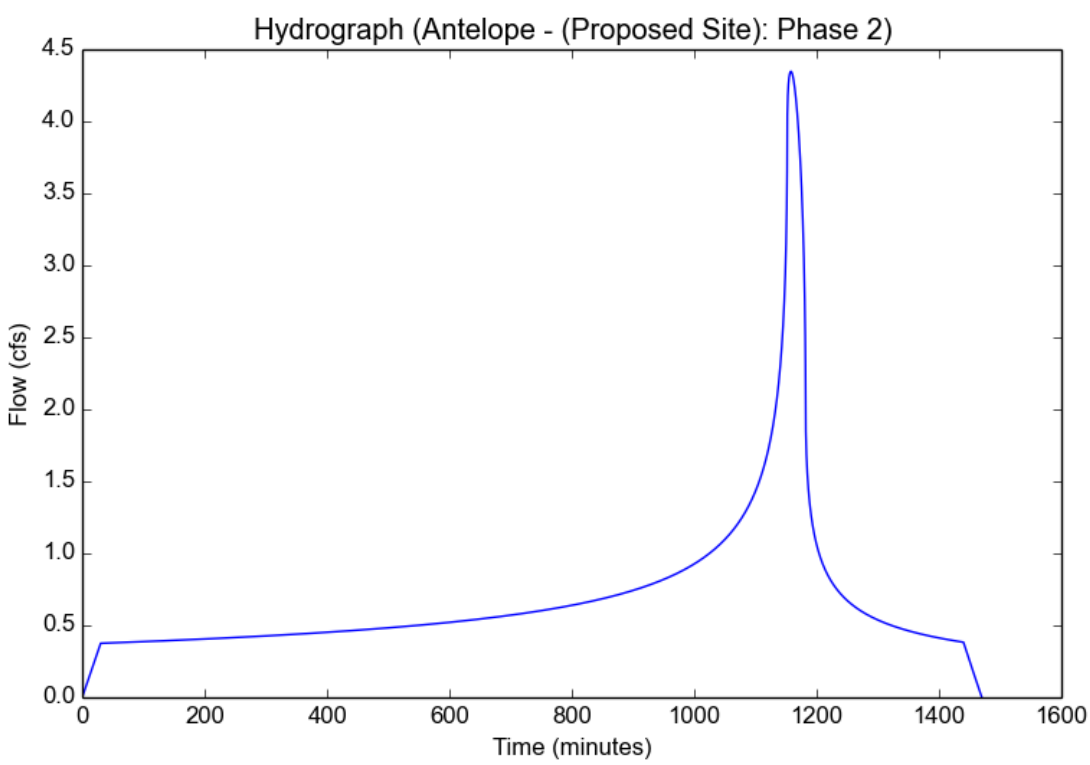
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 2- 25 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	25-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.2828
Peak Intensity (in/hr)	0.5867
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	4.347
Burned Peak Flow Rate (cfs)	6.0758
24-Hr Clear Runoff Volume (ac-ft)	1.3978
24-Hr Clear Runoff Volume (cu-ft)	60886.8102



Peak Flow Hydrologic Analysis

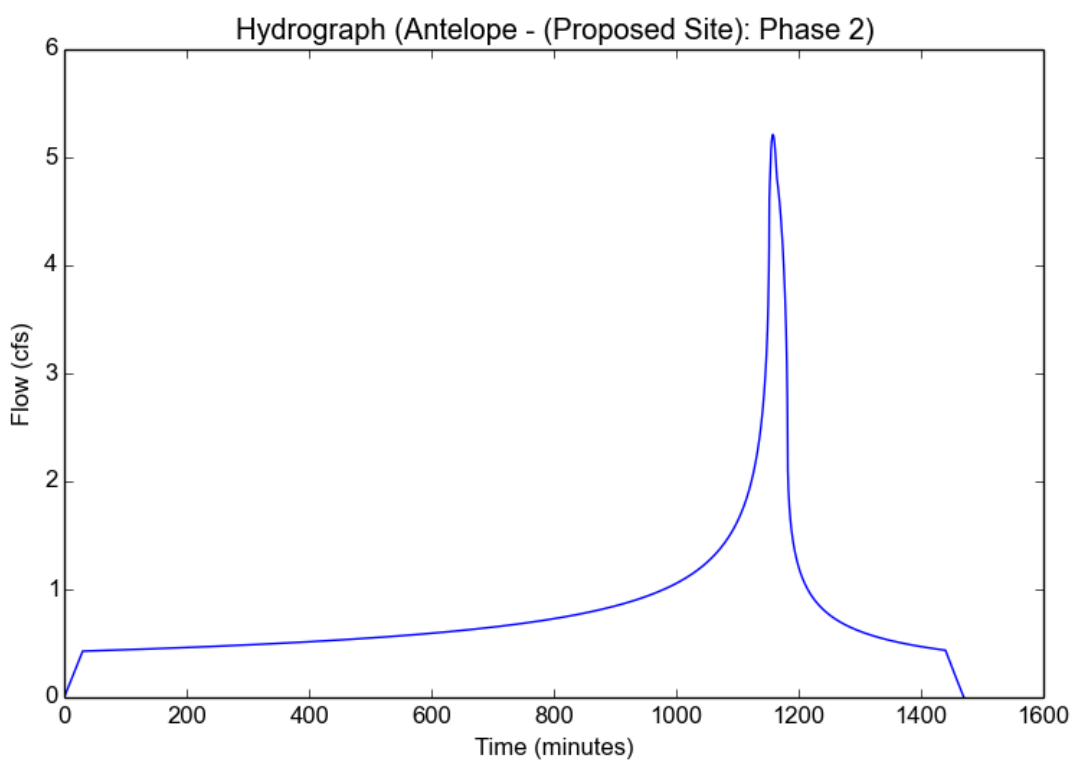
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 12%/Antelope - (Proposed Site) - Phase 2- 50 yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - (Proposed Site)
Subarea ID	Phase 2
Area (ac)	37.8
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.12
Soil Type	120
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.6
Peak Intensity (in/hr)	0.6683
Undeveloped Runoff Coefficient (Cu)	0.1117
Developed Runoff Coefficient (Cd)	0.2063
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	5.2112
Burned Peak Flow Rate (cfs)	7.2193
24-Hr Clear Runoff Volume (ac-ft)	1.5946
24-Hr Clear Runoff Volume (cu-ft)	69461.1661



