Phase I Archaeological Survey of the Desert Green Solar LLC – Borrego Springs Solar Farm Offsite Improvements, San Diego County, California.

Modification for MUP 09-012, ER No. 09-05-001

County of San Diego
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NATIONAL ARCHAEOLOGICAL DATABASE INFORMATION

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Type of Study:	Phase I Archaeological Survey
Updated Sites:	CA-SDI-2366, CA-SDI-19,431,
New Sites:	CA-SDI-20690, DG-1, DG-2, DG-3
Isolates:	P-37-032643; P-37-032645
USGS Quads:	Clark Lake 7.5-minute T10S/R6E Sections 27, 34 and 35
Acreage:	14 acres surveyed
Keywords:	Borrego Springs, Kumeyaay, Prehistoric Pot Drop, Prehistoric Campsite, Historic Trash Deposit; CA-SDI-2366, CA-SDI-19,431,; CA-SDI-20,690; P-37-032643; P-37-032645; Solar Projects

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LIST OF ACRONYMS

APE	area of potential effect
AMS	Accelerator mass spectrometry
ASM	ASM Affiliates, Inc.
bfe	base flood elevation
BSFPD	Borrego Springs Fire Protection District
DPR	Department of Parks and Recreation
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
CPV	concentrated photovoltaic
CRHR	California Register of Historical Resources
FAR	fire affected rock
GPS	global positioning systems
kW	kilowatt
MW	megawatts
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
O&M	operations and maintenance
PRC	Public Resources Code
RPO	Resource Protection Ordinance
SCIC	South Coastal Information Center
SPRR	Southern Pacific Railroad
STPs	shovel test pits

EXECUTIVE SUMMARY

This document presents the results of a Phase I archaeological survey of two offsite improvement corridors for the Desert Green Solar Farm Project. The Desert Green Solar Farm Project proposes installation of a concentrated photovoltaic (CPV) solar farm for the long-term generation of clean, renewable energy from solar power. Desert Green Solar Farm LLC proposes modification to a Major Use Permit (P09-012) previously approved by the County of San Diego. The 45-acre solar energy facility and associated offsite improvements are located on privately owned lands in Borrego Springs, San Diego County, California. The project is located in Sections 27, 34 and 35, Township 10S, Range 6E, on the Clark Lake USGS 7.5-minute quadrangle.

ASM Affiliates, Inc. (ASM) was contracted by RBF to complete a Phase I survey of two offsite improvement corridors associated with the Soitec Desert Green Project. This study was completed to satisfy the requirements of the California Environmental Quality Act (CEQA). ASM prepared this report in compliance with *County of San Diego Guidelines for Determining Significance* (County of San Diego 2007a), *Report Format and Content Guidelines* (County of San Diego 2007b), Resource Protection Ordinance (RPO), Section 21083.2 of the Public Resources Code, and the San Diego County CEQA Guidelines.

This report presents the results of a survey of the modified locations of two proposed access and utility corridors not covered in the previous report by Affinis (Robbins-Wade 2010). The results of that investigation cover the 288 acre proposed development area for the proposed solar energy facility located on parcel (APN 141-230-26) as well as the previously proposed access and utility corridors. The major use permit (MUP) for the design plan along with the recommended mitigation measures made by Affinis was approved by the County of San Diego. The development area associated with the solar energy facility has since been reduced to 45 acres but, the modified design plan maintains open space easements and avoidance measures presented in the previous report by Affinis (Robbins-Wade 2010).

The previous study included a records search with the South Coastal Information Center (SCIC) of a 1-mile radius surrounding the development area. Additionally, ASM conducted a records search for a previously proposed project in the same area in 2011 (Daniels and Hale 2011). The results of these record searches were used as reference for the current investigations rather than requesting a new search from the SCIC.

The current investigations was conducted on April 21, 2012 for the southern Palm Canyon Drive access road and February 7, 2013 for the northern Borrego Valley Road access route and Gen-tie alignment. The pedestrian surveys were conducted at 10-meter intervals of the proposed access and utility corridors including a 100-foot buffer around the 30-foot offset line in the project development plan. In the southern corridor two prehistoric isolates (P-37-032643 and P-37-032645) and one previously recorded site, CA-SDI-2366, were identified during the archaeological survey, but there will no longer be any impacts to these sites due to project design changes. Additionally, one prehistoric site, CA-SDI-20,690, was identified just outside the eastern edge of the north/south trending corridor survey area, but will not be impacted based on

current design plans. However, the site was recorded, reported to the SCIC, and is documented in this report due to its close proximity to the area of potential effects (APE).

It is important to note that human remains were previously identified at CA-SDI-2366. As this site is located immediately outside of the proposed project, a qualified archaeological monitor and a Native American monitor are recommended during ground disturbance in the case of inadvertent discoveries. Additionally, while the newly identified CA-SDI-20690, was not recorded as inside the APE, impacts are possible during construction. Therefore, an archaeological monitor is recommended to ensure avoidance of the resource.

In the northern survey corridor four sites were documented. Three newly recorded sites include a small prehistoric temporary camp with lithics, ceramics, and animal bone (DG-02), a prehistoric ceramic pot drop (DG-03), and a historic trash dump (DG-01). A previously recorded and tested site, CA-SDI-19431, was relocated although was found to be almost devoid of artifacts because they were apparently collected during testing. Two additional ground stone fragments and some animal bone not previously recorded were recorded during this survey. They were likely exposed during shifting of loose sandy alluvium. Testing at CA-SDI-19,431 resulted in an evaluation that it was not eligible for listing in the California Register of Historic Resources (CRHR). Sites DG-01 is evaluated as not eligible for CRHR listing due to poor historic context and integrity. Site DG-02 is a temporary camp that absent subsurface testing, is provisionally evaluated as CRHR eligible. Site DG-03 is a small pot drop with some vehicular impacts and also is evaluated as not CRHR eligible. Direct impacts are only projected for CA-SDI-19,431 although due to prior recovery of artifacts and a negative evaluation, no effects are anticipated. The other three sites in the northern survey corridor will be avoided because the new access road and undergrounded Gen-tie line are located south of these site boundaries. The route and Gen-tie line are 100 ft. south of site DG-02, specifically, and no impacts are projected.

Field notes, photographs, and GIS data associated with the current investigation are kept on file in house at ASM's office in Carlsbad, California. California Department of Parks and Recreation (DPR) forms for each resource documented are provided as a confidential appendix to this report and have been submitted to the SCIC of the California Historical Resources Information System (CHRIS) at San Diego State University.

1.0 INTRODUCTION

This report documents the results of an archaeological survey for two access and utility corridors associated with the Desert Green Solar Farm Project, which was conducted to provide compliance with the County of San Diego Guidelines, the County RPO, and CEQA. The 45-acre solar energy facility and associated offsite improvements are located on privately owned lands in Borrego Springs, San Diego County, California. The project is located in Sections 34 and 35, Township 10S, Range 6E, on the Clark Lake USGS 7.5-minute quadrangle (Figures 1 – 3a).

A previous report by Affinis presents the results of a cultural resource inventory and assessment for the previous 288 acre development area (Robbins-Wade 2010). The major use permit (MUP) for the design plan along with the recommended mitigation measures made by Affinis was approved by the County of San Diego. The development area associated with the solar energy facility has since been reduced to 45 acres but, the modified design plan maintains open space easements and avoidance of identified cultural resources presented in the previous report by Affinis (Robbins-Wade 2010). The current report only presents the results of the archaeological survey of the proposed offsite improvements not previously assessed by Affinis.

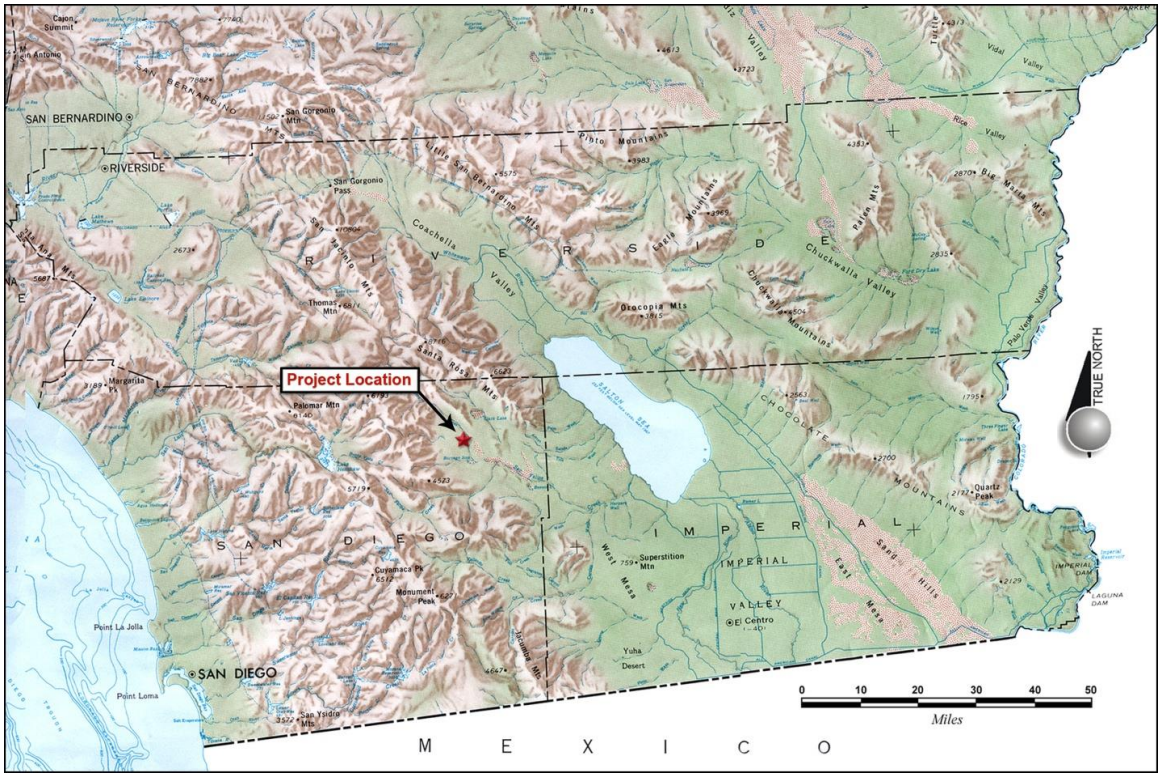

Figure 1. Project vicinity map.

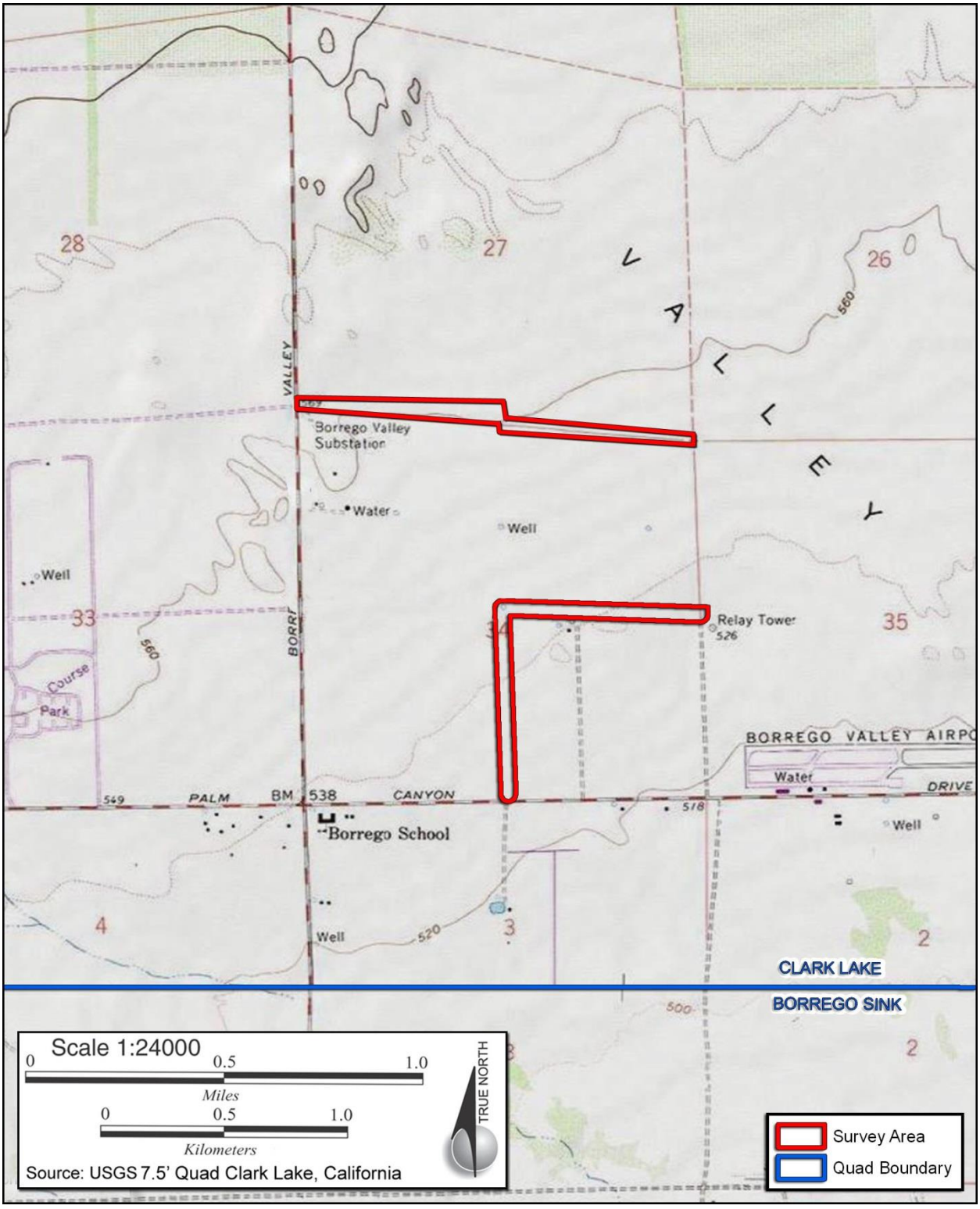

Figure 2. Current investigation study area location map.