Peak Flow Hydrologic Analysis

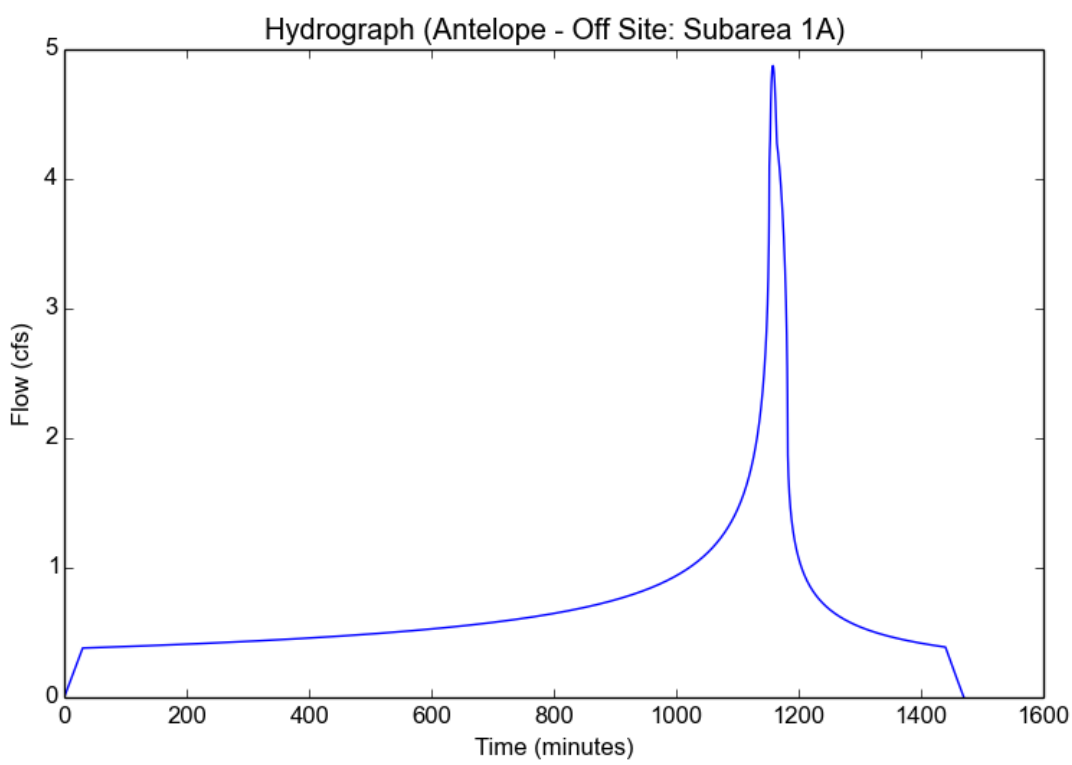
File location: C:/Users/yramos/Desktop/CSV, hydrocalc/Impervious 10%/Antelope - Off Site 50-yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Antelope - Off Site
Subarea ID	Subarea 1A
Area (ac)	61.0
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.6
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.6
Peak Intensity (in/hr)	0.6683
Undeveloped Runoff Coefficient (Cu)	0.1117
Developed Runoff Coefficient (Cd)	0.1196
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	4.8748
Burned Peak Flow Rate (cfs)	8.4694
24-Hr Clear Runoff Volume (ac-ft)	1.4204
24-Hr Clear Runoff Volume (cu-ft)	61871.3557



APPENDIX A

NOTES:

THIS IS A CONCEPTUAL LAYOUT AND DESIGN AND NOT RELEASED FOR CONSTRUCTION.

SITE PLAN
FOR
ANTELOPE VALLEY SOLAR, LLC
SOLAR PHOTOVOLTAIC ENERGY PROJECT
UNINCORPORATED LOS ANGELES COUNTY, CA

LEGAL DESCRIPTION

PARCEL 1: (APN: 3307-016-012)
THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 31, TOWNSHIP 8 NORTH, RANGE 10 WEST, S.B.B.M., COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND, APPROVED BY THE SURVEYOR GENERAL ON JUNE 19, 1856.
PARCEL 2: (APN: 3307-016-013)
THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 31, TOWNSHIP 8 NORTH, RANGE 10 WEST, S.B.B.M., COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND, APPROVED BY THE SURVEYOR GENERAL ON JUNE 19, 1856.

ASSESSOR'S PARCEL NUMBERS

APNs: 3307-016-012, 3307-016-013

ZONING

HEAVY AGRICULTURE (A-2-1)

LAND USE

EXISTING-VACANT LAND

PROPOSED-PHOTOVOLTAIC ENERGY PROJECT

AREA:

GROSS AREA: 81.74 ACRES

NET AREA: 72.84 ACRES

PROJECT PHASING:

THE PROJECT WILL BE CONSTRUCTED IN TWO PHASES.
PHASE 1 IS EXPECTED TO BE APPROXIMATELY LOCATED WITHIN PARCEL 1, AND PHASE 2 IS EXPECTED TO BE APPROXIMATELY LOCATED WITHIN PARCEL 2. APPLICANT WILL OBTAIN GRADING AND BUILDING PERMITS, AND SATISFY OTHER CONDITIONS, APPLICABLE TO EACH PHASE SEPARATELY.

TITLE POLICY EXCEPTIONS:

OUR SERVICE IS LIMITED TO THOSE ITEMS WHICH CAN BE VERIFIED BY A SURVEYOR PURSUANT TO A FIELD SURVEY. EXCEPT AS EXPRESSLY REPRESENTED HEREON, NO REPRESENTATION IS MADE AS TO THE LEGAL EFFECT OF ANY TITLE MATTER OR THE COMPLIANCE OR NONCOMPLIANCE WITH ANY LAW, WHETHER STATE, FEDERAL, OR LOCAL JURISDICTION. EXCEPT AS SPECIFICALLY NOTED HEREIN NO REPRESENTATION IS MADE AS TO THE EFFECT OF ANY EXCEPTIONS LISTED IN SCHEDULE B OF THE TITLE POLICY.

THE FOLLOWING EXCEPTIONS ARE FROM SCHEDULE B OF COMMONWEALTH LAND TITLE COMPANY, OWNER'S POLICY OF LAND TITLE INSURANCE, POLICY NO.: CA-SFXFC-IMP-81306-1-13-08010692.

<K1> EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

PURPOSE: ROAD
RECORDED: IN BOOK 6604 PAGE 343 OF DEEDS
AFFECTS: THE EASTERLY 30 FEET

<K2> EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

PURPOSE: PUBLIC ROAD
RECORDED: MAY 5, 1920, AS INSTRUMENT NO. 437, IN BOOK 7128 PAGE 345 OF DEEDS
AFFECTS: THE SOUTH 20 FEET

<K3> EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

PURPOSE: ROAD, HIGHWAY
RECORDED: IN BOOK 6711 PAGE 4 OF OFFICIAL RECORDS
AFFECTS: THE SOUTHERLY 20 FEET

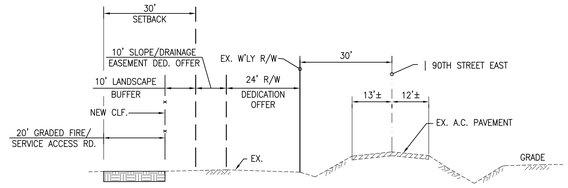
<K4> AN EASEMENT OVER THE SOUTHERLY 30 FEET OF SAID LAND FOR ROAD AND HIGHWAY PURPOSES, AS DISCLOSED BY THE BOARD OF SUPERVISORS OF LOS ANGELES COUNTY BY ORDER ENTERED DECEMBER 19, 1932 IN MINUTE BOOK 184 PAGE 360 OF OFFICIAL RECORDS.

<K5> EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

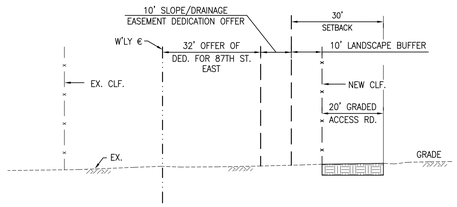
PURPOSE: PUBLIC ROAD AND HIGHWAY PURPOSES
RECORDING DATE: NOVEMBER 25, 1952
RECORDING NO: IN BOOK 40385 PAGE 412 OF OFFICIAL RECORDS
AFFECTS: THE NORTH 40 FEET

NOTES:

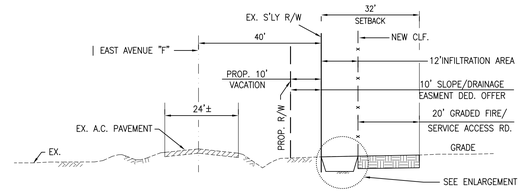
BOUNDARY LINES	ARE ESTABLISHED FROM RECOVERED COUNTY AND PRIVATE ENGINEER MONUMENTS WHOSE CHARACTER AND SOURCE ARE SO NOTED ON THE SITE PLAN.
LEGAL DESCRIPTION	FROM THE TITLE INSURANCE POLICY PROVIDED BY THE CLIENT
EASEMENT RIGHTS	EASEMENTS ARE SHOWN FROM THE TITLE POLICY.
TITLE POLICY	COMMONWEALTH LAND TITLE INSURANCE COMPANY, OWNER'S POLICY OF TITLE INSURANCE, POLICY NUMBER: CA-SFXFC-IMP-81306-1-13-08010692. <No.> INDICATES TITLE POLICY EXCEPTIONS FROM COVERAGE PER THIS TITLE INSURANCE POLICY.
BASIS OF BEARINGS	THE BEARING OF N00°05'03"E FOR THE CENTERLINE OF 90TH STREET EAST, SAID CENTERLINE ALSO BEING THE EASTERLY LINE OF SECTION 31, T8N, R10W, SBBM, AS SHOWN ON MAP OF TRACT NO. 40824, M.B. 1101-16-17, IS THE BASIS OF BEARINGS FOR THIS SITE PLAN.
AREAS	BASED UPON THE MEASURED BEARINGS AND DISTANCES AS SHOWN HEREON, THE GROSS AREA OF THE SITE IS 3,560,452 SQ. FT. (81.74 ACRES).
FLOOD HAZARD	PORTIONS OF THIS SITE ARE LOCATED IN BOTH ZONE "A" AND ZONE "X" PER FEMA'S FLOOD INSURANCE RATE MAP NUMBER 06037C0475F.
ADDRESSES	THIS SITE IS CLASSIFIED BY THE LOS ANGELES COUNTY ASSESSOR AS VACANT LAND AND HAS NOT BEEN ASSIGNED ANY ADDRESSES.
ZONING	THIS SITE IS ZONED HEAVY AGRICULTURE (A-2-1) PER LOS ANGELES COUNTY DEPARTMENT OF REGIONAL PLANNING RECORDS.
BUILDINGS	THERE ARE NO BUILDINGS ON THE SITE.
SUBSTANTIAL FEATURES	THE EARTHEN BASIN SHOWN ON THIS SITE PLAN COVERS 0.67 ACRES, MORE OR LESS.
PARKING	THERE ARE NO PARKING AREAS, LOTS OR STRUCTURES ON THE SITE.
CURRENT WORK ON-SITE . . .	THERE IS NO EVIDENCE OBSERVED OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS ON THE SITE.
WASTE	THERE IS NO EVIDENCE OBSERVED OF SITE USE AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.
OFFSITE EASEMENTS	PER THE TITLE INSURANCE POLICY PROVIDED BY THE CLIENT, THERE ARE NO OFFSITE EASEMENTS OR SERVITUDES BENEFITING THE SITE.
NEARBY PARCEL INFORMATION .	INFORMATION LISTED FOR NEIGHBORING PARCELS IS PROVIDED BY ANTELOPE VALLEY SOLAR, LLC, AND IS APPROXIMATE.
LANDSCAPE BUFFER	THE INFILTRATION AREA WILL INCLUDE DROUGHT TOLERANT VEGETATION, SUCH AS AFGHAN PINES OR OTHER VEGETATION APPROVED BY THE COUNTY.



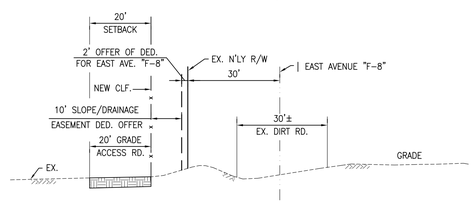
SECTION THROUGH 90TH STREET EAST
(APPROX. 1100' S/O AVE. "F")
SCALES: HOR. 1"=20', VER.: 1"=4'



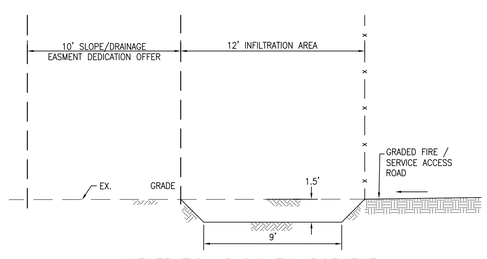
SECTION THROUGH WEST ℄ (87TH ST. EAST)
(APPROX. 500' S/O AVE "F")
SCALES: HOR. 1"=20', VER.: 1"=4'



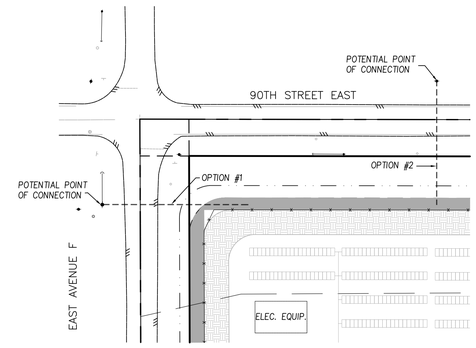
SECTION THROUGH EAST AVENUE "F"
SCALES: HOR. 1"=20', VER.: 1"=4'



SECTION THROUGH EAST AVENUE "F-8"
SCALES: HOR. 1"=20', VER.: 1"=4'



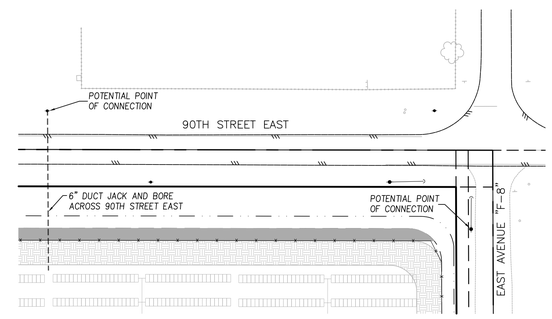
INFILTRATION BASIN ENLARGEMENT
SCALES: 1/4"=1'-0"



PHASE 1 - 12KV CIRCUIT CONNECTION DUCT

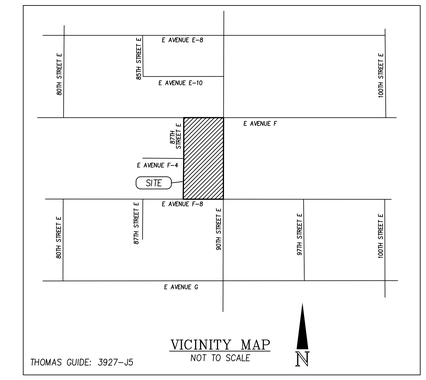
OPTION #1: 6" DUCT JACK AND BORE ACROSS EAST AVENUE "F"
OPTION #2: 6" DUCT JACK AND BORE ACROSS 90TH STREET EAST