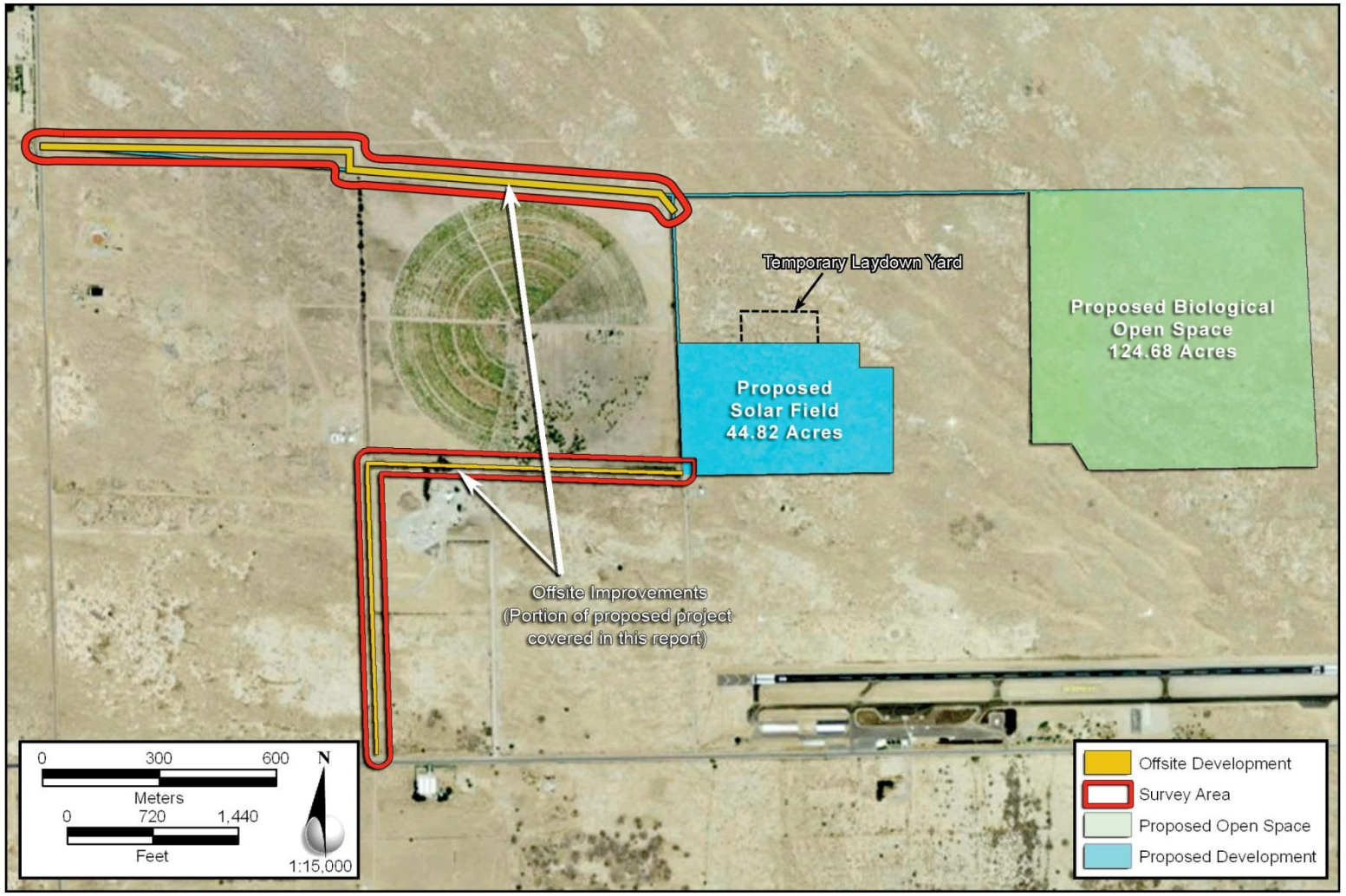

Figure 3a. Current investigation survey areas, including proposed development areas and open space easements.

The report was compiled in accordance with the *County of San Diego Guidelines for Determining Significance* (County of San Diego 2007a) and *Report Format and Content Guidelines* (County of San Diego 2007b), the RPO, Section 21083.2 of the Public Resources Code (CEQA), and the County of San Diego CEQA Guidelines. This report addresses the direct construction impacts to resources and makes an assessment of impact severity as outlined in Section 4.2 of the County Guidelines, as well as any indirect impacts from the project.

1.1 PROJECT DESCRIPTION

The Desert Green Solar Farm Project (Project) proposes installation of a concentrated photovoltaic (CPV) solar farm for the long-term generation of clean, renewable energy from solar power. Desert Green Solar Farm LLC is requesting a Major Use Permit (MUP) modification to previously-approved MUP 09-012 for the purpose of authorizing a CPV solar farm pursuant to Section 6952 of the County of San Diego Zoning Ordinance. Approval of the MUP modification by the County of San Diego would allow for the construction, operation, and maintenance of the renewable energy Project.

1.1.1 Project Location and Setting

The land area that comprises the Project site is located northeast of the community of Borrego Springs, California, within northeastern San Diego County. The Anza-Borrego Desert generally surrounds the Project site and is part of the larger Colorado Desert. The Borrego Sink is located approximately four miles southeast of the Project area, and the Borrego Badlands are approximately five miles to the east.

The Project site is located approximately 0.45 mile north of Palm Canyon Drive and one mile east of Borrego Valley Road. The Borrego Valley Airport is located approximately 0.30 mile to the south of the southern border of the site. To the north and east is undeveloped land; to the west are a commercial palm nursery and a small-scale commercial sand and gravel yard. A microwave tower is also adjacent to the southwest corner of the parcel. Land uses to the south across Palm Canyon Drive generally include undeveloped lands interspersed with industrial-type and residential uses.

The land to be developed with the solar CPV systems is comprised of one main parcel, with additional lands affected to support the transmission of power generated to the existing Borrego Substation and for purposes of access and utility installation (water line). The County Assessor Parcel Number (APN) for the main facilities is APN 141-230-26 (288.29 acres, or approximately 288 acres). Additional parcels potentially affected by Project improvements may include APNs 141-210-04, -05, -06, -25, and -26 [site access, generation-tie (Gen-tie) line, and/or water line easement]; APNs 141-230-33 and -38 (private water line easement); and/or, APN 141-060-08 (12kV Borrego Valley Road Access/Gen-tie Route).

The 288-acre parcel is presently undeveloped. Vegetation largely consists of desert saltbush scrub and stabilized and partially stabilized desert dunes, with sparse groundcover consisting of a mixture of Mediterranean grass and mustard. Soil types found on the parcel also generally support bur-sage, saltbush, and annual grasses and forbs. Some native wildflower species occur

intermittently, with a number of dead mesquite trees also present in various locations on the parcel.

1.1.2 Proposed Project

Desert Green Solar Farm LLC is requesting a MUP modification to previously-approved MUP P09-12 on the 288-acre parcel (Figure 3b). The previously-approved project included the 288-acre parcel and the 104-acre parcel located directly adjacent to the south (APN 141-230-33; P09-14). The proposed Desert Green Solar Farm does not include the 104-acre parcel (P09-014) as part of the Project, and is instead limited to development of the 288-acre parcel and additional lands for access/utility easement purposes. The Project would involve the construction of an approximately 45-acre solar energy electrical generation facility to provide electricity for public consumption. The proposed facilities would have an overall capacity of approximately 6.5 megawatts (MW), serving the Borrego Valley area. Of the 288 acres, the proposed development area where the trackers would be installed, the underground portion of the12kV Gen-tie line/access route, and the temporary construction laydown area would total 50.63 acres. An additional 2.61 acres on the 288-acre parcel would be affected to allow for a 15-foot wide trail easement along the northern and western property boundaries (no improvements proposed at this time); however, the trail easement is not included as part of the Major Use Permit boundary. Additionally, 124.68 (or approximately 125) acres of the 288-acre parcel would be dedicated as undisturbed onsite open space for biological mitigation purposes (to remain unfenced with intermittent small-scale signage installed along the perimeter). The remainder of the parcel (approximately 110 acres) would remain undeveloped and in its current natural state (unfenced).

A total of 308 solar CPV systems are proposed. The solar CPV systems would be manufactured at an offsite location and transported to the Project site.

The solar arrays would track the sun and would rotate from east to west to ensure maximum absorption of sunlight. The face of each panel would measure 48 feet in length by 25 feet in height, for a total surface area of 1,200 square feet. The total height of the panels measured from ground surface to the top of the panel would be approximately 30 feet when the panels are in the vertical position, and 15 feet from ground surface to top of panel when horizontal. All panels would be elevated one foot above the base flood elevation (bfe), which is one foot above ground level, for a total of two feet. The arrays would be spaced approximately 69 feet apart along the north-south axis (center to center) and 82 feet apart along the east-west axis (center to center), and would be installed using a concrete drilled pier or metal driven pile system. The ultimate arrangement/number of solar CPV systems, spacing of supporting racks, and rack pilings are subject to modification at final engineering design. Grading would require an estimated 93,300 cubic yards (c.y.) of balanced cut and fill.

Additional Project components would include up to five small-scale, metal structures (on a 10-foot by 40- foot pad) to house dual or triple invertors and transformers. The inverter/transformer pads would be covered by a shade structure to shield the equipment from the elements. Each inverter station would include a medium voltage transformer to step-up the voltage from the inverter to a nominal 12kV, which is compatible with the local San Diego Gas & Electric (SDG&E) distribution system. Additionally, the Project would include one unmanned 300 square foot (s.f.) onsite metal storage building (within a 1,000 s.f. fenced and screened storage yard);

one generator pad (12 feet by 20 feet) to house one 100kW generator for emergency purposes; 12kV switchgear (constructed on a 10-foot by 10-foot pad) to protect the Project equipment from any short-circuits occurring on the Gen-tie line; a supervisory control and data acquisition (SCADA) equipment enclosure (10 feet by 30 feet); an ultra-capacitor storage unit on a 10 foot by 40 foot pad; a 10,000 gallon (15-foot diameter) water tank for fire and panel washing plus an optional 10,000 gallon tank; and, a 12kV Gen-tie line to the existing Borrego Substation. All structures would be constructed on piers and elevated one foot above the bfe. An illuminated fire department directory sign and switch (to stow the trackers) would be located inside of the fence at the entrance.

Energy generated by the Project would be transmitted to the existing Borrego Substation which lies approximately one mile to the west of the site, adjacent to the east side of Borrego Valley Road. The portion of the Gen-tie line located on the 288-acre parcel would be extended underground from the Project trackers to the northwestern corner of the parcel along a 30-foot wide Gen-tie route. The Gen-tie line would then trend westward along one of two proposed routes, as follows:

The Borrego Valley Road Gen-tie Route would be undergrounded and would cross the adjacent Cocopah nursery (APN 141-210-05) and the 20-foot wide SDG&E easement, then extend west to the Borrego Substation along the Borrego Valley Road Access route (see *Access and Circulation*, below). The point of interconnection (POI) for the Borrego Valley Road Route would occur at the Borrego Substation.

The SDG&E 12kV Line Extension Route would extend across the adjacent Cocopah nursery to the POI located near the northwestern corner of the Project site. The Gen-tie line would then run westerly within the existing 20-foot wide SDG&E easement (Record #72-3377663) to the Borrego Substation. All improvements for the SDG&E 12kV Line Extension would be completed by SDG&E and would be under the land use authority of the California Public Utilities Commission (CPUC), pursuant to General Order 131D. Therefore, the SDG&E 12kV Line Extension is not included as part of the Major Use Permit boundary because it is not within the County's land use jurisdiction.

Water for the purpose of Project maintenance would be provided to the site from one of two optional routes (West Water Line and East Water Line). Both routes would require extension of a 4-inch private line northward from Palm Canyon Drive to the southern Project boundary, as shown on the MUP Plot Plan. The CPV facilities would be unmanned and operated remotely. The proposed facilities would be remotely monitored during operating (daylight) hours, even though the Project facilities would be capable of automatic start up, shutdown, self-diagnosis, and fault detection. Appropriate levels of shielded security lighting would be installed at the storage building and gated entrance. The site would be secured via remote security services with motion detection cameras. For security purposes, the parcel boundary would be fenced with a 6-foot high chain-link fence (breakaway fencing to allow for flood flows), topped with one foot of three-strand barbed wire. Routine maintenance would include periodic inspection and repairs on an as-needed basis, as well as washing of the solar CPV panels once every six to eight weeks.