1"=50'



PHASE 2 - 12KV CIRCUIT CONNECTION DUCT

1"=50'

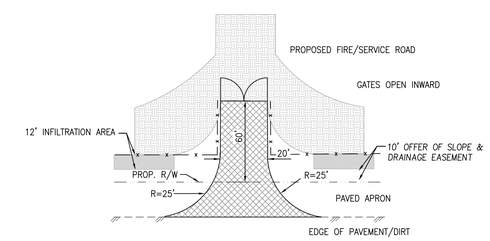


VICINITY MAP
NOT TO SCALE

THOMAS GUIDE: 3927-J5

LEGEND:

ABANDONED	ABAND.
ASSESSOR'S PARCEL #	A.P.N.
ASPHALT	ASPH.
AVENUE	AVE
CENTER	CEN.
CENTERLINE	℄
CONCRETE	CONC.
COUNTY ENGINEER FIELD BOOK	CEFB
CORNER	COR.
DOWN	DN.
EAST	E
EASTERLY	E'LY
EDGE OF PAVEMENT	
EXISTING	EX.
FEET	FT.
FEDERAL EMERGENCY MANAGEMENT ADMINISTRATION	FEMA
FIBER OPTIC CABLE	F.O.C.
FLOOD INSURANCE RATE MAP	FIRM
FOUND	FD.
GENERAL TELEPHONE AND ELECTRONICS CORP.	GTE
GUY WIRE	
IRON PIPE	IP
IRRIGATION	IRG.
MAP BOOK	M.B.
MONUMENT	MON.
NORTH	N
NORTHERLY	N'LY
OVERHEAD UTILITY LINE	— OH —
PAVED	PVD
POST	
PUBLIC WORKS FIELD BOOK	PWFB
RANGE	R
RECLAIMED WATER VALVE	RWV
RIGHT OF WAY	R/W
SAN BERNARDINO BASELINE AND MERIDIAN	SBBM
SECTION	SEC.
STREET	ST
STREET SIGN	
SOUTH	S
SOUTHERLY	S'LY
STANDPIPE	SP
SQUARE	SQ.
TRUST	TR
TOWNSHIP	T
TYPICAL	TYP.
UTILITY POLE	♦
VICINITY	VIC
WEST	W
WESTERLY	W'LY



PROPOSED ACCESS GATE (TYP)
AVE F (PHASE 1) & AVE F-8 (PHASE 2)
NOT TO SCALE

NO.	DATE	BY	REVISION
0	03/18/14	MJ	ORIGINAL

BENCHMARK:

LOS ANGELES COUNTY PUBLIC WORKS BENCHMARK L 436. 2" IRON PIPE WITH CONCRETE PLUG AND BOAT SPIKE DOWN 18", IN WELL, AT CENTERLINE INTERSECTION OF 90TH STREET EAST AND EAST AVENUE F-8.

ELEVATION = 2365.71'

OWNER/DEVELOPER:

ANTELOPE VALLEY SOLAR, LLC
837 9TH STREET
SUITE D
SANTA MONICA CA 90403

PREPARED UNDER THE DIRECT SUPERVISION OF:

DONALD N. DIRIAN
R.C.E. 36357
LIC. EXP. 06/30/2016

REGISTERED PROFESSIONAL ENGINEER
DONALD N. DIRIAN
No. 36357
Exp. 6/30/16
CIVIL
STATE OF CALIFORNIA

PREPARED BY:

DJP ENGINEERING
100 NORTH BARRANCA, SUITE 860
WEST COVINA, CA 91791
TEL 626-966-8200
FAX 626-966-8255
info@djpengineering.com