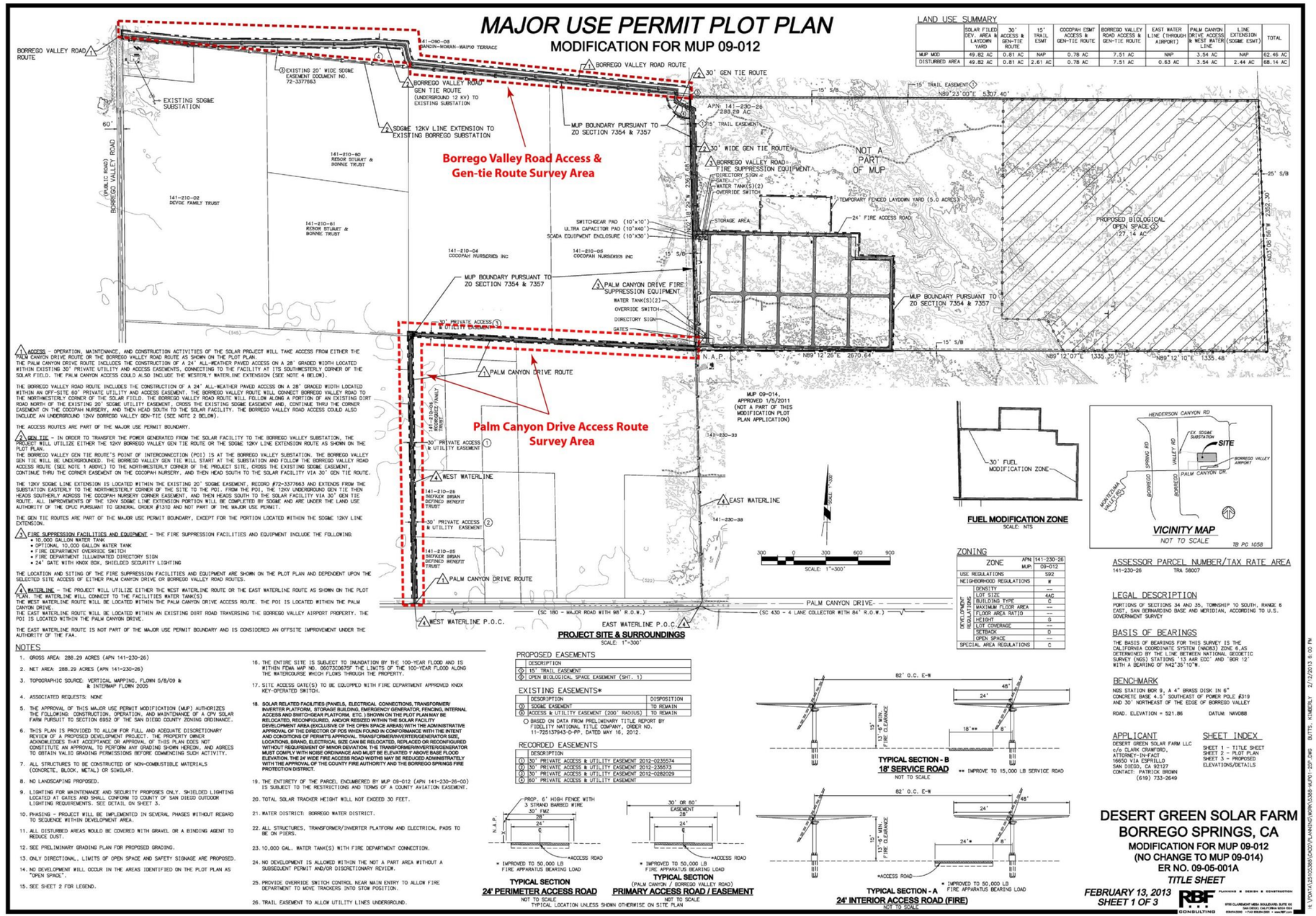

Figure 3b. Project design plan including offsite improvements assessed during current investigation. Survey areas shown in red.

1.1.3 Access and Circulation

Operation, maintenance, and construction activities for the Project would take access from either the proposed Palm Canyon Drive access route or the proposed Borrego Valley Road access route, as shown on the MUP Plot Plan. Both access routes are included as part of the Major Use Permit boundary.

The Palm Canyon Drive access route would include construction of a 24-foot wide all-weather paved access drive (in accordance with County of San Diego Fire Standards and capable of supporting 50,000 lbs) within a 28-foot wide graded width, located within an existing 30-foot wide private utility/access easement. This route would connect to the solar facility at the southwesterly corner of the solar field. The Palm Canyon Drive access route may also include construction of the West Water Line extension.

The Borrego Valley Road access route would include construction of a 24-foot wide all-weather paved access drive (in accordance with County of San Diego Fire Standards and capable of supporting 50,000 lbs) within a 28-foot wide graded width, located within a 50-foot wide private utility/access easement. The Borrego Valley Road access route would extend from Borrego Valley Road to the northwesterly corner of the solar field. This access route would follow along a portion of an existing dirt road located just north of the existing 20-foot wide SDG&E utility easement, cross the SDG&E easement near the northwest corner of the Project site, continue through the adjacent Cocopah nursery (APN 141-210-05), and then trend south to the proposed solar facility. The Borrego Valley Road access route would also include construction of the12kV Borrego Valley Road Gen-tie Route (underground).

A series of north/south interior fire access and perimeter loop roads would be constructed onsite to a width of 24 feet (fire access road widths may be administratively reduced with the approval of the County Fire Marshal and Borrego Springs Fire Protection District) with all-weather surfacing, in accordance with County of San Diego Fire Standards. The interior access roads would be designed and maintained to support imposed loads of fire service apparatus (not less than 50,000 lbs) and would have an approved surface so as to provide all-weather driving capabilities. These interior fire access roads would be constructed between every fourth row of north-south trackers to facilitate a maximum fire hose pull of 160 feet. In addition, the Project includes east/west running fire access roads for connectivity and circulation. The purpose of the interior fire access roads are to allow for access of fire service apparatus throughout the Project site and in order to reach the inverter/transformer units.

On the north/south rows where the interior fire access roads are not proposed, service roads would be constructed to a width of 18 feet and would be constructed and maintained to support imposed loads of not less than 15,000 lbs and to support panel washing equipment vehicles. Service roads would run in a north-south direction along the west side of the columns of the CPV systems, except where there would be a fire access road that would facilitate access to the CPV systems and inverter/transformer units.

1.1.4 Construction Schedule

Project construction is expected to commence in second quarter 2013. Construction of the Project is anticipated to occur over a six-month period, from initial site development through

energization and testing. All construction would be completed at one time and would not be phased.

1.2 EXISTING CONDITIONS

1.2.1 Environmental Setting

This section reviews the environmental setting of the survey area, along with prehistoric, ethnohistoric, and historic contexts. Previous archaeological research conducted in the area is also included. The discussion that follows is a summary describing how pertinent investigations in the general region have contributed to the current constructions of past cultural history, and is not intended to be an exhaustive account of all research conducted in the area.

Natural Setting

The study area lies on the margin of the Salton Trough. The Salton Trough consists of a massive graben formed by the interface of portions of the North American and Pacific tectonic plates. The trough formed by the ongoing movement of faults has been filled by immense quantities of sediments that, in places, are up to 6,000 meters (m) deep (Morton 1977). Much of this sediment is derived from the continuous uplift and erosion of the high Peninsular Ranges on the west side of the basin, the Transverse Ranges to the north, and the lower Chocolate and Cargo Muchacho mountains to the east. Major topographic units in the project vicinity include the Santa Rosa Mountains, Clark Dry Lake, and Coyote Canyon to the north, Borrego Valley to the west, and large mesquite dune and sand dune fields near Borrego Airport to the south.

During the Pleistocene and Holocene periods, the Colorado River periodically shifted its channel between a direct route south to the Gulf of California and a northwest course into the Salton Trough. In the latter phase, it created prehistoric freshwater Lake Cahuilla, which dwarfed its latter-day successor, the Salton Sea, rising to an elevation of 12 m above mean sea level (amsl). Travel between the Peninsular Ranges and the western shore of Lake Cahuilla would have provided one potential motive for prehistoric activity in the present study area.

Typical vegetation in the study area includes creosote (*Larrea tridentata*) and bursage (*Ambrosia dumosa*), established on broad stretches of alluvial sand and gravel. Larger washes host plants of the woodland wash community intermixed with creosote-bursage (Cleland and Apple 2003), along with such species as burrobrush (*Hymenoclea salsola*) and ocotillo (*Fouquieria splendens*).

Fauna common to creosote-bursage environments in the study area include typical desert mammals such as the coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), cottontail rabbit (*Sylvilagus audubonii*), and various mice (*Peromyscus* spp.). Among larger mammals, the Sonoran pronghorn (*Antilocapra americana sonorensis*) once occupied open plains and desert areas but is now extirpated in the Colorado Desert. Mule deer (*Odocoileus hemionus*) are occasionally found in areas away from mesa floors. Reptiles such as the desert tortoise (*Gopherus agassizi*), western diamondback (*Crotalus atrox*), rosy boa (*Lichanura trivirgata*), and various lizards and horned lizards are quite common in creosote-dominated habitats (Jaeger 1965).

Evidence concerning environmental conditions in the Colorado Desert during the period of human prehistory is very limited. Pollen-bearing stratified deposits from caves or lakebeds are not as common in the Colorado Desert as they are in the Great Basin, where most of the desert climatic reconstructions have been based. Among other sources, the best information comes from investigations of macrofloral remains in fossil packrat (*Neotoma* sp.) middens along the Colorado and Gila rivers, and extending across the Sonoran Desert to the east (King and Van Devender 1977; Van Devender 1990; Van Devender and Spaulding 1979, 1983). Of greatest relevance to the low elevations of the Colorado Desert are the stratified fossil middens in the Wellton Hills (160-180 m), Hornaday Mountains (240 m), Butler Mountains (240-255 m), Picacho Peak, California (300 m), Tinajas Altas Mountains (330-580 m), and Whipple Mountains (320-525 m) (Van Devender 1990). Van Devender (1990) provides an authoritative review and reconstruction of climate and vegetation over the last 14,000 years from these investigations that is summarized in Table 1. We have focused on those data specific to the lower Sonoran Desert.

During infillings of the Salton Trough by the Colorado River that formed ancient Lake Cahuilla, the maximum shoreline at 12 m (40 feet) amsl would have supported a freshwater lacustrine littoral wetlands habitat. Predominant flora included cattail (*Typha domingensis*), bulrush (*Scirpus olneyi*), arrowweed (*Pluchea sericea*), and other wetland plants adapted to alkaline soils. These marshy habitats would have attracted migratory waterfowl such as mudhen (*Fulica americana*) and eared grebe (*Podiceps caspicus*) as well as numerous other species like those now occupying the margins of the Salton Sea. The density and distribution of marshy habitats would not have been evenly distributed along the west-facing shoreline but would have varied with the near-shore lakebed contours and sedimentology. In many places, wave action from seasonal storms would have produced sandy strand lines parallel to the shore, behind which low-lying depressions would have filled with water that seeped under the strands. The resulting marshy embayments or enclosed marshes would have been particularly attractive to waterfowl and other wildlife, and consequently, to prehistoric Native Americans.

The lake would also have supported several Colorado River fish species that would wash in during the flood stages. These include humpback sucker (*Xyrauchen texanus*), bonytail chub (*Gila elegans*), Colorado pike minnow (*Ptychocheilus lucius*), and possibly striped mullet (*Mugil cephalus*). These protein sources would have been another major magnet for prehistoric peoples, who would have traveled from the Colorado River and delta and from the Peninsular Ranges.

Table 1. Colorado Desert Paleoenvironmental History
(Based on Van Devender 1990)

Period	Climate	Vegetation in Packrat Middens
Late Holocene (2000 B.C. - Present)	Modern climatic regime with high summer temperatures, mild winters, and low precipitation in the lowlands. Periodic wetter and drier intervals evident in the uplands.	Lowlands (<300 m): Modern creosote scrub. Uplands (300-600 m): Modern Sonoran Desert habitat distributions.
Middle Holocene (7000 - 2000 B.C.)	Winter-dominant rainfall pattern replaced by modern bimodal pattern. Rainfall 20 percent greater than present. Summer monsoon rains greater than present in uplands and west of the lower Colorado River valley but probably the same as present in the lowlands. A dry altithermal may apply only to winter dominant rainfall areas.	Lowlands: Modern desert scrub with creosote bush, Mormon tea, white bursage, pygmy cedar, ironweed, and catclaw acacia by the beginning of period. Uplands: Juniper disappeared from the Sonoran Desert at 6900 B.C. when modern transition boundary between the Mojave and Sonoran deserts was established. Desert riparian species found on hot, dry, south-facing slopes, unlike modern conditions.
Early Holocene (8000 – 7000 B.C.)	Transitional to present climate with still cooler summers. Rainfall 20-40 percent greater annually and 70 percent greater in winter than present.	Lowlands: Desert scrub already established. Mojavean scrub persisted at sites closest to Colorado River. California Juniper disappeared from the Butler Mountains midden profile. Uplands: Mesic woodland plants and singleleaf pinyon ascended to above 1,315 m after 9000 B.C. Xeric juniper-scrub live oak woodland or chaparral continued, although California juniper disappeared from the Whipple and Tinajas Altas mountains midden profiles.
Late Wisconsin (16,000 - 8000 B.C.)	Summers cooler, winters not much cooler than present but with more freezes. Rainfall 40-60 percent greater than present with winter-dominant pattern.	Lowlands: Mojavean scrub with creosote bush, black bush, Joshua tree, and Whipple yucca. Uplands: Woodland-scrub ecotone at 240-300 m. Xeric juniper woodland with California juniper, shrub live oak, Joshua tree, Whipple yucca, and Bigelow beargrass from 300 to 600 m. Singleleaf pinyon started above 460 m.

Throughout the Quaternary, the Salton Trough, when not filled by Lake Cahuilla, probably contained much the same alkali sink habitat as it now does, although no paleoenvironmental data are available to make a firm determination. At least six Late Pleistocene infillings of Lake Cahuilla have left relic maximum shorelines at elevations between 31 and 52 m amsl. The latest and lowest is tentatively radiocarbon dated at ca. 22,000 years before present (B.P.) and has no cultural associations (Waters 1983a). Radiocarbon dating and $^{87}Sr/^{86}Sr$ ratio assays of tufa deposits around Lake Cahuilla independently establish Colorado River inundations extending back at least 20,000 years (Li et al. 2008). Lake Cahuilla continued to rise and recede throughout the middle and late Holocene, and late Holocene archaeological remains are frequently found in association with its maximum and recessional shorelines, extending back in time for at least 3,000 years (Schaefer 1994; Schaefer and Laylander 2007).

Hydrologic modeling for Late Holocene Lake Cahuilla suggests that it would have taken a minimum of about 18 years to fill, and a minimum of about 56 years to recede completely, under modern hydrologic and climatic conditions (Laylander 1997; cf. Waters 1980:44, 1983b:375; Weide 1976:15; Wilke 1978). Archaeologists and geologists have attempted to reconstruct the chronology of the lake, based on radiocarbon dates of archaeological deposits and natural

stratigraphic exposures, as well as on early historic-period evidence (Gurrola and Rockwell 1996; Laylander 1997; Love and Dahdul 2002; Meltzner et al. 2006; Moratto 2009; Moratto et al. 2007; Rockwell et al. 1990; Thomas and Rockwell 1996; Waters 1983b; Wilke 1978). The models proposed by various investigators have diverged substantially, based in part on the types of materials that were sampled (e.g., charcoal, shell, bulk soil), the contexts from which they were taken, the precision of the dates that were obtained, the error ranges that were acknowledged for those dates, the calibration methods that were used, and the interpretations of early historical records. The consensus is that there were approximately six high stands in the late history of the lake.

Cultural Setting

The following outline of Colorado Desert culture history largely follows a summary by Schaefer (2007). It is founded on the pioneering work of Malcolm J. Rogers in many parts of the Colorado and Sonoran deserts (Rogers 1939, 1945, 1966). Since Rogers' time, several overviews and syntheses have been prepared, with each succeeding effort drawing on the previous studies and adding new data and interpretations (Crabtree 1981; Schaefer 1994; Schaefer and Laylander 2007; Warren 1984; Wilke 1976). The information available concerning the region's prehistory is nonetheless still quite limited. Ongoing studies are continuing to evaluate and modify this picture, which may change substantially in the future.

Four successive chronological periods, each with distinctive cultural patterns or traditions, may be recognized in the prehistoric Colorado Desert, extending back in time over at least 12,000 years. They include Pleistocene and Early, Middle, and Late Holocene periods. To these is added ethnographic evidence from the modern period, which sheds substantial light on earlier prehistoric conditions. Following that discussion, the general themes of historic Euro-American development in the Colorado Desert will be summarized.

Prehistory

Pleistocene Period (prior to ca. 8000 B.C.)

A Malpais complex is represented by archaeological materials that have been hypothesized to date between 50,000 and 8000 B.C. (Begole 1973, 1976; Davis et al. 1980; Hayden 1976). The term was originally used by Rogers (1939, 1966) for ancient-looking cleared circles, tools, and rock alignments that he later classified as San Dieguito I. The designation Malpais continued to be applied to heavily varnished choppers and scrapers found on desert pavements of the Colorado, Mojave, and Sonoran deserts that were thought to predate San Dieguito assemblages, with their projectile points. Although few would question that most of the Malpais artifacts were culturally produced, dating methods remain extremely uncertain and have been challenged on several grounds (McGuire and Schiffer 1982:160-164). Arguments for early settlement of the Colorado Desert have been further undermined by the redating of the "Yuha Man." Originally assigned to earlier than 18,000 B.C. based on radiocarbon analysis of caliche deposits, more reliable dates based on the accelerator mass spectrometry (AMS) radiocarbon method applied to bone fragments now place the burial at about 3000 B.C. (Taylor et al. 1985).

Early Holocene Period (ca. 8000 to 7000 B.C.)

Most of the aceramic lithic assemblages, rock features, and cleared circles in the Colorado Desert were routinely assigned to the San Dieguito complex by many of the initial investigators. Rogers

first distinguished the San Dieguito complex in western San Diego County, based initially on surface surveys and subsequently on excavations at the C. W. Harris Site (Rogers 1929, 1939, 1966). His extensive surveys also identified the complex in the southern California deserts. Rogers proposed three phases of the San Dieguito complex in its Central aspect, which encompassed the area of the Colorado and Mojave deserts and the western Great Basin. The successive phases were characterized by the addition of new, more sophisticated tool types to the preexisting tool kit.

San Dieguito complex lithic technology was based on primary and secondary percussion flaking of cores and flakes. San Dieguito I and II tools include bifacially and unifacially reduced choppers and chopping tools, concave-edged scrapers (spokeshaves), bilaterally notched pebbles, and scraper planes. Appearing in the San Dieguito II phase are finely made blades, smaller bifacial points, and a larger variety of scraper and chopper types. The San Dieguito III tool kit is appreciably more diverse, with the introduction of fine pressure flaking; tools include pressure-flaked bifaces, leaf-shaped projectile points, scraper planes, plano-convex scrapers, crescentics, and elongated bifacial knives (Rogers 1939, 1958, 1966; Warren 1967; Warren and True 1961). Various attempts have also been made to seriate cleared circles into similar phases, but as yet without convincing results (Pendleton 1986).

Because of the surficial character of most desert sites and the scarcity of good chronological indicators, it has been difficult to test the validity of Rogers' San Dieguito I, II, and III phases as chronologically successive changes in the tool kit. Some of the variations may have been present contemporaneously in response to particular functional, ecological, or aesthetic requirements. Subsequent excavations at the C. W. Harris site in coastal San Diego County failed to confirm Rogers' original observation of a stratigraphic separation between San Dieguito II and San Dieguito III assemblages (Warren 1967:171-172). Rogers (1966:39) also identified different settlement patterns characteristic of each phase, but as Vaughan (1982:6-11) argued, these distinctions were inadequately defined and inconsistently applied. In the future, the phase model may be tested and refined, but at present the application of phase distinctions does not appear to be warranted.

The San Dieguito complex appears to reflect a hunter-gatherer adaptation consisting of small, mobile bands exploiting both small and large game and collecting seasonally available wild plants. An absence of millingstones has been seen as reflecting a lack of hard seeds and nuts in the diet, and as a diagnostic cultural trait distinguishing the San Dieguito pattern from subsequent Middle Holocene patterns (Moratto 1984; Rogers 1966; Warren 1967). Portable handstones and millingstones are now being increasingly identified at coastal sites that have been radiocarbon dated earlier than 8000 B.C. (Hale and Comeau 2010). Arguments have also been made for the presence of a developed grinding tool assemblage during early periods, based on finds from the Trans-Pecos area of Texas (Ezell 1984). Specifically in regard to the Colorado Desert, Lorann Pendleton (1986:68-74) remarked that most of the ethnographically documented pounding equipment for processing hard seeds and screwbeans was made from wood, which would not normally be preserved in the archaeological record.

San Dieguito sites might be situated on any flat area, but the largest aggregations occurred on mesas and terraces overlooking major washes. Where lakes were present, sites with Lake Mojave

complex (i.e., San Dieguito) assemblages are located around their shores. At the northeastern boundary of the Colorado Desert, they occur in the Pinto Basin and around Ford and Palen dry lakes in the Chuckwalla Valley where the nexus with Mojave Desert pluvial lakes traditions is strongest (Carrico et al. 1982; Sutton et al. 2007). These were areas where a variety of plant and animal resources could be found and where water would have been available at least seasonally. It is likely that the chain of lake basins, springs, and tanks through this area provided a network of prehistoric subsistence and travel corridors that connected the Colorado River, Imperial, and Coachella valleys. It is at these water sources and along the trails that the most abundant archaeological evidence can be found. This network continued to develop through the Middle and Late Holocene periods.

Middle to Early Late Holocene Period (ca. 7000 B.C. to A.D. 500)

The Pinto and Amargosa complexes were regional specializations within the general hunting and gathering adaptations that characterized the long Middle Holocene period. These patterns occur more frequently in the Great Basin, the Mojave Desert, and the Sonoran Desert east of the Colorado River. Few Pinto or Amargosa (Elko series) projectile points have been identified on the desert pavements in the Colorado Desert, although that condition is beginning to change as the number of investigations increases. Some late Middle Holocene sites are known, indicating occupations along the boundary between the low desert and Peninsular Ranges and in more favored habitats.

It has been suggested that the environment in the California deserts was unstable and inhospitable during this period, particularly during the so-called Altithermal period between about 5000 and 2000 B.C., and that this condition forced mobile hunter-gatherers to move into more hospitable regions (Crabtree 1981; Schaefer 1994; Wilke 1976). Also, as mentioned, Lake Cahuilla may have mitigated Altithermal effects on human occupation in the Colorado Desert by ameliorating local climatic fluctuations.

Several early Late Holocene Colorado Desert sites have been excavated in recent years. The most substantial Colorado Desert site dated to this period is Indian Hill Rockshelter in Anza-Borrego Desert State Park. At that site, 1.5 m of cultural deposits were excavated below a Late Prehistoric component (McDonald 1992). Particularly significant were 11 rock-lined cache pits and numerous hearths, indicative of either a residential base or a temporary camp where food storage was integral to the settlement-subsistence strategy. Also recovered were numerous Elko Eared dart points, flaked lithic tools, and millingstone tools, as well as three inhumations, one of which was radiocarbon dated to 2000 B.C. Two rock-lined pits similar to those at Indian Hill Rockshelter, along with an accompanying early Late Holocene assemblage, were excavated at a small rockshelter in Tahquitz Canyon near Palm Springs (Bean et al. 1995). The small number of artifacts at the site suggests that the site represents strategically stored food processing equipment that was used by a small, mobile group.

Several important early Late Holocene sites recently have been documented from the northern Coachella Valley (Love and Dahdul 2002). Deeply buried midden deposits with clay-lined features and living surfaces, cremations, hearths, and a rockshelter deposit have been found at various sites in association with calibrated radiocarbon dates ranging from before 1000 B.C. to A.D. 700. Radiocarbon dates of almost 1000 B.C. and associated bird and fish bone confirm an

early Late Holocene Lake Cahuilla occupational horizon, as well as early interlacustrine phases. Larger habitation sites from this period remained elusive in the Colorado Desert until 2006, when a series of deeply buried midden deposits and some house features were discovered under alluvial fan and dune formations at the very northern end of the Coachella Valley at Seven Palms near Desert Hot Springs (Mariam Dahdul, personal communication 2006). These findings bring Colorado Desert cultural history more in line with comparable patterns in the Mojave Desert and Owens Valley.

Early projectile points in Imperial County have generally been reported only as isolates on desert pavements, but a recent inventory at the Salton Sea Test Base produced a cluster of early projectile points, including Lake Mojave, Pinto, and Elko forms, and even two eccentric crescentics, scattered among protohistoric sites on the bed of Lake Cahuilla 30 m below sea level (Apple et al. 1997; Wahoff 1999). If these points are in situ, as the investigators suggest, presumably they escaped burial by lake sediments or were subsequently re-exposed. An alternative explanation may be that they were collected elsewhere and reused by protohistoric occupants. Several large points also have been reported within the Truckhaven area. Direct evidence of a Middle Holocene occupation comes from the Truckhaven flexed burial (IMP-109), found under a cairn and dated to 5790 ±250 B.P. (Taylor et al. 1985; Warren 1984:404).

The emerging picture of late Middle Holocene and early Late Holocene occupation in the Colorado Desert is of mobile hunter-gatherer bands with atlatls for hunting and millingstones for seed and nut processing, operating out of a limited number of base camps in optimal areas on the boundaries of the Salton Basin and on the shoreline of Lake Cahuilla. This pattern may be viewed as a cultural precursor of the Late Holocene period, although linguistic data and tribal origin stories suggest some demographic displacements also occurred.

Late Prehistoric of the Late Holocene Period (after ca. A.D. 500)

Sites dating to the Late Prehistoric of the Late Holocene period are probably more numerous than any others in the Colorado Desert. The period has sometimes been divided into four phases, including a pre-ceramic transitional phase from A.D. 500 to 800. The major innovations were the introduction of pottery production using the paddle-and-anvil technique around A.D. 800, initiating the Patayan I phase, and the introduction of floodplain agriculture on the Colorado River, perhaps at about the same time (Rogers 1945). Within the Colorado Desert, according to some investigators, ceramics first appear around A.D. 800 (Love and Dahdul 2002). Exact dating for the presence of early domesticated plants is not available (Schroeder 1979). Both these technological advancements were presumably introduced either directly from Mexico or indirectly through the Hohokam culture of the Gila River (McGuire and Schiffer 1982; Rogers 1945; Schroeder 1975, 1979). The most recent Late Holocene episodes of Lake Cahuilla have been taken to define the Patayan II phase, previously dated between about A.D. 1050 to 1500 and bracketed by Patayan I and III phases. However, recent research has demonstrated that a lake infilling occurred between A.D. 1600 and 1700 (Laylander 1997; Schaefer 1994). As discussed in the environmental section above, the now-confirmed presence of lake stands both before A.D. 1050 and after A.D. 1500 casts some doubt on the viability of the perceived Patayan I, II, and III phase distinctions as a more complex and accurate understanding of Lake Cahuilla natural history is attained. The phases of Lake Cahuilla infillings and recessions may have influenced demographic movements and intercultural contacts, perhaps even playing a role in the

introduction of ceramics and other cultural traits that have been used to differentiate the Patayan phases. How Lake Cahuilla acted as a stimulus for cultural change in the Colorado Desert remains a question of intense interest. Answers to these questions can only be made after more investigations of well-dated Late Prehistoric sites with demonstrable Lake Cahuilla associations are undertaken.

Lyndon L. Hargrave (1938) coined the term "Patayan" from the Walapai word for "old people" to refer to the late prehistoric archaeology of the Colorado River Valley. In so doing, he wanted to avoid assumptions that specific prehistoric cultures in this area were directly ancestral to the modern Yuman cultures. The Patayan pattern is equally applicable to the prehistoric ancestors of the desert Cahuilla, who speak an unrelated language but whose culture shares many of the economic and technological attributes of the cultures of the Yuman speakers.

Harold S. Colton (1945:118) applied a direct historical approach to developing a Patayan culture scheme. Relying on very little information, for the most part no more than surface sherd scatters, he made an initial attempt at defining a Patayan pattern. Assuming that the ethnohistoric practice of intensive warfare among Colorado River peoples extended back into the prehistoric past, he postulated that the center for the dispersion of Patayan peoples to the east and west lay on the Colorado River and was brought about by high population densities of warlike communities that were circumscribed by inhospitable desert conditions. The Ipai, Kumeyaay, and Tipai of California and the Havasupai, Walapai, and Yavapai of western Arizona were some of these offshoots. The presumption was that these people had been pushed into other areas by the same process of warfare that later drove the Kahwan, Halyikwamai, and Halchidhoma off the river to become ultimately amalgamated with the Maricopa on the Gila River in the early nineteenth century. Colton also revised Alfred L. Kroeber's (1943) classification of river and delta Yuman languages to propose a southern branch (Laquish) centered on the Colorado Delta and a northern branch (Cerbat) centered on the Needles area. In another paper, Colton tentatively classified the Cohonina and Prescott patterns as branches of Patayan in the mountains of northwestern Arizona.