SITE PLAN
PROPOSED HYDROLOGY STUDY FOR CUP 201300170

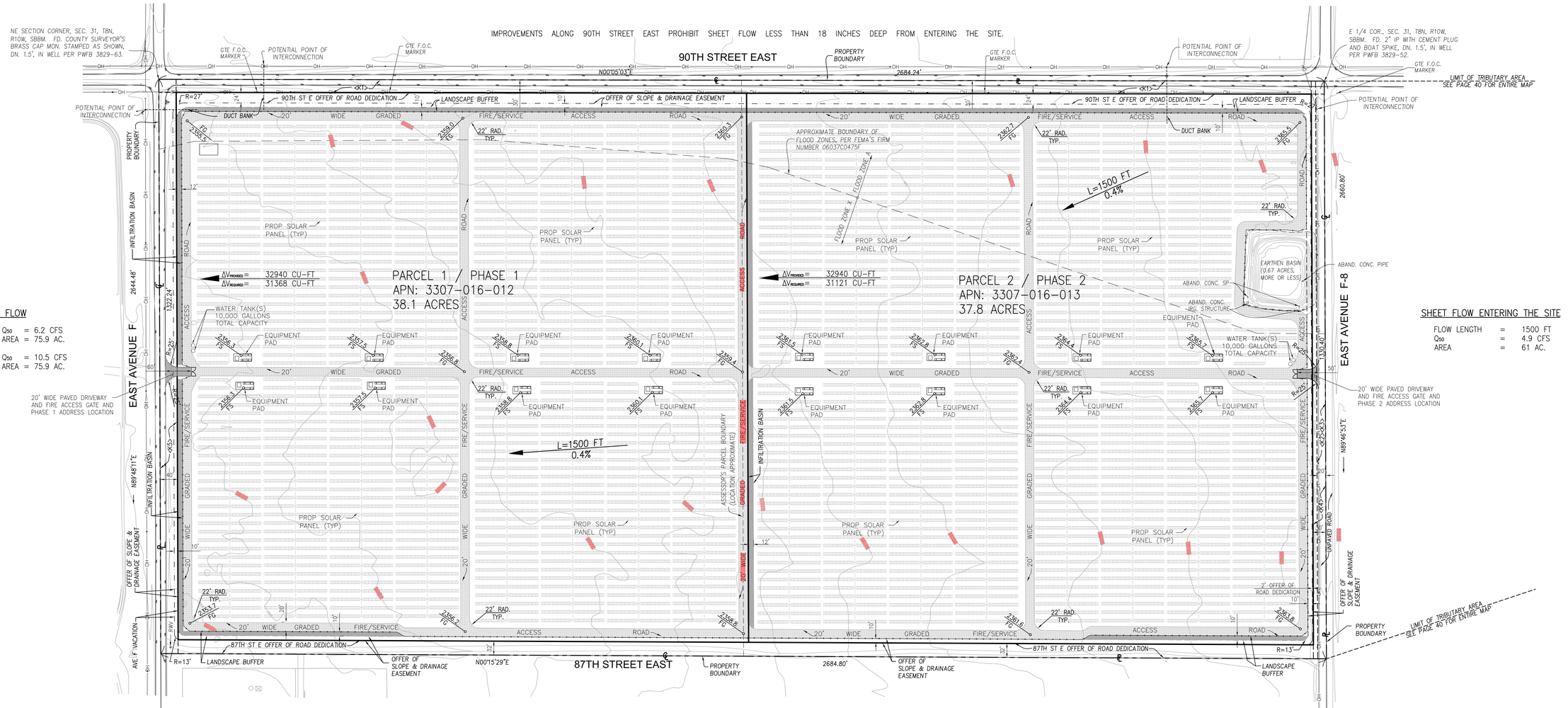
A.P.N. 3307-016-012 AND 3307-016-013
UNINCORPORATED LOS ANGELES COUNTY, CA

JOB NO. 14008 | SHEET 1 OF 2

NOTES:

1. THIS IS A CONCEPTUAL LAYOUT AND DESIGN AND NOT RELEASED FOR CONSTRUCTION.
2. INVERTERS AND ALL ELECTRICAL EQUIPMENT WILL BE PROTECTED FROM INUNDATION DURING A FLOOD EVENT.
3. INFILTRATION TRENCH MAINTAINANCE WILL BE THE RESPONSIBILITY OF THE PROPERTY OWNER.

NOTE: "SITE NOT WITHIN COUNTY ADOOPTED FLOODWAY"



MITIGATION FLOW

PRE DEVELOPMENT: Q_{50} = 6.2 CFS
AREA = 75.9 AC.

POST DEVELOPMENT: Q_{50} = 10.5 CFS
AREA = 75.9 AC.

SHEET FLOW ENTERING THE SITE

FLOW LENGTH = 1500 FT
Q_{50} = 4.9 CFS
AREA = 61 AC.

PHASE 1								
DESIGN STORM FREQUENCY	NET AREA (ACRES)	Tc CALCULATED (MIN)	INTENSITY (IN/HR)	PRE DEVELOPMENT PEAK FLOW (CFS)	24-HR RUNOFF VOLUME (CU-FT)	POST DEVELOPMENT PEAK FLOW (CFS)	24-HR RUNOFF VOLUME (CU-FT)	Δ VOLUME (CU-FT)
2-YEAR	38.1	30	0.26	1.1	14905	1.9	27050	12145
5-YEAR	38.1	30	0.39	1.6	22493	2.9	40820	18327
10-YEAR	38.1	30	0.48	2.0	27500	3.6	49907	22407
25-YEAR	38.1	30	0.59	2.4	33816	4.4	61370	27554
50-YEAR	38.1	30	0.67	3.0	38644	5.3	70012	31368
3/4" SUSMP	38.1	30	0.19	–	–	1.4	20163	20163
85TH %	38.1	30	0.09	–	–	0.7	9409	9409

HYDROLOGY DESIGN DATA	
SOIL TYPE	120
DPA ZONE	11
BURN FACTOR	0.34
BULKING FACTOR	1.02
PERCENT IMPERVIOUSNESS (POST DEVELOPMENT)	12%

PHASE 2								
DESIGN STORM FREQUENCY	NET AREA (ACRES)	Tc CALCULATED (MIN)	INTENSITY (IN/HR)	PRE DEVELOPMENT PEAK FLOW (CFS)	24-HR RUNOFF VOLUME (CU-FT)	POST DEVELOPMENT PEAK FLOW (CFS)	24-HR RUNOFF VOLUME (CU-FT)	Δ VOLUME (CU-FT)
2-YEAR	37.8	30	0.26	1.1	14788	1.9	26837	12049
5-YEAR	37.8	30	0.39	1.7	22316	2.9	40499	18183
10-YEAR	37.8	30	0.48	2.1	27283	3.5	49514	22231
25-YEAR	37.8	30	0.59	2.6	33550	4.3	60887	27337
50-YEAR	37.8	30	0.67	3.2	38340	5.2	69461	31121
3/4" SUSMP	37.8	30	0.19	–	–	1.4	20004	20004
85TH %	37.8	30	0.09	–	–	0.7	9335	9335

N 1/4 COR., SEC. 31, T8N, R10W, SBBM. FD. COUNTY ENGINEER'S BRASS CAP MON. STAMPED AS SHOWN, DN. 1.0', IN WELL PER CEFB 3219-166.