While Colton's cultural scheme focused on Arizona, Rogers established the first systematic culture history and artifact typologies for the Colorado Desert in California, but also including evidence from western Arizona. Rogers' (1939, 1945) investigations of Yuman ceramics and culture history remain fundamental for archaeological research in the region. He distinguished three phases of Late Prehistoric archaeology in the Colorado Desert as Yuman I, II, and III, with Yuman II being contemporary with the late Holocene phase of Lake Cahuilla between around A.D. 1000 and 1500. In applying the label "Yuman," Rogers brought back the assumed association between the archaeological pattern and a specific linguistic grouping.

Also included in this early period of basic archaeological research is Albert H. Schroeder's examination of lower Colorado River sites (Schroeder 1952, 1979). Schroeder (1961) excavated the Willow Beach site, located just below Boulder Canyon, one of the few stratified Late Prehistoric sites known on the Colorado River. He developed a cultural sequence that emphasized the similarities of the Colorado River assemblages with the upland areas of western and central Arizona, lumping a number of cultural patterns into the concept of the Hakataya pattern, an expanded version of Rogers' Yuman pattern (Schroeder 1979). Some scholars found

Schroeder's concept of the Hakataya to be too inclusive and also noted conflicts with Rogers' original Yuman ceramic typology (see McGuire and Schiffer 1982). Schroeder (1957, 1958, 1975) postulated associations between subdivisions of the Hakataya pattern, certain ceramic types, and historically identified tribal groups. These branch-ceramic-tribal associations include, among others, the linking of the Roosevelt branch, Tonto Brown pottery, and the Southeast Yavapai; the Cerbat branch, Cerbat Brown, and the Walapai; the La Paz branch, Needles Buff, and the Halchidhoma; the Palo Verde branch, Tumco Buff, and the Quechan; the Amacava branch, Parker Buff, and the Mohave; and the Salton branch, Topoc Buff, and the eastern Kumeyaay. This approach may give insufficient consideration to the mobility of some groups, who may have produced different ceramic types depending on the proximity of particular clay types to their seasonal settlements.

The term "Patayan" regained prominence with the publication of *Hohokam and Patayan* by Randall H. McGuire and Michael B. Schiffer (1982). They provide a critical history of the development of the terminology and cultural concepts. Michael R. Waters (1982a, 1982b) applied the term to a ceramic chronology and typology for the Colorado Desert, based on Rogers' unpublished notes and type collection at the San Diego Museum of Man. Waters critically discussed differences between Rogers' and Schroeder's approaches, both in the definition of prehistoric cultures and in the application of a Lower Colorado River Buff ceramic typology.

Within the Late Holocene period, desert peoples of this region developed broad-spectrum and diversified resource procurement systems emphasizing a collector organization that made use of residential bases and temporary logistical camps, scheduled according to the ripening seasons of staple plant resources. Mobility was an important element in this pattern, with frequent travel between the Colorado River and Lake Cahuilla when the lake was present. The diversity of sites and assemblages associated with Lake Cahuilla indicates considerable variability in late prehistoric and protohistoric social and ecological adaptations to the lake (Wilke 1978). The number of house pits at fish camps ranges from one to more than a dozen, perhaps indicating the number of households in residence at any one time. Fish traps range from single examples to long lines that are suggestive of cooperative fishing ventures. Archaeological excavations of house pits indicate that some have well-developed middens and diverse artifact types, suggestive of season-long temporary camps, while others have only sparse artifact associations suggestive of short-term fishing expeditions. Faunal assemblages vary from those largely limited to fish bone or the remains of migratory water birds, to others that contain more diverse resources, including rabbit and large mammal bone. This variability in site types and assemblage contents has yet to be correlated in a systematic manner with other variables, such as the recessional stages of Lake Cahuilla (reflected in elevation), localized geography and paleoenvironments, ethnicity, or other factors (Schaefer 2000; Schaefer and Laylander 2007).

The numerous trail systems throughout the Colorado Desert attest to long-range travel to special resource collecting zones and ceremonial locales, trading expeditions, and possibly warfare. Pot drops, trailside shrines, and other evidence of transitory activities are associated with these trails (McCarthy 1993). During the Late Holocene and perhaps during earlier periods as well, an important travel corridor existed to the northwest of Black Mountain and south of the Chocolate Mountains. A series of long trail segments with associated ceramic pot drops and lithic scatters

exists parallel to Ninemile Wash and State Route 78, linking the Colorado River and Imperial Valley. Another corridor went up the Salt Creek Pass between the Chocolate Mountains and the Orocopia Mountains, following alternative routes either through the Chuckwalla Valley or following a string of springs and tanks south of the Chuckwalla Mountains. In the historic period, this route was known as the Coco-maricopa Trail (Johnston 1980; Johnston and Johnston 1957; McCarthy 1982).

Trade and travel is also seen in the distribution of localized resources such as Obsidian Butte obsidian, wonderstone from the south end of the Santa Rosa Mountains, soapstone, marine shell from the Gulf of California and the Pacific coast, and different ceramic types. The Elmore site near Kane Springs, for example, contained evidence of *Olivella* shell bead manufacturing and other shell processing, trade, and possibly cultural connections with delta Yumans who may have been displaced during Lake Cahuilla infillings (Laylander 1997; Rosen 1995; Schaefer 2000). Evidence of millingstone manufacture is also documented at several sites in the Superstition Mountain area where outcrops of Imperial Formation sandstone afforded a ready local material for milling equipment (Schaefer 1988).

Historic Background

The study area has generally been marginal to major historic period events in the Colorado Desert (Lawton 1976). The wider region first came to the attention of Europeans in 1539-1540, when Francisco de Ulloa reached the northern limit of the Gulf of California, Hernando de Alarcón sailed up the lower Colorado River at least as far as present-day Yuma, and Melchior Díaz travelled overland from Sonora to reach and cross the river. Juan de Oñate traveled down the lower Colorado River between the Bill Williams River and the delta in 1604-1605. The portions of the desert west of the Colorado River were only first visited as late as the 1770s, when Francisco Garcés and Juan Bautista de Anza pioneered a route from the Colorado River to coastal southern California

Ethnohistory

The 1774-1776 Anza expeditions passed through the Borrego Valley where they camped at a place they named San Gregorio, probably near Borrego Springs. Garcés provided descriptions of the 60 *Cajuenches*, interpreted to be referring to Cahuilla, who were living there, and possibly the first Cahuilla to be encountered. They actually appear to be living in co-residence with the Kumeyaay at Borrego Springs, at least seasonally, and it may be Kumeyaay who he actually saw in majority. Another diarist on the expedition, Pedro Font, used the term, *Jecuiches*, for the same people and was more likely referring to Kumeyaay people (Bolton 1930:130; Coues 1900:42). There appears to have been some confusion with the application of these names (Luomala 1978: 607) and this may have resulted from the intermingling of the tribal groups where their traditional territories abut in this portion of the Colorado Desert. The Garcés account provides a rare early description of the Native inhabitants at Borrego Springs:

> March 12.-Going west-northwest and through small hills we came to a valley, and after passing a red hill we halted, having traveled five leagues, at some wells and salty marshes called San Gregorio, a place which has much pasturage and is in a very narrow valley between two ranges. To this point came many Cajuenches, and here we saw another tribe. These Cajuenches do not paint themselves as much as the Yumas. With their

> macanas they are accustomed to kill many rabbits and some deer, with whose skins the women cover themselves behind, but in front they wear aprons of the fiber of arria, made of the inner bark of trees. These multitudes of fibers some wear like a net and others loose, but all cover themselves well, and even the little girls three years old or even infants are never seen naked. In these regions the women use the nets to carry wood, herbs and the ollas in which they carry water, and also to carry their little children. The men build corrals with the nets, stakes and flat rocks, and, driving the game from long distance toward a corral, they kill it in abundance. Since these mountain Indians eat much mescal and in some parts the roots of the tule, their teeth are very badly decayed and damaged. Some carry a lance with a good point, which appears to be a weapon for war, and even the women carry poles that are shorter and thicker. They eat a great quantity of wild onions, which abound in these parts. Although these Cajuenches are not such people as the Yumas they are friendly and more timid (Bolton 1930, II:341-342).

Ethnographic information by Spier (1923:304) indicates that this area was in the territory of the Kumeyaay *litc* clan in the 19th century. Their territory extended along a broad corridor centered on San Felipe Creek, from the mountains down to the desert floor and a major settlement at San Sebastian Marsh.

Major ethnographies for the Kumeyaay and the desert branch of the group, the Kamia, were researched and written in the 1920s and 1930s (Spier 1923; Gifford 1918, 1931), about 150 years after the establishment of the mission system. By this time many traditions were known only by memory or were practiced in modified form on the small reservations in the mountains (Cline 1984). The Kamia had been largely integrated into the Quechan tribe on the Colorado River. Kumeyaay social organization appears to have been loosely structured at the band level. Patrilineal, minimally territorial, exogamous lineages called "*cimuL*," or gentes, have been described as the highest level of Southern Diegueño social organization (Spier 1923). Luomala (1963:285-286, 1978) suggested that residence was not strictly patrilocal, but bilocal, in that newly married Diegueño couples resided with the woman's family as often as not. This type of flexibility may be a cultural response to environmental stresses such as drought (Shipek 1981:297), or a result of reduced population and territory after historic contact.

The Kumeyaay are depicted primarily as hunters and gatherers in ethnographic and ethnohistoric documents, but some groups practiced agriculture in areas of the Imperial Valley (Gifford 1931:21-22). Shipek (1989) has hypothesized that horticultural practices among the Kumeyaay were widespread and intensive, involving transplantation and cultivation of several native plant species. There is still some controversy regarding the degree of dependence these groups placed on "cultivated" crops versus "natural" crops. Review of the ethnographic and ethnohistoric record indicates that most groups moved to different areas on a seasonal basis to capitalize on particular crops such as acorns or agave, and were not wholly dependent on any one crop.

Animal resources for the Kumeyaay consisted mostly of small game such as rabbits (*Sylvilagus* spp.), hares (*Lepus californicus*), woodrats (*Neotoma* spp.), lizards, some snakes, and grasshoppers (Spier 1923:335-336; Gifford 1931:14; Shipek 1991:32). Many birds probably were not eaten by the Southern Diegueño (Drucker 1937:8), although this restriction seems to apply mostly to shorebirds. Eagles and buzzards were avoided by the Diegueño; hawks, owls,

doves, crows, roadrunners, and mockingbirds were sometimes avoided and sometimes not (Drucker 1937:8, 1941:100). Fish (in some springs and streams) were not ignored, although these probably contributed to the diet in much smaller proportion. Larger game, mostly mule deer (*Odocoileus hemionus*) and possibly pronghorn (*Antilocapra americana*, now locally extinct) were also hunted.

Different Kumeyaay lineage groups followed varying seasonal routines, probably relying upon staple foods that were common to the lineage home area. Hicks (1963:214) assumed that the majority of aboriginal Kumeyaay lineage locations would have been in the mountains near oak groves, rather than in the desert or desert foothills where agave is more plentiful, but cited only Spier (1923) and not Gifford (1931). Archaeological surveys have helped illustrate that villages were commonly located near reliable water sources and at contact areas between biotic zones (May 1975; Shackley 1980).

The lower Colorado River area was one of shifting tribal boundaries in ethnohistoric times due to intertribal warfare (Forbes 1965). When Alarcón sailed up the lower Colorado River in 1540, he described a situation of incessant warfare. During Oñate's 1604-1605 expedition, he found the Halchidhoma living south of the Gila River confluence, along with the Kahwan and Halyikwamai. Oñate encountered the Ozaras, who were probably a Piman-speaking group, at the Gila-Colorado junction, and the Bahacecha, who may possibly have been Quechan, between the Ozaras and the Mohave (Laylander 1997). Almost a century passed until Jesuit missionary Eusebio Francisco Kino made half a dozen visits to the vicinity of the Colorado-Gila junction between 1699 and 1706 (Bolton 1936; Burrus 1971; Kino 1919). Another Jesuit, Jacobo Sedelmayr, returned in the 1740s and 1750s (Donohue 1969; Sedelmayr 1955). Finally, the Franciscan missionary-explorer Francisco Garcés and the soldier Juan Bautista de Anza in the 1770s established a strong east-west travel link across the Salton Basin (Bolton 1930; Garcés 1900). The eighteenth-century observers clearly found substantial evidence of ethnic displacements since the previous century, and substantial further changes would occur during the early nineteenth century (Spier 1933).

During the early historic period, the Kamia of Imperial Valley were politically and militarily allied with the Quechan and Mohave, in opposition to the Cocopa and Maricopa. They maintained good relations with the Quechan at the confluence of the Colorado and Gila rivers and were permitted a farming rancheria at the large Quechan settlement of *Xuksil* (in Quechan, "sandstone"), located a few kilometers south of the modern Mexican town of Algodones and north of the branching off of the Alamo River near the southern tip of the Imperial Dunes (Russell et al. 2002:84). These people were collectively known as the *Kavely cadom* or "south dwellers" and were known to the early Spanish expeditions as the rancherias of San Pablo; their leader was also named Captain Pablo. They were estimated to number 800 people when the Anza Expedition passed through in 1774 (Bolton 1930(2):51; Forde 1931:101). The Franciscans established the mission community of San Pedro y San Pablo de Bicuñer near this location in 1780, along with another mission community at La Purísima Concepción, later to become Fort Yuma. Both were destroyed in a Quechan uprising in 1781 (Forbes 1965:191-204).

Historic Period (after ca. 1770)

The project area lies on or near important routes of exploration, travel, and transportation that crossed the Colorado Desert during the late eighteenth, nineteenth, and twentieth centuries. It has

seen agricultural development, urbanization, and associated land uses, beginning in the early twentieth century.

The region encompassing the present project area entered written history in the 1770s, when the expeditions under Juan Bautista de Anza and Francisco Garcés penetrated west from the lower Colorado River and linked Sonora with coastal southern California. Subsequent use of the overland route was interrupted by the 1781 Quechan revolt, but resumed in the early nineteenth century. Regular travel along this branch of the Southern Immigrant Trail by couriers and mail carriers, immigrants, commercial stage lines, the military, surveyors, and cattle drivers, as well as cattle rustlers and outlaws, began during the Mexican and American periods (Lawton 1976:65; Warren et al. 1981).

In 1853, surveyors under the auspices of the U.S. government sought to find a southern route for the transcontinental railroad and expanded the geographical and scientific knowledge of the area (Blake 1853). It was at this time that William Blake, the geologist on the expedition, first identified Lake Cahuilla for the American public and documented the geological traces of the extinct lake. This was also the period of the 1856 U.S. Government Land Office survey, which recorded several historic trails (Warren and Roske 1981:94; Warren et al. 1981:11).

The Southern Pacific Railroad (SPRR) line was constructed in 1877. It generally ran along the eastern margin of the Salton trough, but portions of its alignment had to be relocated farther east in the early 1900s when they were flooded by the rising Salton Sea. The San Diego & Arizona Eastern Railroad, established in 1906, passed through El Centro.

1.2.2 Records Search Results

For the current investigation, a records search performed for a previous study in the same area was used for reference (Daniels and Hale 2011). The records search was conducted at the SCIC and includes a 1-mile radius surrounding the project area. The search involved a review of recorded cultural resources, previous cultural resources survey report boundaries, historic addresses, and a historic maps database.

Previous Studies

Nine previous cultural resource reports have addressed areas within the 1-mile records search buffer area (Table 2). These reports are on file at the SCIC. Three of the previous reports have addressed portions of the APE (Daniels and Hale 2011; Mealey and Shabel 2002; Mooney-Lettieri and Associates 1983).

Table 2. Previous Cultural Resources Reports Addressing the APE and Buffer Area

NADB No.	Authors	Date	Title
1120115	Apple, Stephen A.	1984	Cultural Resource Survey Report and Mitigation, Palm Canyon Estates, Ltd.
1121132	Leonard, Nelson N. III	1977	Cursory Archaeological Evaluation of the Borrego Springs Park Development, Borrego Springs, California.
1122143	Graves Engineering, Inc.	1985	Environmental Impact Report the Roadrunner Club, The Springs at Borrego and a Mini-Mobile Home Park, Borrego Springs CA, EAD Log#84-5-2 Modification to Use Permit #P74-99, P85-094, P85-095.
1122171	Mooney-Lettieri and Associates, Inc.	1983	Extended Initial Study for UEC Solar Energy Project P-83-22, LOG#83-5-1.
1123825	Ultrasystems Incorporated	1981	Borrego Country Club Specific Plan Federated Development Company Draft EIR.
127791	Mealey, Marla, and Karen Shabel	2002	Anza-Borrego Desert State Park Record Search and Site Evaluation.
1130674	Smith, Brian F., and Richard Greene	2007	An Archaeological Assessment of the AMG Borrego 138 Project, San Diego, California.
1131954	Globa, Victor	2008	Borrego Valley Airport, Borrego Springs, California, Section 106 Coordination.
	Daniels, James, and Micah Hale	2011	Archaeological Evaluation of CA-SDI-2366 for the Sol Orchard San Diego 5 LLC Project, Borrego A and B, San Diego County, California.

Previously Recorded Sites

Forty-five previous cultural resources have been previously recorded within a 1-mile radius surrounding the study area (Figure 4 Confidential Appendix A; Table 3). One site, CA-SDI-2366, overlaps the current investigation study area. The site was recorded first by Seidel et al. in 1973 as 20 discrete prehistoric campsites. The site was previously evaluated by Mooney-Lettieri and Associates in September 1983 and recommended as not eligible for listing on the California Register of Historical Resources (CRHR). However, parts of this site were not extensively evaluated. The site was revisited in 2007 by Gallegos and Associates, who were able to locate 13 separate loci of artifacts and hearth features within the original site boundary. The site record was updated again by Mary Robbins-Wade of Affinis, but no changes were noted to the site. ASM revisited the site in 2010. The site was noted as heavily disturbed by previous agricultural practices and a solar energy farm. The site was again evaluated by ASM who concluded the sum of archaeological investigations at the site, including the evaluation by Mooney-Lettieri and Associates (1983), has exhausted the site's data potential and indicated that no significant subsurface cultural deposits are likely to be present. However, the Colorado Desert District Office of the California State Parks completed an inventory of human remains and associated funerary objects in compliance with NAGPRA. The inventory is included in a report prepared by Schneider and Bruce (2007). A recent notice in the Federal Register (2012:19688) reads:

> At an unknown date in the 1970s, human cranial bone fragments representing, at minimum, one individual were removed from site CA-SDI-2366 (Carlburg) located near Clark Dry Lake in Anza Borrego Desert State Park by archaeologist William Seidel. No known individual was identified. No associated funerary objects are present. The age of the human remains is unknown.

As the original site record housed at the SCIC indicates that the identification of the site was made in December of 1973, it is assumed that this is when the remains were collected. ASM staff has contacted both the California Department of Parks and Recreation Capital Office in

Sacrament and the Colorado Desert District office in Borrego Springs where the collection is currently housed in an effort to obtain additional information regarding the collection made by Seidel in 1973 and any additional notes or reports that may have been written. To date, no additional information has been received.

Table 3. Previously Recorded Cultural Resources within a 1-mile Radius of the APE

Designation		Site Type	Report Reference or Recorder
Primary Number (P-37-)	Trinomial (CA-SDI-)		
028164		Isolate: one Salton Brownware potsherd, one obsidian flake	Smith and Green 2007
028165		Isolate: one Salton Brownware potsherd	Smith and Green 2007
028166		Isolate: one Salton Brownware potsherd	Smith and Green 2007
028167		Isolate: one Salton Brownware potsherd	Smith and Green 2007
028168		Isolate: one Salton Brownware potsherd	Smith and Green 2007
028169		Isolate: one Salton Brownware potsherd	Smith and Green 2007
029074		Isolate: one buffware potsherd	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029075		Isolate: one buffware potsherd	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029076		Isolate: one brownware potsherd	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029077		Isolate: one buffware potsherd	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029078		Isolate: one piece of brown chert debitage	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029079		Isolate: one granitic bifacial handstone fragment	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029080		Isolate: two buffware potsherds	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
030542		Isolate: one brownware potsherd	Robbins-Wade 2009
030544		Isolate: one brownware potsherd	Robbins-Wade 2009
030556		Isolate: one buffware potsherd	Robbins-Wade 2009
030562		Isolate: one buffware potsherd	Robbins-Wade 2009
002365	2365	AP2. Lithic scatter; AP11. Hearths/pits	Robbins-Wade 2010; Seidel et al. 1973
002366	2366	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearth/pits; AP15. Habitation debris	Robbins-Wade 2010; Gallegos 2007; Seidel et al. 1973
002367	2367	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearth/pits; AP15. Habitation debris	Seidel et al. 1973
009936	9936	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearth/pits	Apple 1984
009937	9937	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearth/pits; AP15. Habitation debris	Apple 1984
010312	10312	AP3. Ceramic scatter	Apple 1984
028170	18315	AH4. Trash dump	Smith and Greene 2007
028171	18316	AP2. Lithic scatter; AP3. Ceramic scatter; AP15. Habitation debris	Smith and Greene 2007
029083	18622	AP3. Ceramic scatter	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008

Designation		Site Type	Report Reference or Recorder
Primary Number (P-37-)	Trinomial (CA-SDI-)		
029084	18623	AP3. Ceramic scatter; AP15. Habitation debris	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029085	18624	AP3. Ceramic scatter	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029086	18625	AP11. Hearth; AP15. Habitation debris	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029087	18626	AP3. Ceramic scatter	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
029088	18627	AP3. Ceramic scatter; AP15 Habitation debris	L. Piek, B. Williams, B. Linton of Gallegos and Associates 2008
030538	19411	AP3. Ceramic scatter	Robbins-Wade 2009
030539	19412	AP3. Ceramic scatter	Robbins-Wade 2009
030540	19413	AP3. Ceramic scatter and debitage isolate	Robbins-Wade 2009
030543	19415	AP3. Ceramic scatter	Robbins-Wade 2009
030545	19416	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearth; AP15. Habitation debris	Robbins-Wade 2009
030549	19420	AP3. Ceramic scatter	Robbins-Wade 2009
030555	19424	AP2. Lithic scatter; AP3. Ceramic scatter; AP15. Habitation debris	Robbins-Wade 2009
030557	19425	AP3. Ceramic scatter; AP11. Hearth	Robbins-Wade 2009
030558	19426	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearth	Robbins-Wade 2009
030559	19427	AP2. Lithic scatter; AP3. Ceramic scatter; AP15. Habitation debris	Robbins-Wade 2009
030560	19428	AP2. Lithic scatter; AP15. Habitation debris	Robbins-Wade 2009
030563	19429	AP3. Ceramic scatter	Robbins-Wade 2009
030564	19430	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearth; AP15. Habitation debris	Robbins-Wade 2009
030566	19431	AP2. Lithic scatter; AP15. Habitation debris	Robbins-Wade 2009

1.3 APPLICABLE REGULATIONS

Cultural resource regulations that apply to the project area are the County of San Diego RPO, the San Diego County Local Register of Historical Resources (Local Register), CEQA, and provisions for the CRHR.

Historic or archaeological districts, sites, buildings, structures, and objects are assigned significance based on their exceptional value or quality in illustrating or interpreting the heritage of San Diego County in history, architecture, archaeology, engineering, and culture. A number of criteria are used in demonstrating resource importance.

In general, cultural resources that have data of scientific value are recommended as significant and eligible for CRHR listing, based on the application of state criteria for significant resources under CEQA (Public Resources Code [PRC] Section 5024.1, Title 14 CCR, Section 4852). CEQA contains regulations regarding cultural resources as historical resources, unique archaeological sites, and human remains. These provisions assist in assessing the importance of

cultural resources. Section 15064.5 (a) of the CEQA guidelines provides a definition of "Historical Resources." Section 15064.5 (c) contains additional provisions regarding archaeological sites. Sections 15064.5 (d) and (e) contain additional provisions regarding human remains.

Other regulations must also be considered during evaluation of cultural resources. Specifically, the County of San Diego's RPO protects significant cultural resources. The RPO defines "Significant Prehistoric and Historic Sites" in Section 2.

Determining what is an important cultural resource worth preserving is a subjective and interpretive process. Therefore, it is useful to utilize a standard assessment approach to evaluate cultural resources. In order to evaluate cultural resources, a comprehensive assessment must be conducted, including measuring the resource against the above CEQA guideline provisions and criteria established by the CRHR and RPO, as well as assessing the integrity of the resource.

2.0 GUIDELINES FOR DETERMINING SIGNIFICANCE

Determining resource significance is a two-step process. First, the cultural environment must be identified. Then the criteria for determining significance must be applied to the resource. A number of criteria are used in identifying the significance of historical/archaeological resources and are based upon the criteria for inclusion in the San Diego County Local Register. Significance is assigned to districts, sites, buildings, structures, and objects that possess exceptional value or quality to assist in illustrating or interpreting the heritage of San Diego County in history, architecture, archaeology, engineering, and culture.

The fact that a resource is not listed in or determined to be eligible for listing in the CRHR, or is not included in a local register of historical resources (pursuant of Section 5020.1(k) of the PRC), or is not identified in an historical resources survey (meeting the criteria in Section 5024.1(g) of the PRC) does not preclude a lead agency from determining that the resource may be a historical resource as defined in PRC Section 5020.1(j) or 5024.1.

Any site that yields information or has the potential to yield information is considered a significant site. Unless a resource is determined to be "not significant," it will be considered significant for management purposes.

2.1 COUNTY OF SAN DIEGO RESOURCE PROTECTION ORDINANCE (RPO)

The County uses the CRHR criteria to evaluate the significance of cultural resources. In addition, other regulations must be considered during the evaluation of cultural resources. Specifically, the County of San Diego's RPO defines significant prehistoric and historic sites.

The County defines a significant prehistoric or historic site under its RPO as follows:

1. Any prehistoric or historic district, site, interrelated collection of features or artifacts, building, structure, or object either:
   (a) Formally determined eligible or listed in the National Register of Historic Places (NRHP); or
   (b) To which the Historic Resource (H designator) Special Area Regulations have been applied; or
2. One-of-a-kind, locally unique, or regionally unique cultural resources which contain a significant volume and range of data or materials; and
3. Any location of past or current sacred religious or ceremonial observances which is either:
   (a) Protected under Public Law 95-341, the American Religious Freedom Act, or PRC Section 5097.9, such as burials, pictographs, petroglyphs, solstice observatory sites, sacred shrines, religious ground figures, or

(b) Other formally designated and recognized sites which are of ritual, ceremonial, or sacred value to any prehistoric or historic ethnic group.

2.2 SAN DIEGO COUNTY LOCAL REGISTER OF HISTORICAL RESOURCES

The County maintains a Local Register that was modeled after the CRHR. Significance is assigned to districts, sites, buildings, structures, and objects that possess exceptional value or quality illustrating or interpreting the heritage of San Diego County in history, architecture, archaeology, engineering, or culture. Any resource that is significant at the national or state level is by definition significant at the local level. The criteria for eligibility for the Local Register are comparable to the criteria for eligibility for the CRHR and NRHP, but significance is evaluated at the local level. Included are:

(A) Resources associated with events that have made a significant contribution to the broad patterns of California or San Diego County's history and cultural heritage;

(B) Resources associated with the lives of persons important to our past, including the history of San Diego and our communities;

(C) Resources that embody the distinctive characteristics of a type, period, region (San Diego County), or method of construction, or represent the work of an important creative individual, or possesses high artistic values; or.