CENTER OF SECTION 31, T8N, R10W, SBBM. FD. 2" IP WITH CEMENT PLUG, TAGGED "L.S. 2991", DN. 0.7', PER PWFB 3829-51.

N00°25'56"E 2685.37'

100 0 50 100 200 300
SCALE: 1" = 100'

NO.	DATE	BY	REVISION
0	03/18/14	MJ	ORIGINAL

BENCHMARK:
LOS ANGELES COUNTY PUBLIC WORKS BENCHMARK L 436. 2" IRON PIPE WITH CONCRETE PLUG AND BOAT SPIKE DOWN 18", IN WELL, AT CENTERLINE INTERSECTION OF 90TH STREET EAST AND EAST AVENUE F-8.

ELEVATION = 2365.71'

OWNER/DEVELOPER:
ANTELOPE VALLEY SOLAR, LLC
837 9TH STREET
SUITE D
SANTA MONICA CA 90403

PREPARED UNDER THE DIRECT SUPERVISION OF:

DONALD N. DIRIAN
R.C.E. 36357
LIC. EXP. 06/30/2016

REGISTERED PROFESSIONAL ENGINEER DONALD N. DIRIAN No. 36357 Exp. 6/30/16 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DJP ENGINEERING
100 NORTH BARRANCA, SUITE 860
WEST COVINA, CA 91791
TEL 626-966-8200
FAX 626-966-8255
info@djpengineering.com

SITE PLAN

PROPOSED HYDROLOGY STUDY FOR CUP 201300170

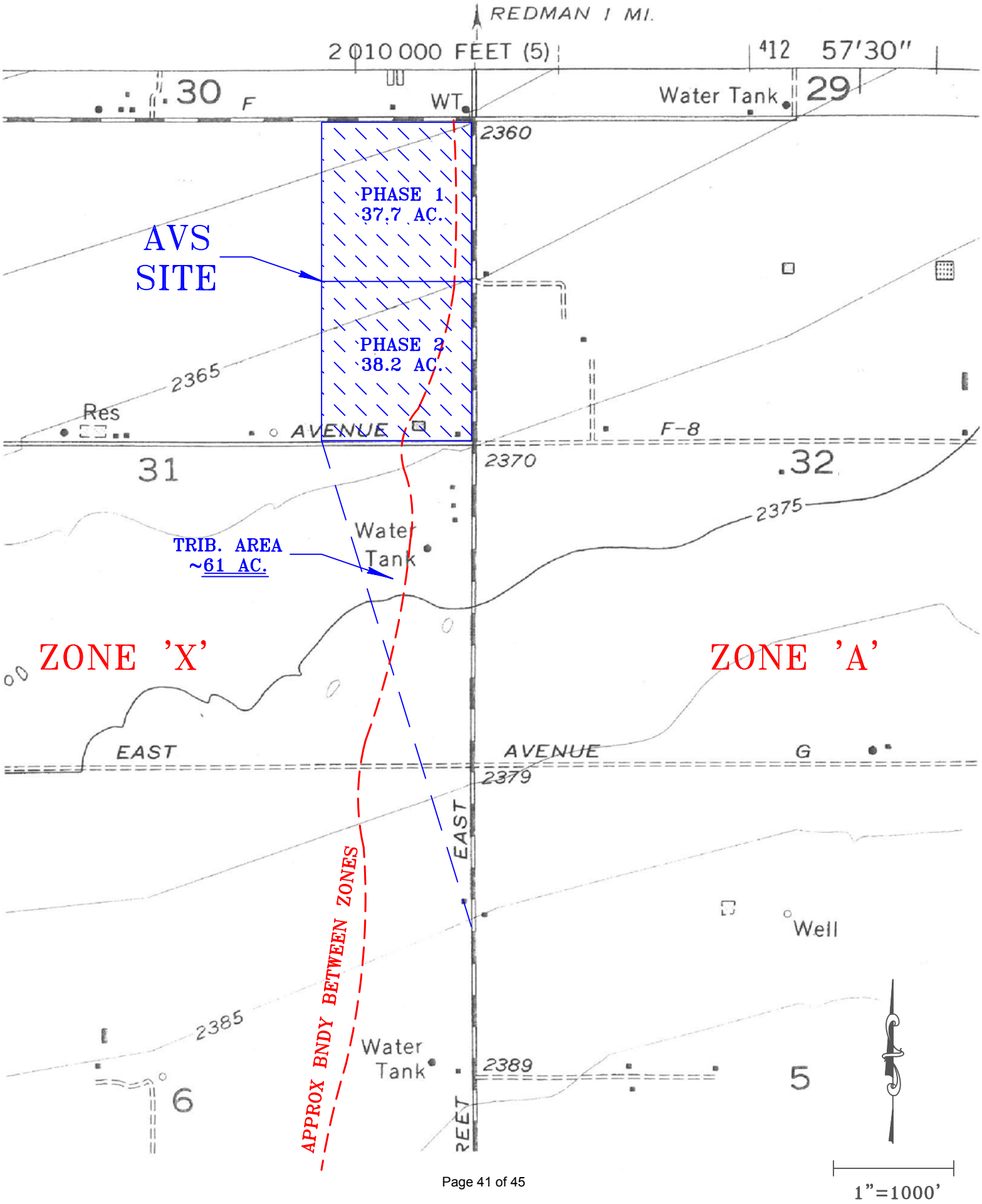
A.P.N. 3307-016-012 AND 3307-016-013
UNINCORPORATED LOS ANGELES COUNTY, CA

JOB NO. 14008 | SHEET 2 OF 2

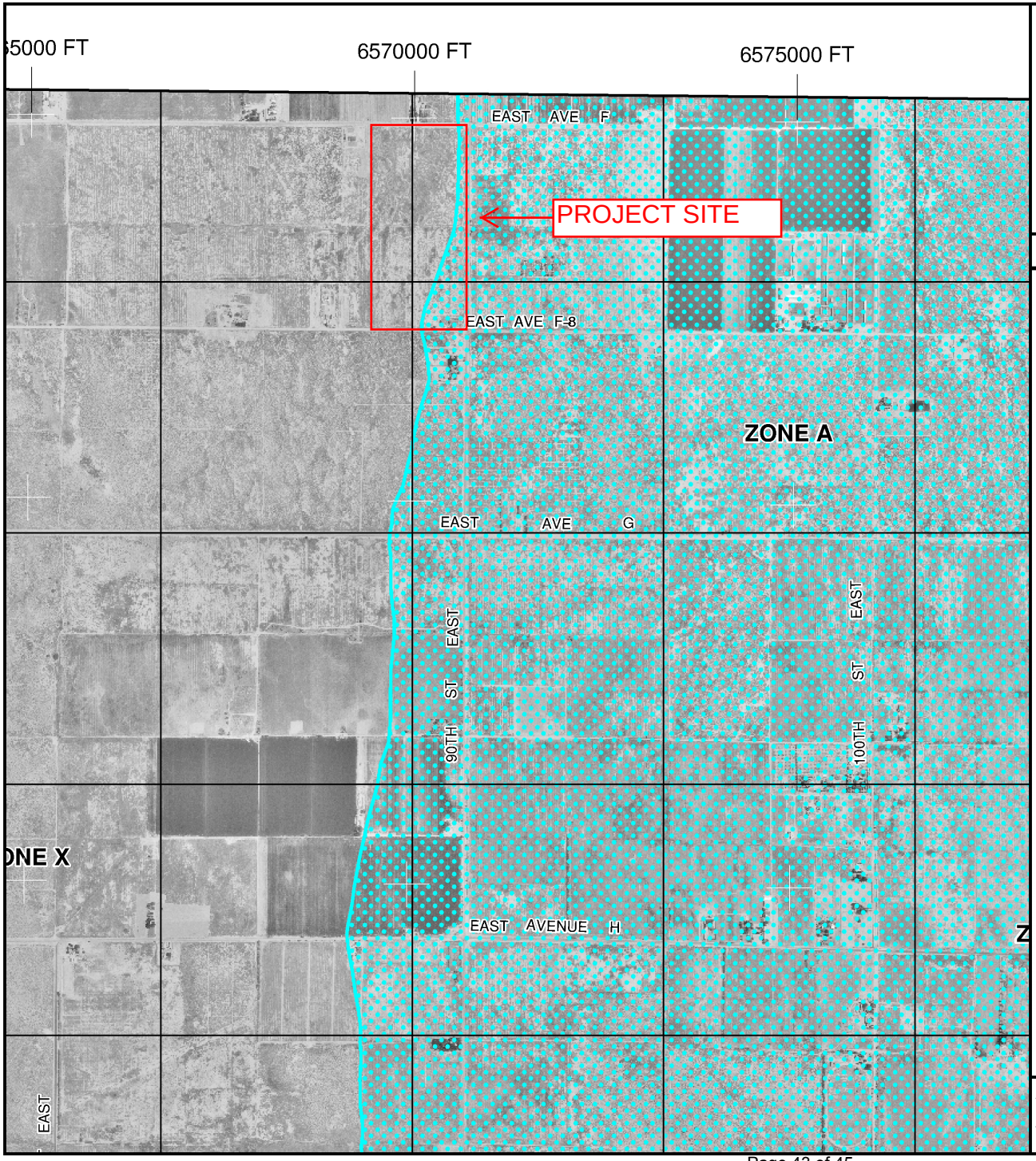
APPENDIX B

HYDROLOGY MAP

(PORTION ALPINE BUTTE 7.5 MINUTE QUAD)



APPENDIX C



MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0475F

FIRM

FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 475 OF 2350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0475	F
LANCASTER, CITY OF	060672	0475	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C0475F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX D

Hydrology Map A GIS viewer application to view the data for the hydrology manual.

LAYERS

- 50yr Two Tenths (Rainfall)
- DPA Zones
- Soils 2004
- TG Page
- Final 85th Percentile, 24-hr Rainfall
- 1-year, 1-hour Rainfall Intensity

SEARCH

Zoom to TG Page:

Enter Address, Cross Street, or Parcel No.:

(ex: 900 S. Fremont Ave., Fremont@Valley, 5342005904)

Search

THE FINAL 85TH PERCENTILE, 24-HOUR RAINFALL AMOUNT FOR THIS SITE IS 0.35 INCHES, THEREFORE ALL INFILTRATION WATER QUALITY DEVICES ARE SIZED USING THE 0.75 INCH STORM.