(D) Resources that have yielded or are likely to yield, information important in prehistory or history.

Districts are significant resources if they are composed of integral parts of the environment that collectively (but not necessarily as individual elements) are exceptional or outstanding examples of prehistory or history.

The County also treats human remains as "highly sensitive." They are considered significant if interred outside a formal cemetery. Avoidance is the preferred treatment.

Under County guidelines for determining significance of cultural and historical resources, any site that yields information or has the potential to yield information is considered a significant site (County of San Diego 2007:16). Unless a resource is determined to be "not significant" based on the criteria for eligibility described above, it will be considered a significant resource. If it is agreed to forego significance testing on cultural sites, the sites will be treated as significant resources and must be preserved through project design (County of San Diego 2007:19).

2.3 CALIFORNIA REGISTER OF HISTORIC RESOURCES AND THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA requires that all private and public activities not specifically exempted be evaluated against the potential for environmental damage, including effects to historical resources. Historical resources are recognized as part of the environment under CEQA, which defines historical resources as "any object, building, structure, site, area, or place that is historically significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California" (Division I, PRC Section 5021.1[b]).

Lead agencies have a responsibility to evaluate historical resources against the CRHR criteria prior to making a finding as to a proposed project's impacts to historical resources. Mitigation of adverse impacts is required if the proposed project will cause substantial adverse change. Substantial adverse change includes demolition, destruction, relocation, or alteration such that the significance of an historical resource would be impaired. While demolition and destruction are fairly obvious significant impacts, it is more difficult to assess when change, alteration, or relocation crosses the threshold of substantial adverse change. The CEQA Guidelines provide that a project that demolishes or alters those physical characteristics of an historical resource that convey its historical significance (i.e., its character-defining features) is considered to materially impair the resource's significance. The CRHR is used in the consideration of historical resources relative to significance for purposes of CEQA. The CRHR includes resources listed in, or formally determined eligible for listing in, the National Register of Historic Places and some California State Landmarks and Points of Historical Interest. Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts), or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be significant resources for purposes of CEQA unless a preponderance of evidence indicates otherwise.

Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the CRHR (PRC Section 5024.1, Title 14 CCR, Section 4852) consisting of the following:

A. It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States; or

B. It is associated with the lives of persons important to local, California, or national history; or

C. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values; or

D. It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

3.0 ANALYSIS OF PROJECT EFFECTS

3.1 METHODS

3.1.1 Survey Methods

Standard transect spacing was 10 m, while methods called for spacing to be reduced to 3 to 5 m within identified archaeological sites in order to adequately define the site character. Transects followed a north-south or east-west orientation depending on the direction of the corridor being surveyed.

Survey forms on the progress, condition, and findings of the survey were completed. These forms included a description of vegetation cover (including contextual photos), as well as estimates of ground surface visibility, rated as poor (0-25 percent), fair (26-50 percent), good (51-75 percent), or excellent (76-100 percent).

In that the primary goal of this survey was to relocate previously recorded sites and inspect the surface for evidence of previously unknown deposits, new sites were not anticipated. Regardless, ASM employs the basic definition of a site as either three or more artifacts, or two artifacts of two different kinds, in a 25-m^2 area. Lower densities of artifacts are considered isolates.

Standard global positioning systems (GPS) aided navigation in the field. Together with hard-copy field maps, GPS receivers were used to keep the field crew aware at all times of the limits of the APE, and areas of different land ownership, and were also used to record the locations of archaeological sites, if discovered, to decimeter-level accuracy. This information was downloaded with the Microsoft ActiveSync program and converted to GIS shape files using Pathfinder software. A GIS specialist created digital maps to accompany the site forms and report. All resources were recorded on appropriate Department of Parks and Recreation (DPR) 523 series site forms, with updates to be submitted to the SCIC.

3.1.2 Native American Participation

The Native American Heritage Commission (NAHC) was contacted for a search of their Sacred Lands Files by Affinis during the initial investigation in 2010 (Robbins-Wade 2010). Letters regarding the project were sent to individuals and groups identified by the NAHC by Affinis. Carmen Lucas of the Kwaaymii Laguna Band of Mission Indians responded with concerns regarding the potential for significant cultural resources within the project area.

During the current investigation, Clint Linton of Red Tail Monitoring and Research Inc. served as the Native American monitor for the survey of the Palm Canyon Drive corridor. Justin Linton of Red Tail Monitoring and Research Inc. served on the Borrego Valley Road access and Gen-tie route survey.

3.2 FIELD RESULTS

Results of the two access road corridors are discussed under separate headings below.

3.2.1 Palm Canyon Drive Access Road Survey

On April 21, 2012, a pedestrian survey of the southern Palm Canyon Drive access road corridor was conducted as part of the offsite improvements for the Desert Green Solar Farm Project. An access road corridor that was originally twice as long as the final design was surveyed (Appendix A, Figure 5) but due to site discoveries, the access road was reduced to half its length to avoid potentially sensitive cultural resources. (The final road alignment is shown in Figures 2, 3a, and 3b). A total of two prehistoric isolates and one previously recorded prehistoric site were noted during the survey, but due to project design changes, these resources are no longer part of the proposed project area. One site was located just outside the former project area, and since it was recorded with the SCIC, it is also included with this report (Figure 5 Confidential Appendix A). The DPR forms for the newly identified resources and the site update for CA-SDI-2366 are located in Confidential Appendix B. A description of each resource is listed below.

Previously Recorded Sites

CA-SDI-2366

This is now entirely avoided and outside of the APE by the elimination of the northern half of the originally designed Palm Canyon Drive access road. Its size and proximity to the project, however, warrants discussion and documentation of the survey results. SDI-2366 was first recorded by Seidel et al. in 1973 as 20 discrete campsites consisting of two projectile points, broken handstones and millingstones, debitage, pottery, burned and unburned bone (including fish vertebrae), and *Olivella* sp. shell. Seidel reported disturbance associated with surface plowing that may have elongated the camping areas. The Colorado Desert District Office of California State Parks completed an inventory of human remains and associated funerary objects housed at their facilities in compliance with NAGPRA. A collection of human cranial fragments recovered by Seidel in 1973 from CA-SDI-2366 was included in this inventory (Federal Register 2012; Schneider and Bruce 2007). The site record on file at the SCIC does not list any human remains, but it does mention that burned and unburned bones were identified at the site. The NAGPRA inventory report by Schneider and Bruce (2007) indicates the remains were positively identified as human by Rose Tyson of the San Diego Museum of Man. To date, no other human remains have been recovered from the site.

The site was subjected to an "extended initial study" by Mooney-Lettieri and Associates for the UEC Solar Energy Project (1983). Mooney-Lettieri and Associates located seven separate loci with 27 separate concentrations of archaeological material within the various loci. Artifacts identified included potsherds, ground stone artifacts, debitage, bone, and a couple of projectile points. Features that were identified included several hearths or roasting ovens, and two rock cairns. Fourteen 1-m-square excavations units and three trenches were excavated at the site. Maximum subsurface deposits identified varied between 20 and 130 cm with an average depth of 50 cm before reaching sterile soil. Although Mooney-Lettieri evaluated the site as having significant research potential, no data recovery program was ever undertaken. The UEC Solar

Energy Project was constructed shortly after this evaluation, but it subsequently became a tilapia fish farm which was abandoned by 1987.

In 2007, Gallegos and Associates conducted a pedestrian survey of the property as part of the SDG&E Sunrise Powerlink project (Gallegos and Associates 2008). The survey was able to locate 13 separate loci of artifacts and features within the original site boundary of CA-SDI-2366. Artifacts noted at this time included 36 buff and brown ware potsherds, two millingstone fragments, one handstone, one handstone fragment, and one hearth feature.

In 2010, A. Giletti, F. Salazar, and M. Robbins-Wade of Affinis submitted a site update for CA-SDI-2366 but it did not report any alterations in the condition of the site as reported by Gallegos in 2007.

In December 2010, the site was revisited by ASM and noted as completely disturbed by the work associated with the previous solar farm, earlier agricultural activity, and modern dumping and off-road vehicle activity. The pedestrian survey resulted in the identification of three blown-out hearth features and 100 discrete artifacts on the surface, including 75 potsherds, 19 ground stone artifacts and fragments, and six pieces of debitage. Three blown-out hearth features, along with seven handstone fragments, one complete handstone, three millingstone fragments, four potsherds, and three pieces of shatter, were identified just south of the previously defined site boundary within the Borrego A parcel. A slight modification to the site boundary was made to include these new discoveries. The survey indicated the loci identified by Gallegos may be better described as small, low-density artifact concentrations.

In August 2011, ASM revisited the site to complete a formal evaluation of the eastern half of the site that was proposed for development. A series of 36 shovel test pits (STPs) and 17 shovel scrape units were excavated across the site. The results of the evaluation led to a recommendation that the site not be considered a significant resource pursuant to the guidelines of the County RPO, the CRHR, and CEQA. Significant subsurface cultural deposits were reportedly not likely to be present and the site's data potential had been exhausted (Daniels and Hale 2011).

During the current investigation, a small portion of the site was observed intersecting the formerly identified project APE, while it is now outside of the APE. As this site was updated for this project, the information is still presented below and still has relevance for this project. The several artifacts located during the survey were just outside of former 100-foot survey buffer of the east/west trending access and utility corridor (Figure 6 Confidential Appendix A). These artifacts were located within or near the boundaries of Locus VI as defined by Mooney-Lettieri and Associates (1983). The artifacts identified during the survey included three pieces of Lower Colorado Buff Ware, four ground stone fragments, one piece of cryptocrystalline shatter, and several fragmented pieces of fire affected rock (FAR).

The density and variability of artifacts associated with CA-SDI-2366 and the identification of human remains associated with the site suggest that at one time that this cultural resource would have been considered significant, but the integrity of the site has been drastically impacted by modern disturbance. The site has also been surveyed multiple times and evaluated twice and has

been found to lack the potential to provide any additional information important to the prehistory of the region, making it not eligible for listing in the CRHR based on Criterion D. Evaluation of the site under Criterion A was considered because of the reported past presence of human remains at the site, but the only evidence of human remains are the four pieces of cranial fragments housed at the Colorado Desert District Office of California State Parks that were collected by Seidal in 1973 from an unknown provenience. No additional human remains were recovered from the site during subsequent investigations. For these reasons, the site cannot be considered significant under Criterion A. While the site is important, as all sites are considered important by the County, the site is not recommended eligible based on the evidence from numerous surveys and evaluations and the overall integrity of the site that has been compromised by extensive disturbance. Reduction of impacts to this site to a level of less than significant can be achieved by an archaeological grading monitoring mitigation which could help prevent significant impacts to any unanticipated discoveries associated with the site.

Newly Recorded Sites and Isolates

CA-SDI-20,690

This small ceramic concentration is located on the western slope of a low dune encircled by the dirt road associated with a nearby commercial rock plant (Figure 7 Confidential Appendix A). The site was encountered during the survey of the south/north trending corridor beginning at Palm Canyon Drive. The site is located just outside of the defined survey boundary that includes the 100-foot buffer around the centerline of the access road. Since the site was immediately to the east of the buffer, it was examined and recorded in order to assess potential impacts to this resource. The site consists of a relatively small yet fairly dense concentration of pot sherds. The site is approximately 28.5 m north/south x 17 m east/west and consists of over 50 potsherds, one ground stone fragment, and multiple fragments of FAR. The artifacts appear to be eroding out of the side of the dune (Figure 8).

While the current project is unlikely to impact the site, the implementation of an archaeological monitoring program will prevent possible impacts during the construction of the access and utility corridor due to the site's close proximity to the APE.

P-37-032643

At the start of the survey of the north/south trending corridor alongside Borrego Springs Road, just south of the existing Borrego Springs Substation, a single Lower Colorado Buff Ware pot sherd was encountered (Figure 9). The sherd is located within the currently proposed APE of offsite improvements. No other artifacts were located within the immediate vicinity of the isolate. The location of the isolate is approximately 288 m northwest of the previously defined boundary of CA-SDI-2366.

The currently proposed project will directly impact the isolate; however, cultural resource isolates are not considered significant and do not require any additional evaluation efforts.

Figure 8. Eastern facing overview of CA-SDI-20,690 on the western slope of a low rise sand dune.

Figure 9. Isolate Lower Colorado Buff Ware pot sherd located just south of the Borrego Springs substation.

P-37-032645

This prehistoric isolate consists of two small potsherds of indeterminate type less than 1 m apart located just north of an existing dirt road. The isolate was located within the 100-foot survey buffer but outside of the current project APE. The isolate was encountered during the survey of the east/west trending portion going from the southwest corner of the proposed solar facility development area to Borrego Springs Road.

The currently proposed project will not directly impact the isolate; no further work is recommended.

3.2.2 Borrego Valley Road Access and Gen-tie Route

On February 7, 2013 an intensive systematic survey was conducted of the northern access corridor, the Borrego Valley Road access and Gen-tie route (see Figures 3a, 3b, Figure 10). A previously recorded and tested site, CA-SDI-19,431, was relocated and three newly recorded sites were discovered, including a small prehistoric temporary camp with lithics, ceramics, and animal bone (DG-02), a prehistoric ceramic pot drop (DG-03), and a historic trash dump (DG-01). The site location maps appear in Appendix A (Figure 11) and DPR site forms for each site appear in Appendix B. Each site is described below.

Figure 10. Overview of the western portion of Borrego Valley Road access and Gen-tie route survey area, view east with SDG&E Borrego Substation to the right.

Previously Recorded Sites

CA-SDI-19,431

This site was originally discovered in May 2009 by Affinis for the proposed Borrego Solar Project in Section 35 (Robins-Wade 2010). A small "scatter" of lithics (n=2), mano fragments (n=2), and fire affected rock were distributed over a 10-x-10-m area. A testing phase in September 2009 increased the site size to 18-x-55 m and increased the artifact inventory to I hammerstone, 3 lithics, 3 mano fragments, 1 milling stone fragment, and 9 pieces of animal bone. Three shovel test pits (STPs) were excavated across the site, one being placed in one of the three fire affected rock concentrations. All the tests subsurface tests were negative. The site was therefore evaluated as not significant.

Surveyors relocated this site and noted a small amount of cultural material which was not collected during the 2009 STP testing (Figure 12). Two additional ground stone fragments were recorded as well as a small concentration of bone (faunal remains) that did not have any characteristics similar to human remains. The site dimensions did not change due to this site relocation.

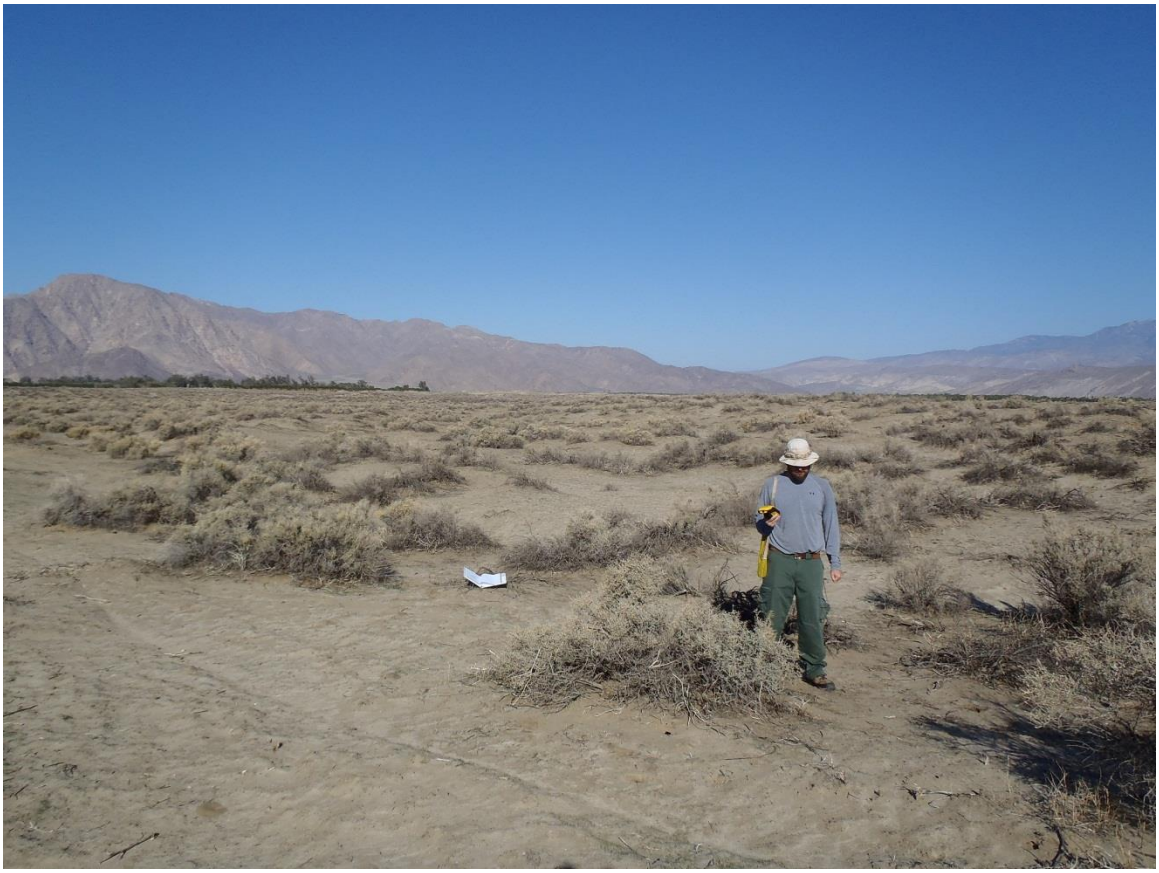

Figure 12. Overview of site SDI-19,431 looking northwest. Surveyor is standing at the recorded location of the site datum.

Newly Recorded Sites

DG-1

This site consists of a mid-twentieth century historic trash dump and trash scatter, as well as a secondary target shooting site. The site covers a 30-x-60-m area. There are two concentrations (A & B) with a surrounding scatter of artifacts. Concentration A is a can dump and concentration B (Figure 13) is a glass bottle shatter scatter, the result of target shooting. The artifact assemblage includes 50+ cans (flat and cone top beverage, condensed milk, sanitary food, and fish/meat tins) and both clear and brown bottle glass that has been heavily fragments from being used for target practice. From that activity, the site included a discarded (10-round) 45 caliber 1911 handgun magazine, 45 caliber bullet casings, and 45 caliber slugs. The target shooting appears to have been relatively recent, but with use of some older weaponry.

DG-2

This site consists of a small diffuse quartz lithic (n=25) and ceramic artifact scatter (n=3) in a 26-x-38-m area. There are also animal bones, some of which are burned. One tool is the tip of a clear quartz biface (Figure 14). The artifact numbers are small but the diversity of items and presence of food remains qualify it to be defined as a small temporary camp.

DG-3

This small ceramic scatter or "pot drop" contains eight buff ware sherds over a 5-x-7-m area. A vehicle turned around through the center of the scatter, leaving deep tracks although not otherwise destroying site (Figure 15).

Figure 13. Site DG-1, historic trash and target shooting scatter, view north.

Figure 14. Quartz biface tip from site DG-2

Figure 15. Site DG-3 pot drop, view northwest.

4.0 INTERPRETATION OF RESOURCE IMPORTANCE AND IMPACT IDENTIFICATION

4.1 RESOURCE IMPORTANCE

The investigation of the proposed offsite access and utility corridors for the Borrego Springs Desert Green Project resulted in the location of two previously recorded and evaluated sites, CA-SDI-2366 and SDI-19,431, four newly encountered sites, CA-SDI-20,690, DG-1, DG-2, and DG-3, and two new isolates, P-37-032643 and Borrgeo-ASM-04.

CA-SDI-2366 has previously been formally evaluated in 2009 and did not meet the criteria to be considered eligible for listing in the CRHR or the Local Register due to poor integrity. However, based on a statement in the Affinis (Robbins-Wade 2010) report, relating to CA-SDI-2366, "human remains were identified at this site during a review of the collection in conjunction with NAGPRA". Based on this statement, additional research was conducted by ASM for the current study related to human remains. A collection of artifacts procured by archaeologist William Seidel housed at the Colorado Desert District Office, California State Parks, was inventoried in compliance with the Native American Graves and Repatriation Act (NAGPRA) (Federal Register 2012; Schneider and Bruce 2007). A collection of human cranial fragments recovered by Seidel in 1973 from CA-SDI-2366 was included in this inventory (Federal Register 2012; Schneider and Bruce 2007). Because human remains have been previously identified at the site and the number and variety of artifacts recorded associated with the site is relatively large, the site may have once had significant research potential. However, the integrity of the site has been radically compromised as a result of modern disturbances and no additional human remains were located during subsequent field studies within the boundaries of the site and thus is not recommended for protection under County RPO.

CA-SDI-19,431 also had been previously evaluated for listing in the CRHR with surface collection of artifacts and excavation of three STPs in 2009 (Robbins-Wade 2010). The test units were negative and the limited number of surface artifacts resulted in an evaluation that the site was not eligible for CRHR-listing or Local Register-listing. The new survey 2013 survey found the area largely devoid of artifacts except for two additional ground stone fragments and a small concentration of animal bone. These artifacts likely became exposed due to shifting sand or had been left during the previous evaluation. The fact that no more artifacts were exposed since 2009 adds evidence that no buried subsurface component of any significance exists at the site.

The newly encountered site, CA-SDI-20,690 (Borrego-ASM-03), would require a formal evaluation effort to determine if the site should be recommended as eligible for listing in the CRHR, the Local Register, or protection under the County RPO. Based on the archaeological materials visible on the site surface and examined during the current investigation, the site is not likely to possess information important to the understanding of the prehistory of the region. The data potential for the site appears to be low. Nevertheless, the site boundaries are just outside of the survey area for the Palm Canyon Drive off-site access road improvement and no direct impacts are projected.

Newly recorded site DG-01 is a historic trash scatter with a mix of materials from the early and middle nineteenth century. Previous impacts include use of the bottles and cans for target shooting. The original trash scatter represents off-road trash dumping from an unidentifiable source so that historic context is impossible to establish, such as a specific historic household or cultural pattern. The trash scatter therefore lacks any appreciable historical or research value because of poor integrity and lack of historic context. The southern boundary of the site lies adjacent to the northern boundary of the Borrego Valley Road access and Gen-tie improvements.

Newly recorded site DG-02 is a small prehistoric temporary camp that includes lithic debris, ceramics, a quartz projectile point tip, and food remains consisting of burnt and unburnt animal bone. Testing would be required to establish its eligibility for listing in the CRHR or Local Register, although the limited spatial extent and surface artifact assemblage suggest it may not be eligible. Some additional artifacts are likely to occur within the soft shifting sand deposits of this environment although subsurface features are unlikely. Nevertheless, the off-site access road and Gen-tie improvements will remain approximately 100 ft. south of the site boundaries and no impacts are therefore projected. Absent formal evaluation, in situ preservation through avoidance is recommended

Newly recorded site DG-03 is a very small ceramic scatter or pot-drop. Additional sherds are likely to occur in below the surface in the general vicinity. Vehicular impacts have occurred to the pot drop but these do not diminish what research value it may contain although the limited artifact quantity and lack of artifact type variability indicate limited research value in any case. The site will remain about 60 ft. from the access road and Gen-tie improvements and therefore no direct impacts are projected. Absent formal evaluation, in situ preservation through avoidance is recommended.

The two isolates recorded during the current investigation, P-37-032643 and P-37-032645, are not considered eligible for listing in the CRHR or the Local Register, are not considered important under County Guidelines, and are not significant under the County RPO.

4.2 IMPACT IDENTIFICATION

Direct impacts will occur at CA-SDI-19,431 due to the construction of the Borrego Valley Road access and Gen-tie improvements (Figure 16 Confidential Appendix A). These impacts are not significant, however, because previous testing has shown the site to be ineligible for listing in the CRHR or Local Register. Monitoring is still be advisable when ground disturbance occurs in this area.

Although the Borrego Valley Road access and Gen-tie improvements will be adjacent to the historic trash scatter at DG-01, the site is not significant and therefore no significant impacts will occur. The access road and Gen-tie corridor is 100 ft. and 60 ft. south of sites DG-02, and DG-03, respectively, and impacts will therefore be avoided. Project design and management during construction should be formulated to avoid accidental or indirect impacts.

Two of the cultural resources (P-37-032643; P-37-032645) encountered during the current investigation will be directly impacted by the proposed construction of the offsite improvements associated with the Borrego Springs Desert Green project. Isolates P-37-032643 and P-37-032645 are by County definition not significant resources. Archaeological and Native American monitors are recommended for construction in the vicinity of CA-SDI-2366.

CA-SDI-2366 and the newly encountered CA-SDI-20,690 are not within the currently proposed APE and will not incur any direct impacts from the proposed improvements. However, an archaeological monitor is still recommended due to the proximity of each of these sites to the project APE.

5.0 MANAGEMENT CONSIDERATIONS – MITIGATION MEASURES AND DESIGN CONSIDERATIONS

5.1 UNAVOIDABLE IMPACTS

5.1.1 Mitigation Measures and Design Considerations

There are no unavoidable impacts associated with the current project design.

5.2 MITIGABLE IMPACTS

5.2.1 Mitigation Measures and Design Considerations

Previously recorded site CA-SDI-2366 is recommended as not eligible for listing in the CRHR but is considered an important resource (County of San Diego 2007a). The previous archaeological constituents of the site suggest the site may have at one time been a significant resources but its integrity has been severely compromised since it was first recorded and tested. While human remains were recovered from the site in 1973, no recent evidence suggests that the site contains any additional burials or cremations. Therefore, data recovery is not necessary. However, an archaeological monitoring plan established for work within 50 feet of the site boundary will ensure any impacts to the site are reduced to less than significant.

While sites CA-SDI-20,690, DB-02, and DG-03 are not within the current APE, an archaeological monitor should be present during construction in the area to prevent any unforeseen indirect impacts to the site.

Although CA-SDI-19,431 has been previously evaluated as not important, direct impacts will occur and a monitor is recommended during construction in this area.

5.3 EFFECTS FOUND NOT TO BE SIGNIFICANT

The prehistoric site, CA-SDI-19,431, the historic site, DG-1 and the two isolates encountered during the survey, P-37-032643 and P-37-032645, are not important resources under the County of San Diego guidelines for determining significance (County of San Diego 2007a), nor are they eligible to the CRHR or the Local Register, or significant under the County RPO. The proposed project design will not result in significant effects in impacting these cultural resources.

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James T. Daniels, Jr. (ASM Affiliates, Inc.): Served as Principal Investigator, Field Director, and author of the technical report.

Clint Linton (Red Tail Monitoring and Research, Inc.): Served as the Native American monitor during the field work.

8.0 MITIGATION MEASURES AND DESIGN CONSIDERATIONS

A grading monitoring plan including a Native American and an archaeological monitor should be established for the currently proposed offsite developments associated with the Borrego Springs Desert Green project in the event of unanticipated archaeological discoveries during project construction (Table 4). CA-SDI-2366 and CA-SDI-20,690 are located immediately outside of the project area. Additionally, CA-SDI-2366 contains sensitive archaeological remains. Therefore, monitoring is recommended during grading for both sites.

Table 4 Recommended Mitigation Measures

Site Designation	Site Attributes	Mitigation Measure
CA-SDI-2366	AP2. Lithic scatter; AP3. Ceramic scatter; AP11. Hearths/pits; AP15. Habitation debris	Grading monitoring by Archaeologist and Native American monitors
CA-SDI-20,690	AP3. Ceramic scatter; AP15. Habitation debris	Grading monitoring by Archaeologist and Native American monitors

APPENDICES

(PROVIDED SEPARATELY)

APPENDIX A

Confidential Figures

APPENDIX B

DPR Forms